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The University of Minnesota

AGRICULTURAL EXPERIMENT STATION

REPORT OF PROGRESS OF WORK
AND
GUIDE TO EXPERIMENTAL PLOTS
NORTH CENTRAL EXPERIMENT STATION
GRAND RAPIDS

UNIVERSITY OF MINNESOTA
DOCUMENTS

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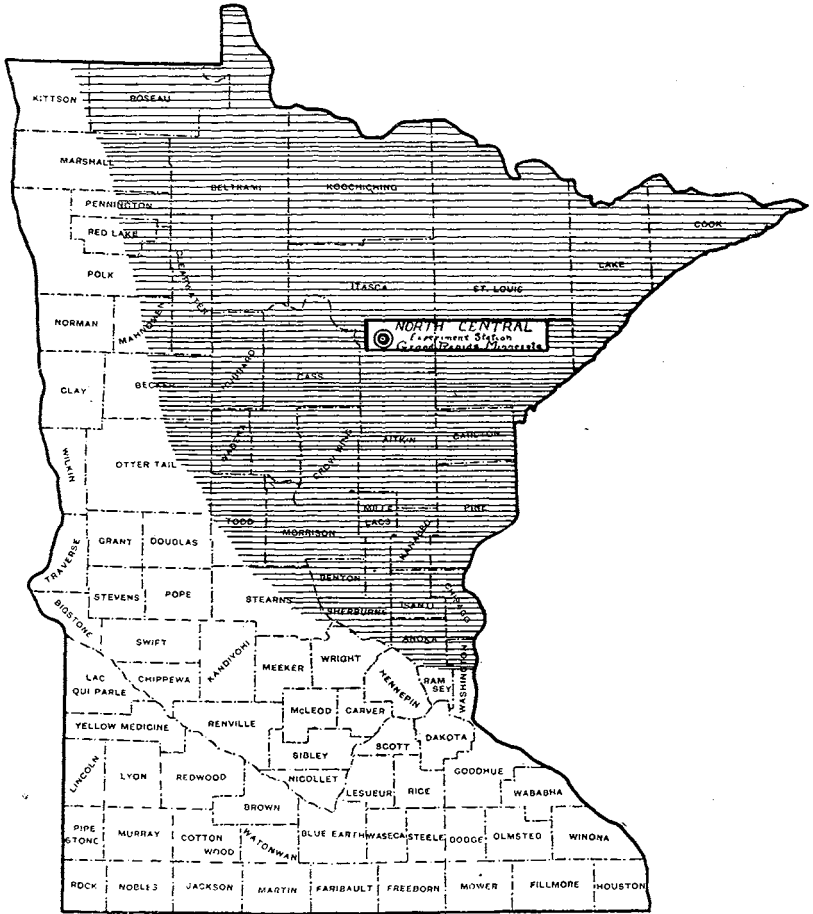


Fig. 1. Grand Rapids, in the Center of the Stump Land Region

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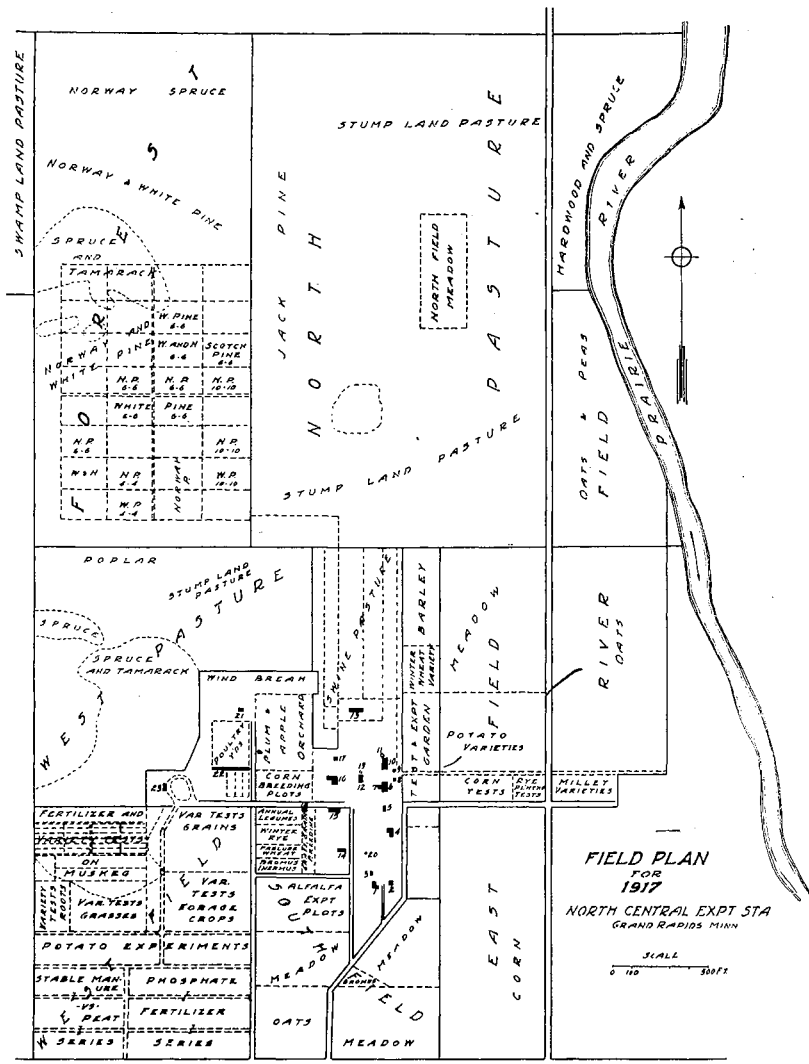


Fig. 2. Field Plans for 1917

REPORT OF NORTH CENTRAL EXPERIMENT STATION, GRAND RAPIDS

INTRODUCTION

The North Central Experiment Station was established in 1896 in compliance with an act of the state legislature passed in 1895. The land selected lies two miles east of the village of Grand Rapids on LaPrairie River, in the very center of the stump-land region which covers two fifths of the area of the state. This Station was known as the Northeast Experiment Station until 1913 when it became the North Central Experiment Station, as a Station was established at Duluth that year.

The Station lands comprise an area of 454.6 acres, of which approximately 140 acres have been cleared. The remainder includes roughly 200 acres of stump-land pasture, 100 of timber, and 15 in the farmstead, including orchard, cattle yards, and poultry runs. Part of these lands were donated and part of them leased by the County of Itasca with a provision that they must be used for experimental purposes.

The purpose of this bulletin is to meet the need of a guide to the experimental projects now under way, and to report the progress of the work in the various projects. No definite conclusions are drawn, as the projects have been started within the last two or three years. As the work on the different experiments is concluded, the results will be published.

It is hoped that this bulletin will be an aid to the numerous visitors who come to study the experiments under way for information which will help them meet the problems on their farms. The public is welcome at all times. First-hand information by a visit to this Station during the growing season is of greatest value. An annual summer visiting day has therefore been instituted to encourage farmers to come to the Station at a time when such information can best be obtained. The date of the visiting day is announced through the press each year.

EXPERIMENTAL PROJECTS

Weather records

Complete meteorological records, both on the campus and on the muskeg bog.

Small grain investigations

Subproject, *Wheat variety tests.*

Subproject, *Oats variety tests.*

Subproject, *Barley variety tests.*

Subproject, *Millet variety tests.*

Potato investigations

Subproject, *Rate of planting.*

Study of effect upon yield, quality, and time of ripening from different thicknesses of planting.

Subproject, *Size of seed.*

Subproject, *Mature vs. immature tubers for seed.*

Subproject, *Early vs. late planting.*

Subproject, *Selected vs. bin-run tubers for seed.*

Subproject, *Variety tests.*

Corn experiments

Subproject, *Selection for local adaptations.*

Ear to row selections.

Subproject, *Variety tests.*

With special reference to value for ensilage and for hogging-off.

Subproject, *Rate of planting.*

Study of effect on value for grain and for ensilage of hill vs. drill seeding.

Investigations with grasses

Subproject, *Grasses and clover variety tests.*

Tests of varieties for hay, on both upland and muskeg land; also securing material for improvement by selection and artificial fertilization.

Subproject, *Alfalfa variety tests.*

Subproject, *Alfalfa inoculation tests.*

Tests of culture and soil inoculation.

Subproject, *Nurse crop vs. no nurse crop for alfalfa.*

Subproject, *Methods of seeding alfalfa.*

A comparison of planting in drills 18 inches apart vs. 6 inches apart.

Fertilizer experiments

Subproject, *Phosphate fertilizer experiment.*

Comparing acid phosphate with rock phosphate as a fertilizer on upland soil.

Subproject, *Fertilizer treatment on muskeg.*

Commercial fertilizers used singly and in combination on muskeg for grasses and grain.

Subproject, *Raw rock vs. stable manure as a fertilizer for upland soil.*

Subproject, *Raw rock vs. stable manure as a fertilizer for upland soil.*

Comparing raw peat with stable manure on upland soil, applied in varying quantities from 5 to 40 tons per acre.

Subproject, *Fertilizers on muskeg for garden crops.*

Various commercial fertilizers and manure on muskeg for garden crops.

Garden crop investigations

Subproject, *Variety tests.* Tests of various garden crops on both upland and muskeg.

Subproject, *Fertilizers for garden crops on muskeg.*

Orchard (tree fruit) experiments

Subproject, *Plum variety tests.*

Subproject, *Crab-apple variety tests.*

Subproject, *Apple variety tests.*

Subproject, *Lime vs. no lime for tree fruits.*

Subproject, *Manure vs. no manure for tree fruits.*

Subproject, *Dynamited vs. spade-dug holes for planting.*

Comparing growth of trees in holes that have been loosened by dynamiting, and those in spade-dug holes.

Forestry investigations

Subproject, *Comparative growth of different kinds of pines for woodlots and windbreaks.*

Management of dairy herd

Subproject, *Breeding for type and production.*

A study of the effect on a herd of dairy cows of using purebred Guernsey sires.

Subproject, *Dairy cattle feeding.*

A comparison of bran vs. middlings as a concentrate with clover and timothy hay and corn silage.

Poultry breeds

Subproject, *A comparison of the various breeds of poultry when kept for profit under uniform conditions of food and care.*

Subproject, *Comparing various types of poultry houses for winter laying.*

Peat for barn litter

Subproject, *To study the various methods of preparing peat for barn litter, both as to expense and the value of same.*

Water levels on tiled muskeg land

Subproject, *To study the effect of tiling muskeg lands on the water levels.*

SEASON OF 1916

The spring of 1916 was later than usual and conditions were unfavorable for planting field crops, owing to excessive moisture; however the spring was favorable for setting out trees, shrubbery, and all kinds of plants, and was especially so for pastures and meadows.

July was especially favorable for corn, but very unfavorable for grains, the excessive heat and high humidity causing serious damage from leaf and stem rusts. August and September were cold and wet, very unfavorable for the maturing of crops, especially corn, and delayed all field work.

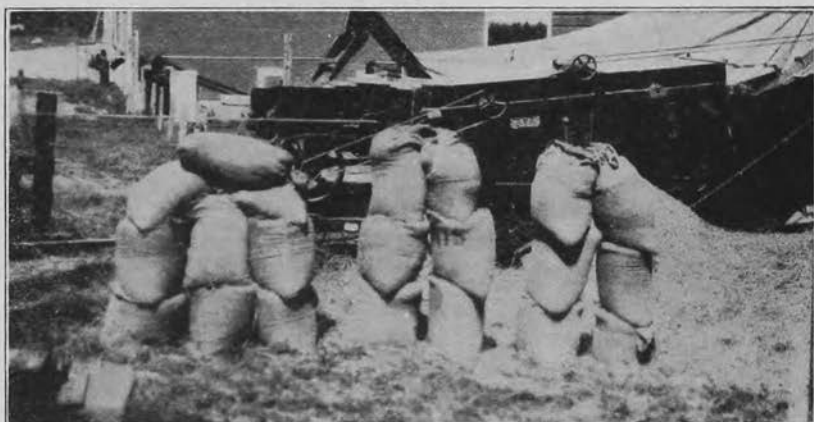


Fig. 3. Yield of Winter Rye (Minn. No. 2)

From left to right: Rye sown Sept. 1—yield, 31.3 bushels per acre.
 Rye sown Sept. 15—yield, 26.1 bushels per acre.
 Rye sown Oct. 1—yield, 23.0 bushels per acre.

WEATHER RECORDS

Tables I to IV, inclusive, give the monthly summary of temperature records, and the daily precipitation for 1915 and 1916, Table V a comparison of the maximum and minimum temperatures on upland with those on muskeg during the growing season of 1916. The last killing spring frost on the upland occurred June 5; and the last on the muskeg, June 21. The first killing frost in the fall on the upland occurred September 2, on the muskeg, August 13. The

frosts on the muskeg were also much more severe than those on the upland. For instance, on the upland the temperature June 5 was 31 degrees, while on the muskeg freezing temperatures occurred during June as follows; June 5, 30 degrees; June 20, 29 degrees; and June 21, 28 degrees. There were no frosts in July on either the upland or muskeg. No injury occurred on the upland during August, but on the muskeg, killing frosts occurred on the 13th as well as on the 30th, thus showing that summer frosts are much more prevalent on peat lands than on mineral soil (upland), which is an important factor to be considered when planning a cropping system on muskeg lands.

TABLE I
MONTHLY SUMMARY OF WEATHER RECORDS, 1915

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, degrees.....	15.8	29.9	36.8	62.6	62.6	67	75	77	69	56	36	24	44.09
Mean minimum temperature, degrees.....	-6.7	7.1	12.5	35.6	35.5	45	49	46	43	31	18	7	26.91
Mean temperature, degrees.....	4.5	18.5	24.6	49.2	49.0	56	62	61	56	44	27	16	38.98
Maximum temperature, degrees*.....	39.0	40.0	49.0	77.0	80.0	83	88	90	86	71	57	38	90.0
Minimum temperature, degrees†.....	-47.0	-17.0	-13.0	17.0	21.0	27	38	30	30	20	-3	-15	-47.0
Days clear.....	17	12	19	19	15	10	14	15	16	12	8	7	164
Days partly cloudy.....	6	2	3	9	6	11	10	13	3	9	2	8	82
Days cloudy.....	8	14	9	2	10	9	7	3	11	10	20	16	119
Days with 0.01 inch or more precipitation.....	5	6	4	9	11	16	15	7	11	3	3	6	86
Precipitation, inches.....	0.48	0.58	0.16	0.94	3.75	7.78	3.02	2.1	1.71	2.78	1.53	0.48	25.31
Snowfall, inches.....	9.3	6.2	0.7	.....	0.8	.....	.....	.....	.....	T.	0.5	3.9	21.4

*Maximum occurred August 14.

†Minimum occurred January 28.

TABLE II
MONTHLY SUMMARY OF WEATHER RECORDS, 1916

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Tot'l	Av.
Mean maximum temperature, degrees.....	11.6	19.3	32.8	50.0	61.3	71.4	87.4	78.9	65.7	50.8	36.6	14.0	.....	48.3
Mean minimum temperature, degrees.....	-18.4	-12.6	2.1	26.2	38.3	45.7	58.6	52.9	41.3	30.6	16.6	-9.4	.....	22.7
Mean temperature, degrees.....	-3.4	3.2	17.4	38.1	49.8	58.5	73.0	65.9	53.5	40.7	26.6	2.3	.....	35.5
Maximum temperature, degrees.....	32.0	46.0	60.0	67.0	77.0	82.0	97.0	95.0	83.0	73.0	67.0	43.0	.....	97.0
Minimum temperature, degrees.....	-46.0	-38.0	-35.0	0.0	26.0	31.0	45.0	32.5	22.0	13.0	-6.0	-34.0	.....	-46.0
Days clear.....	11.0	11.0	10.0	13.0	7.0	10.0	18.0	17.0	13.0	12.0	11.0	17.0	150	12.5
Days partly cloudy.....	8	10	10	6	12	9	11	5	12	9	12	5	109	9.1
Days cloudy.....	12	8	11	11	12	11	2	9	5	10	7	9	107	8.9
Days with 0.01 inch or more precipitation.....	10	5	9	10	15	17	10	18	23	15	5	10	147	12.3
Precipitation, inches.....	1.66	0.24	1.38	3.52	3.8	3.87	1.89	4.22	2.87	1.8	0.16	0.76	26.17	2.18
Snowfall, inches.....	15.95	4.6	12.5	5.0	0.75	.....	.....	.....	.....	5.0	12.0	8.5	54.30	6.79

YEARLY SUMMARY—TEMPERATURE

Maximum.....	97.0	July 19 and 29
Minimum.....	-46.0	January 14
Mean maximum.....	48.3	
Mean minimum.....	24.3	
Mean.....	36.3	

TABLE III
DAILY RAINFALL AND MELTED SNOW, 1915

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total Year
1	In. 0.03	In.	In.	In.	In.	In.	In. 0.14	In.	In.	In. T.	In.	In.	In.
2					T.		0.24	0.04					
3					0.65		0.39						
4		0.09			0.16		0.15	0.01		2.01			
5		0.03	T.		0.04	1.44				T.			
6	0.01				0.43		T.			0.05			
7	T.				0.08	0.52				0.48		0.08	
8				0.23	0.05	0.22	0.17	0.11			0.90	0.02	
9				0.01		0.18	0.06	0.07					
10					0.05	0.30		T.		T.			
11				T.		0.22			0.01		0.55		
12						1.80			0.35				
13		0.03							0.01				
14	T.	0.25	0.01			0.17	0.15		0.29				
15	T.	0.11	0.01	0.11	1.65	0.53	T.	0.04	0.04				
16	0.30				0.50	0.01	T.		T.				
17					0.06	0.06				0.24		0.09	
18		T.	0.05	0.09		T.	1.04	T.	0.08	T.			
19	0.12						0.01		T.	T.	0.08		
20		T.	T.						0.06	T.			
21					0.08		0.01		0.04				
22		0.07					0.13		T.				
23				0.05		0.51	0.04	1.44				0.19	
24			0.09	0.13		T.	0.04	T.					
25	0.02			0.06		0.33		T.	0.10				
26				0.06		0.71			0.14			0.07	
27				0.20		0.53	0.40		T.				
28				T.		T.	0.03		T.				
29								0.39	0.52			0.03	
30						0.25	0.06	T.	0.07				
31													
Total.....	0.48	0.58	0.16	0.94	3.75	7.78	3.02	2.1	1.71	2.78	1.53	0.48	25.31
Daily average....	0.015	0.021	0.005	0.031	0.121	0.259	0.097	0.068	0.045	0.089	0.051	0.015	0.069
Days cloudy....	8	14	9	2	10	9	7	3	11	10	20	16	119
Days pt. cloudy.	6	2	3	9	6	11	10	13	3	9	2	8	82
Days clear.....	17	12	19	19	15	10	14	15	16	12	8	7	164



Fig. 4. Gathering Heads of Rod-Row Winter Wheat for Threshing

TABLE IV
DAILY RAINFALL AND MELTED SNOW, 1916

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
1				0.02	0.01	0.12	0.03						
2	0.37				0.01	0.04		0.03		0.29			
3								0.02	0.04	0.02			
4			0.02			0.11		0.40	0.04	0.21			
5	0.03							T.	0.12	0.01			
6			0.26					0.53	0.03	T.			
7		0.01	0.33				0.08	0.01	0.28				0.10
8		0.03	0.01	0.02	0.53	0.23		0.01	0.02	0.01			0.13
9					T.	0.17			0.01	0.01			0.01
10	0.18					0.04	0.04	0.38	0.01		0.04		
11		0.09	0.1		0.10			0.02	0.33		T.		
12		T.	T.	0.57					0.01	0.10			0.03
13			T.	0.13		0.29			0.35	0.25			
14			0.08		0.19	0.02			1.23		0.02	T.	
15					0.97	0.28			0.01		0.02	0.06	
16				0.23	0.27	0.26	0.01		0.01	0.34		0.04	
17				0.30	0.06	0.02		0.23	0.01			T.	
18		T.			0.03			0.12	0.01	0.01			
19					0.13		0.06	0.03	T.			0.02	
20	0.07			0.65	0.03					0.43			
21	0.01			0.93				1.00	0.02				
22				0.25	0.77			1.02	0.22	0.04			
23					0.22	0.67	0.53		0.02	0.03			
24			0.32		0.03	0.05			0.01		T.		
25			0.05		T.	0.02	0.01	0.18	0.01	T.		0.01	
26	0.02	0.06			0.45	0.30	0.66	0.04				0.21	
27	0.31				T.	T.	0.05	0.10	0.02	0.04		0.15	
28	0.29	0.05							0.05		0.03	T.	
29	0.28	T.		0.42		1.22			0.01		0.05	T.	
30	0.10					0.03	0.40	0.01	T.		T.		
31			0.21				0.02	0.09		0.01			
Total	1.66	0.24	1.38	3.52	3.80	3.87	1.89	4.22	2.87	1.80	0.16	0.76	26.17
Daily average	0.054	0.008	0.045	0.117	0.123	0.129	0.061	0.136	0.096	0.058	0.005	0.025	0.07
Days cloudy	12	8	11	11	12	11	2	9	5	10	7	9	107
Days pt. cloudy	8	10	10	6	12	9	11	5	12	9	12	5	109
Days clear	11	11	10	13	7	10	18	17	13	12	11	17	150



Fig. 5. Rod-Row Winter Wheat Plots After Sowing in Fall

VARIETY TESTS OF FIELD CROPS

The variety tests on field crops were started in 1915, and cover too short a period for drawing definite conclusions. However, the tables give information of value besides indicating the progress of the work.

TABLE V

COMPARISON OF DAILY MAXIMUM AND MINIMUM TEMPERATURES ON UPLAND AND MUSKEG, 1916

Day	May				June				July				August				September				October			
	Upland		Muskeg		Upland		Muskeg		Upland		Muskeg		Upland		Muskeg		Upland		Muskeg		Upland		Muskeg	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1.	42	30	37	29	77	53	75	54	71	53	71	51	83	53	85	46	76	49	76	49	63	36	64	36
2.	41	26	39	26	72	45	72	45	87	52	87	49	87	62	87	60	69	29*	64	25	70	47	71	48
3.	54	29	50	27	69	46	66	40	87	55	86	52	90	54	90	51	69	48	73	43	67	44	68	38
4.	57	39	56	36	73	48	71	48	82	53	81	53	95	64	97	64	83	57	84	58	73	49	74	50
5.	67	34	65	31	65	31*	64	30*	85	62	85	61	85	55	87	50	75	55	76	55	58	32	59	32
6.	77	44	76	42	73	41	72	42	90	60	89	58	81	60	83	59	76	47	77	46	52	28	52	25
7.	69	43	68	43	70	46	67	44	94	64	95	64	88	64	89	64	63	53	64	53	66	42	67	36
8.	76	41	75	43	69	50	70	50	89	58	89	58	81	67	80	44	72	41	72	36	52	37	52	36
9.	59	40	58	40	70	46	69	45	80	47	83	44	88	57	90	52	79	52	79	46	50	24	50	18
10.	66	44	64	45	68	39	67	38	85	63	85	64	86	62	87	63	77	60	78	60	43	20	44	16
11.	58	38	57	36	79	42	76	39	89	67	90	64	78	44	78	39	63	48	64	45	56	31	56	25
12.	53	28	51	26	82	53	82	50	87	55	87	51	66	41	66	36	71	52	70	50	62	42	61	43
13.	58	33	56	30	78	52	77	51	88	55	88	53	67	32*	72	29*	61	41	60	36	63	31	64	29
14.	57	39	56	40	74	51	73	48	92	53	93	53	73	40	73	37	74	44	75	44	57	38	58	39
15.	49	33	50	38	72	40	69	53	90	62	90	59	87	49	87	43	41	28	41	26*	52	36	52	34
16.	46	31	46	30	67	47	66	44	90	61	96	60	91	65	92	64	52	31	51	31*	51	13	51	10
17.	42	33	42	32	69	45	65	44	94	61	92	64	82	68	84	65	54	22	54	19*	37	23	36	23
18.	49	34	48	32	62	45	60	42	91	64	92	64	94	71	95	72	64	38	65	36	39	30	40	28
19.	55	33	52	30	69	35	67	31*	67	66	95	66	88	59	89	59	78	49	79	40	33	27	33	28
20.	62	40	61	37	69	33	68	29*	83	49	83	44	88	59	89	59	78	49	79	40	33	27	33	28
21.	75	39	72	37	71	33	71	28*	89	59	87	52	75	54	73	52	74	45	73	46	37	19	34	4
22.	71	39	72	37	71	33	71	28*	89	59	87	52	75	54	73	52	74	45	73	46	37	19	34	4
23.	60	44	60	44	73	46	72	42	92	60	89	56	75	51	75	45	56	26	54	23*	38	16	38	12
24.	68	41	66	38	70	49	69	49	91	45	88	43	82	54	83	57	60	36	62	32	38	20	45	17
25.	75	48	73	48	68	42	66	39	83	56	87	53	71	50	71	46	75	45	80	43	45	28	46	28
26.	71	50	70	50	74	53	74	53	67	57	68	56	66	39	66	34	76	48	77	42	37	20	36	18
27.	73	50	72	44	77	43	74	39	84	63	84	63	60	38	65	34	70	35	70	32	41	27	41	28
28.	69	44	68	38	81	56	77	55	95	67	95	66	70	42	70	34	57	32	57	32	47	33	43	31
29.	68	41	69	39	71	57	71	56	97	73	96	72	78	52	78	52	48	23	48	18*	44	33	44	32
30.	-74	40	71	38	70	56	70	56	95	68	96	67	68	33	68	30*	57	32	44	26	42	26	42	24
31.	73	42	70	43	.....	.....	.....	.....	78	53	78	49	71	55	72	55	.....	.....	.....	.....	49	30	49	30
Mean	61.3	38.3	59.8	37.1	71.4	45.7	70	44.4	87.4	58.6	87.2	56.7	78.9	52.9	79.7	49.7	65.7	41.3	66	38.8	50.8	30.6	51	28
Mean	49.8	.....	48.4	.....	58.5	.....	57.2	.....	73	.....	72	.....	65.9	.....	64.7	.....	53.5	.....	52.4	.....	40.7	.....	39.5	.....
Av. daily range	22.9	.....	22.4	.....	25.7	.....	25.6	.....	28.4	.....	30.6	.....	26.0	.....	30.0	.....	24.4	.....	27.0	.....	20.1	.....	23.0	.....
Maximum	77	.....	76	.....	82	.....	82	.....	97	.....	96	.....	95	.....	97	.....	83	.....	84	.....	73	.....	74	.....
Minimum	26	.....	26	.....	31	.....	29	.....	45	.....	43	.....	32	.....	29	.....	23	.....	18	.....	13	.....	4	.....
Frosts	5	.....	10	.....	1	.....	4	.....	0	.....	0	.....	1	.....	2	.....	9	.....	11	.....	18	.....	22	.....

*Frost.

The variety tests include the following: Wheat, 12 varieties; oats, 12; barley, 10; field peas, 8; winter rye, 2; winter wheat, 7, besides many included in our rod-row tests for hardiness; grasses and legumes, 12; alfalfa, 7; corn, 20; and potatoes, 53, including the eight varieties recommended by the Minnesota Potato Growers' Association.

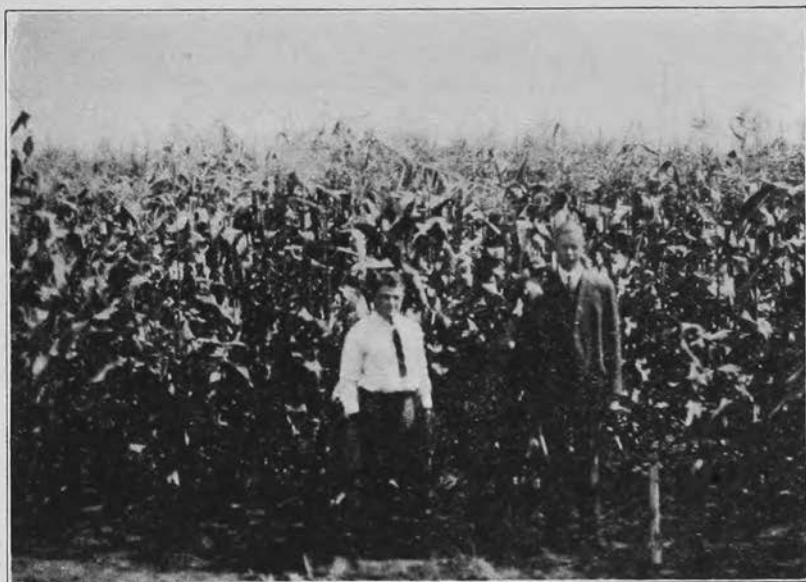


Fig. 6. Field of Minnesota No. 13 Corn

This variety has given best results for ensilage, and in normal seasons ripens sufficiently or seed.

SPRING GRAINS

TABLE VI

VARIETY TEST OF SPRING WHEAT, 1915-1916

Variety	Days to mature		Average length of straw		Per cent lodged		Per cent rusted		Yield per acre		Average yield per acre	Actual weight per bushel	
	1915	1916	1915	1916	1915	1916	1915	1916	1915	1916	1915-16	1915	1916
Prelude.....	112	73	In.	In.	0.0	0	15	40	Bu.	Bu.	Bu.	Lbs.	Lbs.
Marquis.....	123	81	41	35.5	0.0	0	15	90	30.6	9.2	19.9	59.0	53.0
Red Fife.....	128	84	44	40.5	0.0	0	15	90	30.5	4.5	17.5	54.5	41.0
Minn. No. 163...	130	84	46	40.5	2.5	0	15	90	24.3	1.5	12.9	50.5	37.0
Powers Fife.....	130	84	50	40.5	2.0	0	13	73	27.3	2.7	15.0	52.0	37.0
White Fife.....	130	84	46	35.5	1.5	0	10	90	21.6	3.2	12.4	52.0	41.0
Red Chaff.....	130	85	48	33.5	0.5	0	13	90	22.8	2.5	12.6	51.0	40.5
Haynes Bluestem	131	86	47	35.5	1.0	0	13	90	28.5	4.5	16.5	50.0	41.0
Hyde.....	128	84	50	36.0	1.5	0	8	73	30.3	3.0	16.6	53.5	38.0
Minn. No. 951...	133	89	47	39.0	2.0	0	13	73	24.6	3.2	13.9	53.5	46.0
Kubanka.....	133	89	51	41.0	1.0	0	5	50	27.4	10.0	18.7	53.0	60.0
Alaska.....	133	89	54	41.5	20.0	0	5	40	25.1	5.5	15.3	49.0	53.5
Alaska.....	133	89	55	45.0	0.5	0	20	55	20.8	3.0	11.9	47.0	49.0

MILLING TESTS

Milling tests have been made from four varieties of wheat of the 1915 crop. These are: Minnesota No. 169, Bluestem; Powers Five; Marquis; and Prelude. Prelude is a new variety from Ottawa, Canada, and gives promise as an early spring wheat, its yield and quality being above the average of the varieties under test.

TABLE VII

RESULTS OF TESTS FOR MILLING QUALITIES, SPRING WHEATS 1915 CROP

Variety	Total flour	Expansi- meter test	Loaf volume	Water used	Color score	Moisture	Crude protein
	Per cent	Cc.	Cc.	Per cent		Per cent	Per cent
Minn. No. 169....	70.3	910	1,510	59.1	98	12.28	9.93
Marquis.....	68.8	800	1,420	59.5	99	11.55	10.61
Prelude.....	72.7	930	1,580	63.5	100	10.40	12.31
Powers Five.....	59.4	670	1,340	64.0	97	8.14	11.06

TABLE VIII

VARIETY TEST OF OATS, 1915-1916

Variety	Days to mature		Average length of straw		Per cent lodged		Per cent rusted		Yield per acre		Average yield per acre	Actual weight per bushel	
	1915	1916	1915	1916	1915	1916	1915	1916	1915	1916	1915-16	1915	1916
			In.	In.					Bu.	Bu.	Bu.	Lbs.	Lbs.
Ped. Lincoln....	121	83	52	36.0	5.0	0.0	4	10	95.6	46.6	71.1	39.0	38.0
White Russian...	125	86	53	36.0	1.0	0.0	3	3	100.0	57.8	78.9	35.5	31.0
Banner.....	125	86	51	38.0	0.0	0.0	3	3	97.9	61.2	79.5	34.0	28.5
Abundance.....	127	86	51	42.0	0.0	0.0	4	5	83.9	52.2	68.0	31.0	26.5
New Market....	124	84	53	37.0	4.0	7.5	6	5	88.6	57.5	73.0	36.5	36.0
Golden Beauty..	125	85	52	38.0	2.5	10.0	6	5	86.8	57.5	72.1	34.0	33.0
Swedish Select..	125	83	51	42.0	2.5	15.0	7	10	79.6	50.6	65.1	37.5	36.0
Danish Island..	126	84	52	41.0	0.0	0.0	6	3	84.4	56.9	70.6	33.0	32.0
Minn. No. 295...	126	84	53	36.0	0.0	0.0	7	5	87.0	52.2	69.6	32.0	36.0
Trifolium.....	121	84	50	36.0	2.5	25.0	7	10	91.7	40.9	66.3	37.0	37.3
Kherson.....	112	74	40	34.5	0.0	0.0	2	0	106.3	61.9	84.1	34.5	32.5
Sixty-day.....	112	73	41	33.0	0.0	0.0	2	0	110.6	40.0	75.3	34.5	31.0

TABLE IX

VARIETY TEST OF BARLEY, 1915-1916

Variety	Days to mature		Average length of straw		Per cent lodged		Per cent rusted		Yield per acre		Average yield per acre	Actual weight per bushel	
	1915	1916	1915	1916	1915	1916	1915	1916	1915	1916	1915-16	1915	1916
			In.	In.					Bu.	Bu.	Bu.	Lbs.	Lbs.
Blue Ribbon....	106	67	46	27	1.0	0	3	3	62.0	16.25	39.1	44.0	43.0
Oderbrucker....	107	69	49	33	0	0	3	3	54.6	11.7	33.2	44.0	44.0
Odessa.....	107	68	41	31	0	0	3	5	63.3	13.5	38.4	45.5	44.5
O. A. C. No. 21..	106	69	45	31	2.5	0	3	3	63.9	12.1	38.0	44.5	43.5
Houston Golden Queen.....	106	69	47	36	7.5	0	4	3	58.1	12.7	35.4	45.0	42.0
Manchuria.....	106	68	41	36	13.5	0	3	2	61.7	13.7	37.7	47.5	44.5
Champion of Ver- mont.....	113	77	45	30	10.0	0	10	10	55.6	12.9	34.3	50.0	46.0
Austrian Hannah	114	76	46	32	0	0	5	5	47.7	21.8	34.8	49.0	48.5
Svanhals.....	111	77	43	30	0	0	5	5	43.1	15.2	29.2	47.0	43.5
Swedish Chevalier	114	79	44	28	0	0	10	10	36.2	12.9	24.6	47.0	42.0

WINTER GRAINS

The work with winter grains shows that winter rye suffers less winter-killing than winter wheat, and that both crops can be recommended for this section of the state. Winter wheats have given larger yields on the average than spring wheats. The study of the time of planting winter rye, Table XII, shows that early planting is advisable, that is, rye should be planted about the first of September rather than later. A good practice in planting winter grain is to use a one-horse disk drill and plant between the rows in the corn field. The planting can then be done at any time.

TABLE X
VARIETY TEST OF WINTER WHEAT, 1916 *

Variety	Minn. No.	Date mature	Winter injury	Height	Lodged	Rusted	Yield	Weight
				In.			per acre	per bushel
Odessa.....	1471	July 31	Per cent	7.0	43		Bu.	Lbs.
Bearded Pife.....	550	July 30		20.0	34		20.7	52.0
Ghirka.....	1473	July 31		17.0	37	Lodged..	10.6	
Alberta Red Turkey.....	1483	July 31		18.0	36		20.2	59.0
N. K. & Co. Turkey.....	1488	July 30		16.0	38		20.1	59.5
Cos. Turkey.....	1487	July 30		21.0	38		16.2	53.0
Kharkov.....	1474	July 30		29.0	37		20.2	59.0
Padui.....	1491	July 31		4.0	42		17.1	58.0
Jones Longberry.....	1478	July 31		17.0	44	Badly rusted...	19.4	54.5
Big Frame.....	1481	July 30		10.0	39	Badly lodged	21.0	45.0
Malakoff.....	1479	July 30		9.0	38		19.7	50.5
Craile Fife.....	845	July 30		6.0	39		26.0	59.0
Turkey Russian.....	1506	July 31		0.6	39		22.3	56.0
Turkey Russian.....	1507	July 30		6.0	40		19.6	54.5
Turkey Russian.....	1493	July 31		8.0	44	Nearly half..	26.8	59.5
Turkey Russian.....	1505	July 31		6.0	44	Badly rusted...	23.9	54.0
Russian Turkey.....	1497	July 30		6.0	45	Lodged..	18.8	54.0
Russian Turkey.....	1498	July 30		13.0	47		25.1	57.0
Russian Turkey.....	1508	July 30		25.0	42		17.3	53.0
Russian Turkey.....	1509	July 30		18.0	35		18.4	56.0
Russian Turkey.....	1486	July 30		16.0	42		18.1	57.5
Russian Turkey.....	1495	July 31		14.0	41	Immature, rusted...	17.1	56.0
Russian Turkey.....	1494	July 30		22.0	39		16.1	54.0
Turkey.....	1484	July 30		6.0	44		19.5	54.5
P. Henderson.....	1500	July 30		6.0	43		17.5	52.5
Ghirka, Turkey.....	1499	July 30		4.0	42		26.0	59.0
Turkey, Kharkov.....	1510	July 30		10.0	40	Lodged..	24.1	56.0
Turkey, Bearded.....	1503	July 31		7.0	43		23.4	58.0
Turkey, check rows.....	529	July 30		16.0	40		24.7	53.5
							20.9	56.0

* Seeded September 15-16, 1915.

TABLE XI
VARIETY TEST OF WINTER GRAINS, 1916 *

Variety	Winter-killing	Yield
	Per cent	per acre
Winter wheat:		Bu.
Ped. 408 Kharkoff.....	5	26.0
Bonanza.....	5	24.9
Wis. Ped. No. 21.....	5	24.7
World's Champion.....	5	19.8
Turkey Red.....	0	17.9
Marvelous.....	5	11.3
Egyptian Amber.....	0	11.0
Winter rye:		
Wisconsin No. 2.....	0	41.4

* Sown 1915.

TABLE XII
TIME OF SEEDING WINTER RYE

Variety	Date planted	Winter-killing	Date ripe	Yield per acre
Minnesota No. 2.....	Sept. 1, 1915	0	July 31, 1916	Bu. 31.3
Minnesota No. 2.....	Sept. 15, 1915	0	Aug. 2, 1916	26.1
Minnesota No. 2.....	Oct. 1, 1915	0	Aug. 2, 1916	23.0

VARIETY TEST OF CORN

From the results of the variety tests of corn, Minnesota No. 13 can be recommended as one of the best for either ensilage or fodder. Under favorable conditions, this variety may be ripened sufficiently for seed in this locality. For ear corn or hogging-off, earlier varieties should be used. Minnesota No. 23 and early flint corn are recommended.



Fig. 7. Variety Test Fields of Oats

TABLE XIII
VARIETY TESTS OF CORN, 1916

Variety	Date planted	Date tasseling	Amount suckering	Height		Size of stalks	Total yield per acre green weight
				Ft.	In.		
Minnesota No. 13.....	June 12	Aug. 15	Very few..	7	— 1	Medium...	Tons 12.0
South Dakota Pride.....	June 12	Aug. 8	Some.....	6	— 0	Small.....	9.4
R. I. White Cap.....	June 12	Aug. 13	Very many	6	— 0	Medium...	11.8
Skiddoo.....	June 12	Aug. 8	Very few..	6	— 0	Medium...	4.8
Hybrid.....	June 12	Aug. 18	Very few..	7	— 7	Large.....	10.2
Washington.....	June 12	Aug. 14	Very many	6	— 0	Small.....	5.6
Windus.....	June 12	Aug. 10	Very few..	6	— 0	Medium...	5.8
Longfellow.....	June 12	Aug. 15	Very many	7	— 0	Large.....	10.0
N. W. Dent.....	June 12	Aug. 10	Some.....	5	— 6	Medium...	4.0
Malcolm.....	June 12	Aug. 4	Very many	3	— 10	Very small	3.0
Thayers Yellow.....	June 12	Aug. 13	Few.....	5	— 10	Medium...	4.4
Swadley.....	June 12	Aug. 16	Very few..	6	— 4	Medium...	6.8
Calico.....	June 12	Aug. 20	Very few..	6	— 0	Medium...	6.2
King Phillip.....	June 12	Aug. 16	Very many	5	— 5	Small.....	8.6
Merser.....	June 12	Aug. 14	Very many	5	— 10	Very small	5.0
E. Can. Yellow.....	June 12	Aug. 10	Many.....	6	— 3	Small.....	9.8
Davis Flint.....	June 12	Aug. 15	Many.....	6	— 8	Small.....	10.2
Bovina Flint.....	June 12	Aug. 13	Some.....	6	— 0	Medium...	3.4
R. I. A. Flint.....	June 12	Aug. 13	Many.....	5	— 0	Small.....	6.6
Red Dent.....	June 12	Aug. 7	Few.....	4	— 10	Small.....	1.2

TABLE XIV
VARIETY TEST OF FIELD PEAS, 1916

Variety	Yield of hay	Yield of grain
	per acre	per acre
	Tons	Bu.
Wisconsin No. 508.....	2.2	30.5
Green No. 208.....	1.9	25.8
Green Canada.....	2.4	24.6
Green No. 108.....	1.5	18.6
Ped. Marrowfat.....	1.5	18.3
Bengata.....	1.2	14.3
Yellow Canada.....	1.7	14.3
Arthur.....	1.7	14.3

VARIETY TESTS OF GRASSES AND LEGUMES
ON UPLAND, 1916

TABLE XV
YIELD OF HAY IN ONE CUTTING, AVERAGE OF DUPLICATE PLOTS

	Tons per acre
Western rye grass.....	2.25
Bromus inermis.....	2.05
Orchard grass.....	1.15
English bluegrass.....	2.50
English rye grass.....	0.58*
Italian rye grass.....	0.75*
Medium red clover.....	2.55
Mammoth clover.....	3.8
Alsike clover.....	2.2
Sweet clover.....	Poor stand, very weedy
Sanfoin clover.....	Poor stand, very weedy
Bokhara clover.....	Poor stand, very weedy

* Winter killed.

VARIETY TEST OF POTATOES

The variety test of potatoes, Table XVI, shows a surprising variation in yields. This should not be attributed solely to the difference in variety, as the condition of the seed used was probably an important factor. The seed of many of the varieties was shipped in. Those grown from local seed stock invariably gave larger yields. Green Mountain (Carman No. 1) can be recommended as a late market variety. The size-of-seed test indicates that the yield diminished directly with the size of the seed piece used, that is, whole potatoes gave the largest yield, and halves second. Besides the variety test, tests on mature versus immature tubers for seed, early versus late planting, and various rates of planting have been begun, also a comparison of potatoes grown on muskeg with potatoes grown on upland, for seed purposes.

TABLE XVI
TEST OF SIZE OF SEED AND VARIETIES OF POTATOES

Kind of seed	Yield per acre	Yield of marketable potatoes per acre	Percentage of marketable potatoes
	Bu.	Bu.	
Green Mountain			
Whole tuber.....	336.1	294.0	86.9
Half tuber.....	272.7	240.1	88.0
Quarter tuber.....	232.7	205.8	88.4
Ordinary cut.....	258.9	224.8	86.7

VARIETY TEST			
Variety			
Early:			
Irish Cobbler.....	89.0	75.9	85.3
Early Six Weeks.....	175.6	156.0	88.9
Early Rose.....	192.7	85.7	89.0
Early Ohio.....	189.4	171.5	80.5
Bliss Triumph.....	178.8	147.0	82.2
Late:			
Green Mountain.....	258.9	224.8	86.7
Rural New Yorker.....	169.0	151.0	89.3
Burbank.....	169.0	149.2	82.5

TABLE XVII
VARIETY TESTS OF POTATOES

Variety	Average yield per hill	Total yield per acre	Yield per acre over 1½ inches	Percentage marketable
	Ounces	Bu.	Bu.	
Peach Blow.....	42.2	426.0	349.3	82.0
British Queen.....	41.0	412.4	351.3	85.2
Green Mountain.....	41.0	411.5	393.1	95.4
Early Harvest.....	35.5	358.7	334.6	93.3
Beauty of Hebron.....	35.0	353.4	294.4	83.3
National.....	28.0	282.3	250.0	88.2
Snowflake Jr.....	25.5	258.1	228.4	88.9
Burpee's Extra Early.....	25.0	252.5	64.4	25.5
Superlative.....	25.0	252.4	229.9	91.1
Satisfaction.....	24.0	240.3	204.7	85.2
Clyde.....	22.4	225.8	205.9	91.2
Minn. No. 1.....	22.0	220.4	119.4	54.2
Minn. No. 2.....	21.2	213.9	163.8	76.6
Early Norwood.....	20.7	208.5	150.3	72.1
Snow.....	19.7	199.5	122.7	61.5
Early Petosky.....	19.5	196.9	168.3	85.5
Early Six Weeks.....	19.0	189.6	158.7	83.7
Vermont Gold Coin.....	18.4	185.7	160.1	85.5
Early Vermont.....	17.5	177.0	125.4	70.9
Up-to-date.....	15.6	157.8	119.1	75.5
Early Bird.....	15.2	154.1	103.8	67.4
Happy Medium.....	15.0	150.4	133.1	88.5
American Wonder.....	14.1	143.5	79.5	55.4
Rural New Yorker.....	13.8	139.7	123.9	87.0
Cal. Russet.....	13.6	138.5	101.6	73.4
E. W. Rose.....	13.3	134.4	80.6	60.0
Admiral Dewey.....	13.2	132.5	90.2	68.1
Burbank.....	13.1	132.3	107.4	81.2
Peerless Jr.....	13.0	130.8	87.7	67.1
Burbank Russet.....	12.3	124.5	87.6	70.4
Sir Walter Raleigh.....	11.5	116.5	51.6	54.6
White Ohio.....	11.4	115.5	91.6	79.3
Ohio Junior.....	11.7	106.5	89.0	83.6
White Chief.....	10.1	101.8	77.8	76.4
Uncle Sam.....	9.6	97.4	70.0	71.9
Ohio Extra Early.....	8.8	89.3	65.5	73.5
E. W. Albino.....	8.8	88.3	53.0	60.0
Borce.....	8.2	82.5	38.4	46.6

TABLE XVII—Continued
 VARIETY TEST OF POTATOES

Variety	Average yield per hill	Total yield per acre	Yield per acre over 1½ inches	Percentage marketable
	Ounces	Bu.	Bu.	
Pingree.....	8.0	80.3	66.7	83.1
Early Ohio.....	6.0	77.4	57.2	73.0
Delaware.....	7.2	73.4	41.9	57.1
Burbank Seedling.....	7.1	71.7	44.4	61.9
Norcross.....	6.5	64.9	54.6	84.2
White Elephant.....	5.7	57.6	26.5	46.1
Late Petosky.....	5.6	57.3	44.7	78.1
Minn. No. 5.....	5.2	52.0	28.6	55.1
World's Wonder.....	5.1	51.8	41.8	80.0
White Star.....	4.3	43.6	21.8	50.0
New Queen.....	3.0	30.7	13.6	44.4
Carman Seedling.....	2.5	25.0	1.7	17.1
Early Michigan.....	2.1	21.3	7.3	36.3
Early Northern.....	1.5	15.3	5.7	37.5
Early Market.....	0.8	8.0		



Fig. 8. First Cutting of Alfalfa, 1916

ALFALFA PROJECT

The alfalfa project was begun 1915, and includes variety tests, inoculation versus no inoculation, lime versus no lime, and alfalfa seeded with and without a nurse crop.

All varieties came through the winter of 1915-16 with very little winter injury, being well protected by the deep snow. The results were quite satisfactory on areas seeded both with and without a nurse crop. The condition of the plants indicated that inoculation is necessary, tho a fair yield was obtained even where the alfalfa was not inoculated. The plants, however, showed signs of weakness, the leaves being light green and yellow, as against dark green where inoculation with soil from an old alfalfa field was practiced. The following varieties appear to be superior: Grimm and Imp. Turk-

estan. The Northwest Experiment Station seed is very likely of the Minnesota Grimm variety. Table XVIII shows the effect of treatment on different varieties.

TABLE XVIII
YIELDS OF ALFALFA HAY
First Cutting July 7, 1916

Plot	Variety	No nurse crop	Nurse crop, barley cut for grain	Nurse crop, barley cut green	Average of plot
		Lbs.	Lbs.	Lbs.	Lbs.
1	Grimm.....	5,028.6	5,333.3	4,800.0	5,054.0
2	Disco No. 52.....	2,514.3	1,066.6	2,800.0	2,127.0
3	Turkestan.....	2,971.4	2,666.6	3,600.0	3,079.3
4	Imp. N. K. & Co.....	2,971.4	3,733.3	3,200.0	3,301.8
5	N. W. Exp. Sta.....	4,114.3	4,800.0	4,400.0	4,438.1
6	Dakota.....	2,285.7	2,666.6	4,400.0	3,117.3
7	Disco No. 28—S. Dak.....	3,200.0	2,666.6	4,000.0	3,288.9
8	Kansas.....	3,200.0	3,200.0	3,200.0	3,200.0
9	Montana.....	3,200.0	3,200.0	3,600.0	3,333.3
10	Turkestan (In.).....	3,200.0	3,200.0	3,200.0	3,200.0
11	Grimm.....	3,771.4	3,200.0	4,800.0	3,923.8
12	Disco No. 52.....	2,514.3	1,600.0	4,000.0	2,704.8
Average, all varieties.....		3,247.6	3,111.1	3,833.3	3,397.6

Average of all varieties inoculated with soil, no nurse crop 4,600.0
Average of all varieties inoculated with soil, barley nurse crop 3,133.3

Plot	Variety	No nurse crop	Nurse crop, barley cut for grain	Nurse crop, barley cut green	Average of plot
		Lbs.	Lbs.	Lbs.	Lbs.
13	Turkestan, no treatment.....	3,291.4	1,920	4,720	3,310.5
14	Turkestan, limed 2,000 lbs. per A.....	2,834.2	1,920	4,000	2,918.1
15	Turkestan, limed 2,000 lbs. per A, seed treated with Govt. bacteria culture.....	3,748.6	3,840	4,560	4,049.5
16	Turkestan, seed treated with bacteria culture.....	3,200	3,840	2,800	3,280.0
Average yield, all plots.....		3,268.6	2,880	4,020	3,389.5

Average of all plots, no nurse crop, soil inoculation 5,120.0
Average of all plots, barley nurse crop, soil inoculation 3,520.0

TABLE XIX
YIELD OF ALFALFA HAY BY VARIETIES
First cutting July 7, second cutting August 2, and total yields per acre, 1916

Variety	Yield per acre		
	First cutting	Second cutting	Total
	Lbs.	Lbs.	Lbs.
Grimm.....	5,054.0	2,050.0	7,104.0
Disco No. 52.....	2,127.0	2,200.0	4,327.0
Turkestan.....	3,079.3	2,250.0	5,329.3
Imp. Northrup King & Co.....	3,301.8	1,850.0	5,151.8
N. W. Experiment Station.....	4,438.1	2,750.0	7,188.1
Dakota.....	3,117.3	2,750.0	5,867.3
Disco No. 28, South Dakota.....	3,288.9	2,100.0	5,388.9
Kansas.....	3,200.0	2,850.0	6,050.0
Montana.....	3,333.3	1,950.0	5,283.3
Turkestan (Inoculated).....	3,200.0	2,800.0	6,000.0
Grimm.....	3,923.8	2,700.0	6,623.8
Disco No. 52.....	2,704.0	2,300.0	5,004.0
Average, all varieties.....	3,397.3	2,379.2	5,776.4

16 rds.			
Turkestan Rows-18" apart 4# Seed per acre	19	Brush and Grass	
Turkestan - Rows 18" apart - 8# Per acre		18	
Turkestan - Rows 18" apart - 12# per acre		17	
Turkestan Treated Seed		16	
Turkestan Lime-2000* per acre Treated Seed		15	
Turkestan Lime 2000* per acre		14	
x 2 1/2 rds.	Turkestan No Treatment		13
	Disco N°32		12
	Grimm		11
	Turkestan (Treated Seed)		10
	Montana		9
	Kansas		8
	Disco N°285.D.		7
	Dakota		6
	Northwest Expt Station.		5
	Imp. N. K. & Co		4
Turkestan		3	
Disco N°52		2	
1 rd.	Minnesota Grimm		1

Nurse crop of
barley 1915. Inoc-
ulated soil, appli-
ed fall of 1916

Inoculated Soil
Applied in spring
1915

No nurse crop
1915. Inoculated
soil, applied
fall of 1916

Fig. 9. Plan of Alfalfa Project

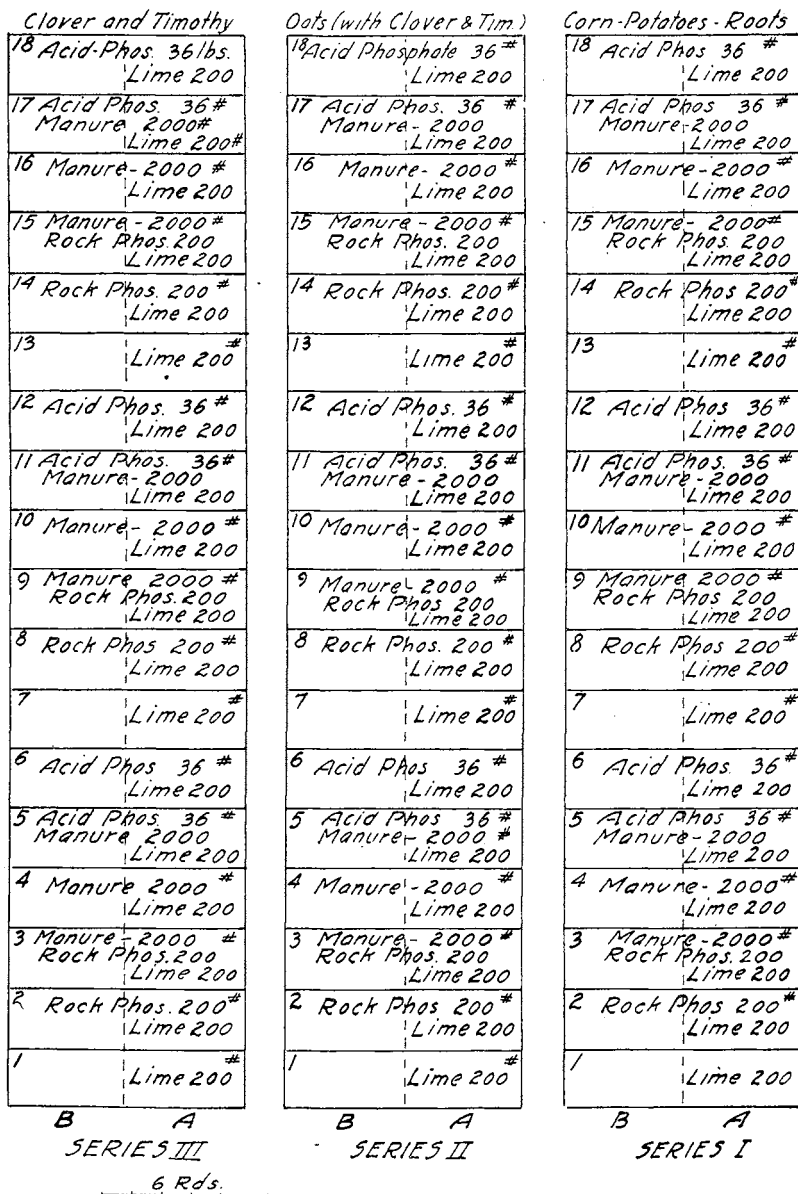


Fig. 10. Plan of Phosphate Fertilizer Project on Upland
 The north half of each series, A, received lime, 200 pounds per plot; the south half, no lime.

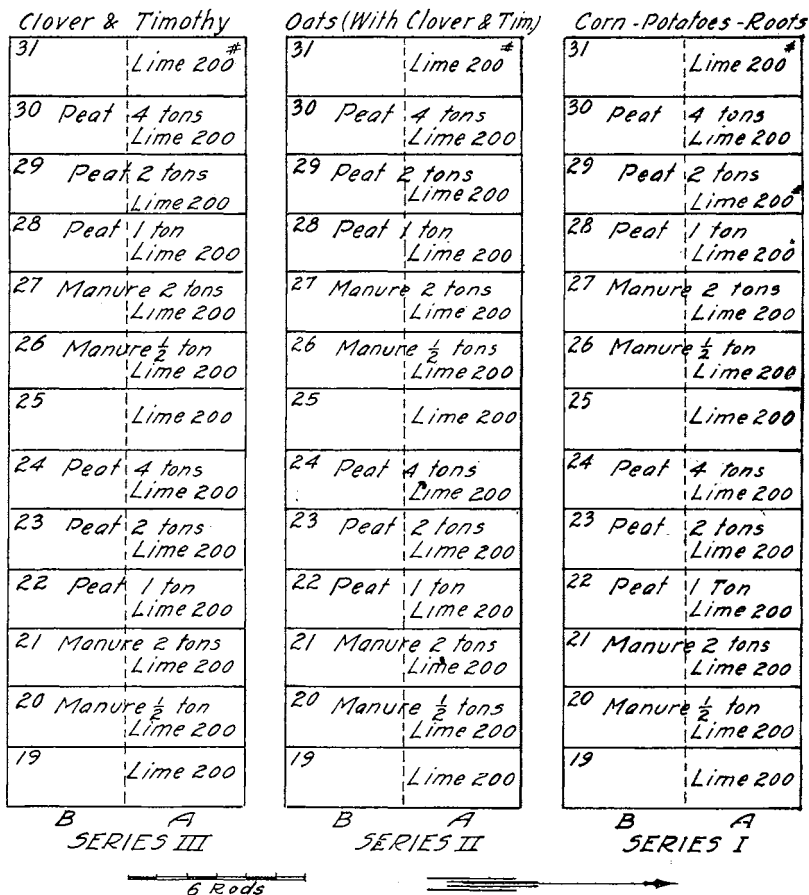


Fig. 11. Plan of Peat vs. Barnyard Manure Project on Upland Soil
 The north half of each series, A, received lime, 200 pounds per plot; the south half, no lime.

FERTILIZER EXPERIMENTS

The fertilizer projects include projects on both upland and muskeg; and cover both field and truck crops. So far no marked improvement in crop yields is shown from any fertilizer except barnyard manure on upland soil. However, the projects have not been continued long enough for any definite conclusions.

On muskeg, liming shows marked beneficial results on practically all crops, grains, grasses, and vegetables. See Tables XXII to XXXV. The effect of lime on the stand of grasses, legumes, and weeds is very striking. The fertilizer treatments on muskeg, including those on variety grasses, rate of application, and effect of lime on native muskeg vegetation, have not been run long enough to give any results.

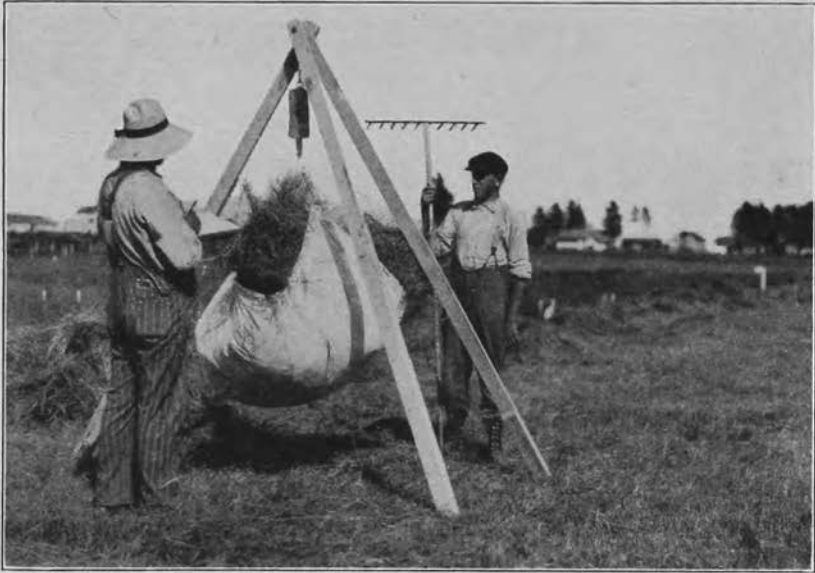


Fig. 12. Weighing Hay From 1 / 100-Acre Plots on Muskeg



Fig. 13. Timothy and Clover Meadow on Muskeg
Note the good stand on the left where lime was used.

The test of vegetables on muskeg shows more marked beneficial results from fertilizer treatment on deep peat than on shallow peat. This is especially true in the use of lime.

Tables XXII and XXIII show the effect of various treatments on the yield of oats, and Tables XXIV to XXXII, on yield of grasses, in 1915.

←		A	B	C	D
1	N			NK	Ⓛ 1
2	NP	Ⓛ		P	Ⓛ 2
3	KL	Ⓛ		NKL	Ⓛ 3
4	L	Ⓛ		NL	Ⓛ 4
5	M	Ⓛ		ML	Ⓛ 5
6	K	Ⓛ			6
7	NPK	Ⓛ		NPK	Ⓛ 7
8	PK	Ⓛ		PK	Ⓛ 8
9	NPKL	Ⓛ		PKL	Ⓛ 9
10	NPL	Ⓛ		NPKL	Ⓛ 10
11	M	Ⓛ		MPK	Ⓛ 11
12				K	Ⓛ 12
13	NK	Ⓛ		N	13
14	PL	Ⓛ		NP	Ⓛ 14
15	NKL	Ⓛ		KL	Ⓛ 15
16	NL	Ⓛ		L	Ⓛ 16
17	ML	Ⓛ		M	Ⓛ 17
18	P	Ⓛ			18
19	NPK	Ⓛ		NPK	Ⓛ 19
20	PKL	Ⓛ		NPKL	Ⓛ 20
21	NPKL	Ⓛ		NPL	Ⓛ 21
22	L	Ⓛ		PL	Ⓛ 22
23	MPK	Ⓛ		M	Ⓛ 23
24					24
25	L			P	25
26	PK				26
27	PK				27
28	P				28
	A	B	C	D	

LEGEND

Original Treatment
 N = Sodium nitrate
 P = Bonemeal
 P = Raw rock phosphate
 K = Potassium sulphate
 L = Lime
 M = Manure
 Ⓛ = Limestone applied in fall of 1916

Fig. 14. Plan of Fertilizer Treatment on Muskeg for Meadow

The mixture used was timothy, reedtop, medium red clover, and alsike clover. Plots marked A were sown in 1914; those marked B, in 1915 with no nurse crop; those marked C, in 1915 with oats as a nurse crop; and those marked D, in 1916 with rye as a nurse crop.

TABLE XX

COMPARISON OF GROUND ROCK PHOSPHATE AND ACID PHOSPHATE APPLIED WITH AND WITHOUT MANURE ON UPLAND SOIL

Oats	Average yield per acre of three plots		
	1915 Series I	1916 Series III	Average
	Bu.	Bu.	Bu.
No treatment.....	47.2	30.0	38.6
Rock phosphate.....	44.1	34.4	39.25
Manure and rock phosphate.....	53.9	40.6	47.25
Manure.....	51.9	37.2	44.55
Manure and acid phosphate.....	54.0	44.4	49.2
Acid phosphate.....	41.9	34.1	38.0
		1916 Series I	
Clover and timothy hay			
		Lbs.	
No treatment.....		2,800	
Rock phosphate.....		3,199	
Manure and rock phosphate.....		3,116	
Manure.....		3,749	
Acid phosphate and manure.....		3,733	
Acid phosphate.....		3,283	
		1915 Series III	
Fodder corn			Average
	Tons	Tons	Tons
No treatment.....	2.14	5.18	3.66
Rock phosphate.....	2.94	5.34	4.14
Manure and rock phosphate.....	3.69	8.04	5.86
Manure.....	3.26	7.29	5.27
Manure and acid phosphate.....	3.80	7.72	5.76
Acid phosphate.....	2.53	5.66	4.09
		1915 Series III	
Potatoes			Average
	Bu.	Bu.	Bu.
No treatment.....	124.3	106.3	115.3
Rock phosphate.....	131.6	95.6	113.6
Manure and rock phosphate.....	179.6	145.8	162.7
Manure.....	180.9	163.6	172.3
Manure and acid phosphate.....	183.3	169.7	176.5
Acid phosphate.....	141.0	104.6	122.8

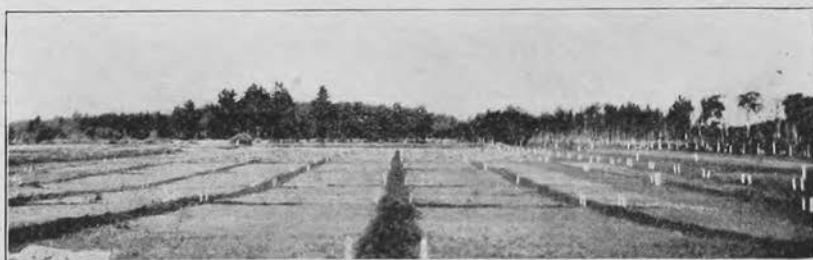


Fig. 15. Muskeg Experimental Fields

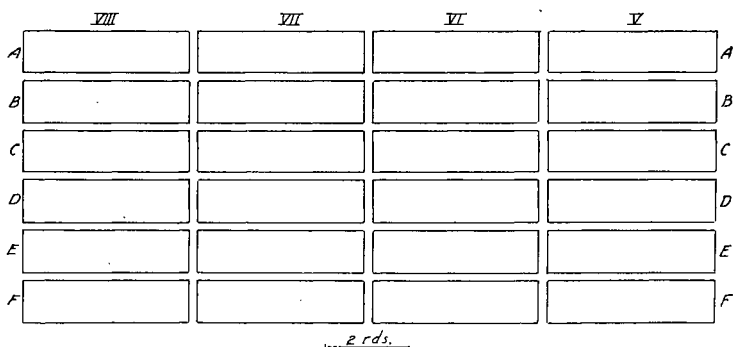


Fig. 16. Plan of Fertilizer Treatment on Variety Grasses, Muskeg

Crops sown in 1916 were:

- | | |
|------------------------|---|
| 1. Timothy | 5. Bromus inermus |
| 2. Redtop | 6. Alfalfa, white clover, and Kentucky bluegrass |
| 3. Meadow fescue | 7. Medium red clover, alsike clover, and timothy |
| 4. Perennial rye grass | 8. Alsike clover, mammoth red clover, and timothy |

Treatments given were:

- A. Upland soil, 200 tons per acre
- B. Check
- C. Potassium chloride, 400 pounds per acre
- D. Potassium chloride, 400 pounds per acre and steamed bone meal, 800 pounds.
- E. Potassium chloride, 400 pounds per acre, sodium nitrate 400 pounds, and steamed bone meal 800 pounds
- F. Barnyard manure, 20 tons per acre

North half of treatments A to F were sown with flax as a nurse crop in 1916; south half with no nurse crop. Limestone on Series I and III at the rate of 4,000 pounds per acre. Upland soil, barnyard manure, and limestone were applied in the fall of 1915; all other fertilizers in the spring of 1916.

TABLE XXI

COMPARISON OF STABLE MANURE AND PEAT APPLIED ON UPLAND SOIL IN VARYING QUANTITIES

Oats, 1916

Treatment	Average yield per acre of two plots
No treatment.....	Bu. 34.1
Manure, 5 tons.....	38.1
Manure, 20 tons.....	37.8*
Peat, 10 tons.....	33.75
Peat, 20 tons.....	29.4
Peat, 40 tons.....	32.8

Clover and Timothy Hay, 1916

	Lbs.
No treatment.....	3,985
Manure, 5 tons.....	2,750
Manure, 20 tons.....	4,875
Peat, 10 tons.....	3,650
Peat, 20 tons.....	2,050
Peat, 40 tons.....	3,575

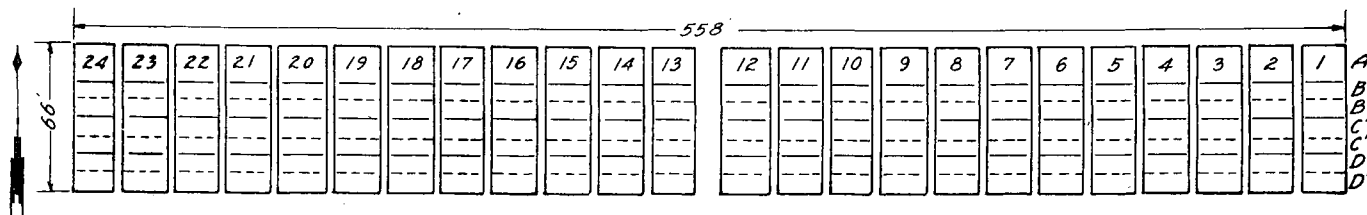


Fig. 17. Muskeg Fertilizers

Treatment per acre applied June, 1916

Plots	Lime-stone	K ₂ SO ₄	Bone Meal	Acid Phosphate	Basic Slag	Rock Phosphate	Plots	Lime-stone	K ₂ SO ₄	Bone Meal	Acid Phosphate	Basic Slag	Rock Phosphate
1 and 13	4,000	.....	800	.....	.....	.....	7 and 19	4,000	400	100	.....	.....	.....
2 and 14	4,000	100	800	.....	.....	.....	8 and 20	4,000	400	.....	400	.....	.....
3 and 15	4,000	200	800	.....	.....	.....	9 and 21	4,000	400	.....	.....	400	.....
4 and 16	4,000	400	800	.....	.....	.....	10 and 22	4,000	400	.....	.....	.....	1,000
5 and 17	4,000	400	400	.....	.....	.....	11 and 23	.....	.....	.....	.....	.....	.....
6 and 18	4,000	400	200	.....	.....	.....	12 and 24 (Q. lime)	2,000	400	800	.....	.....	.....

Crop plan as follows:

- A—Timothy, medium red clover, and alsike clover, sown in 1916 with no nurse crop.
 - B—Timothy, medium red clover, and alsike clover, sown in 1916 with nurse crop of barley.
 - B'—Timothy, medium red clover, and alsike clover, sown in 1916 with nurse crop of oats.
 - C—Winter rye—Sown August 31, 1916.
 - C'—Wild rice.
 - D—Barley.
 - D'—Oats.
- C, C', D', and D', have catch crop of timothy, medium red clover, and alsike clover.

Fig. 17. Plan of Fertilizer Treatment on Rate of Application Project on Muskeg

TABLE XXI—Continued

Fodder Corn, 1916

Treatment	Average yield per acre of two plots Tons
No treatment.....	8.76
Manure, 5 tons.....	9.44
Manure, 20 tons.....	11.41
Peat, 10 tons.....	8.25
Peat, 20 tons.....	7.80
Peat, 40 tons.....	11.07

Potatoes, 1916

Treatment	Bu.
No treatment.....	105.5
Manure, 5 tons.....	102.9
Manure, 20 tons.....	148.3
Peat, 10 tons.....	117.3
Peat, 20 tons.....	115.3
Peat, 40 tons.....	117.6

* Lodged.

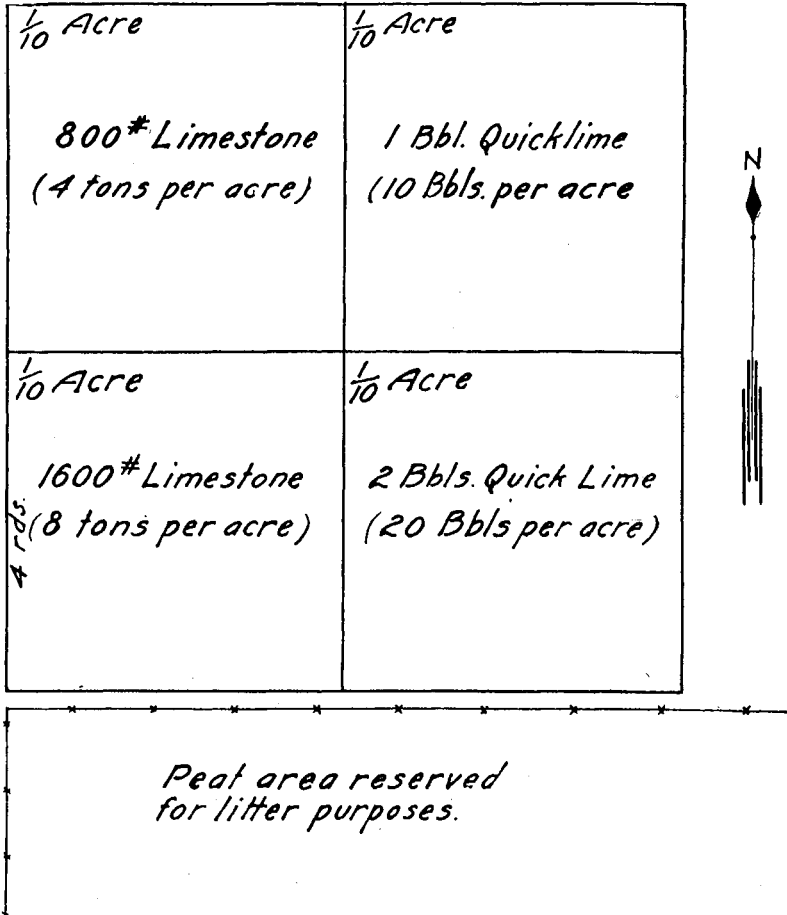


Fig. 18. Plan of Liming Native Muskeg Vegetation

Quick lime and limestone were applied in May, 1916, without stripping off the moss and leatherleaf.

TABLE XXII
YIELD OF OATS, AND PERCENTAGE OF GRAIN AND STRAW, 1915, SOUTH SERIES C

Plot	Depth of peat		Treatment*	Length of straw	Date ripe	Yield of bundles	Yield of grain	Grain	Yield of grain	Weight of grain	Purity	Germination
	Ft.	In.				per acre	per acre		per bushel	Per cent		
1	4	- 1	N K.....	48	Aug. 23	7,070	700	9.9	21.9	30	99.10	73
2	4	- 9	P.....	40	Aug. 22	5,510	650	11.8	20.3	30	97.77	65
3	5	- 5	N K L....	36	Aug. 24	5,970	725	12.1	22.6	31.5	99.07	81
4	6	- 7	N L.....	40	Aug. 24	5,540	650	11.7	20.3	31	99.71	70
5	7	- 6	M L.....	40	Aug. 24	5,070	725	14.3	22.6	31	98.72	68
6	9	- 2	None.....	24	Aug. 22	1,700	175	10.3	5.4	31	89.01	49
7	11	- 6	N P K....	38	Aug. 22	7,380	725	9.8	22.6	32.5	93.63	68
8	12	- 11	P K.....	28	Aug. 22	4,610	375	8.1	11.7	29	93.60	70
9	13	- 7	P K L....	44	Aug. 25	7,050	975	13.8	30.5	33	98.96	77
10	14	- 0	N P K L..	51	Aug. 25	7,370	1,225	16.6	38.3	32.5	98.59	81
11	14	- 2	M P K....	51	Aug. 24	7,360	975	13.2	30.5	30	90.36	70
12	13	- 4	K.....	30	Aug. 24	5,900	375	6.5	11.7	29.5	76.17	78
13	11	- 8	N.....	42	Aug. 22	6,950	825	11.9	25.8	31	89.86	64
14	10	- 3	N P.....	48	Aug. 22	8,070	1,200	14.8	37.5	31.5	93.4	69
15	9	- 0	K L.....	48	Aug. 25	6,360	1,075	16.9	33.6	32	98.12	71
16	7	- 8	L '11 '12..	42	Aug. 23	5,000	850	17.0	26.6	30	92.60	73
17	6	- 3	M '11 '12..	36	Aug. 22	5,500	450	8.2	14.0	29.5	90.0	56
18	5	- 6	None.....	30	Aug. 22	4,990	275	5.5	8.5	27	86.0	31
19	5	- 5	N P K....	44	Aug. 23	7,880	875	11.1	27.3	30.5	97.80	61
20	4	- 9	N P K L..	48	Aug. 24	7,150	1,400	19.5	43.7	33.5	98.61	79
21	4	- 3	N P L....	46	Aug. 24	5,820	1,250	21.5	39.0	32	96.01	70
22	3	- 9	P L.....	42	Aug. 22	4,570	925	20.2	28.9	32	97.97	69
23	3	- 5	M.....	42	Aug. 23	5,880	950	16.1	29.7	31	92.81	72
24	3	- 2	None.....	36	Aug. 22	4,500	550	12.2	17.1	29.5	94.88	61
25	2	- 11	P.....	40	Aug. 21	5,780	600	10.4	18.7	28	95.57	59
26	2	- 8	None.....	42	Aug. 23	4,260	875	20.5	27.3	30.5	98.39	71
27	2	- 6	None.....	36	Aug. 23	3,960	650	16.4	20.3	32.5	97.29	67
28	2	- 4	None.....	36	Aug. 23	3,730	650	17.4	20.3	33	97.74	77

* See Figure 14.

TABLE XXIII

YIELD OF OATS IN BUNDLES, AND PERCENTAGE BY NUMBER, OF GRASSES, SOUTH SERIES C

Plot	Depth of peat		Treatment	Length of straw	Yield of bundles per acre		Oats	Timothy	Redtop	Clover	Rumex Acetecella	Other plants
	Ft.	In.			In.	Lbs.						
1	4	1	NK.....	48	7,070	69.0	3.5	10.0	.....	16.5	1.0
2	4	9	P.....	40	5,510	79.0	2.0	7.0	.....	12.0	.....
3	5	5	NK L.....	36	5,970	67.5	9.5	12.0	.....	11.0	.....
4	6	7	N L.....	40	5,540	83.0	8.0	7.0	2.0	.....	.....
5	7	6	M L.....	40	5,070	64.0	11.0	16.0	1.0	7.4	0.6	
6	9	2	None.....	24	1,700	40.0	7.0	6.0	.....	47.0	.....
7	11	6	NPK.....	38	7,380	54.0	2.5	0.5	.....	43.0	.....
8	12	11	PK.....	28	4,610	29.0	3.0	59.0	.....	8.5	0.5
9	13	7	PK L.....	44	7,050	70.0	8.0	8.6	0.7	12.0	0.7	
10	14	0	NPK L.....	51	7,370	80.0	9.0	6.0	5.0	.....	.....
11	14	2	MPK.....	51	7,360	74.0	18.5	3.0	4.5	.....	.....
12	13	4	K.....	30	5,900	45.0	25.0	16.5	.....	13.5	.....
13	11	8	N.....	42	6,550	77.0	8.5	5.0	.....	8.5	1.0
14	10	3	N P.....	48	8,070	67.0	4.4	3.0	0.6	.....	25.0
15	9	0	K L.....	48	6,360	93.0	6.5	0.0	0.5	.....	.....
16	7	8	L '11 '12...	42	5,000	87.0	6.5	4.0	0.5	.....	2.0
17	6	3	M '11 '12...	36	5,500	66.0	2.5	4.0	.....	25.0	2.5
18	5	6	None.....	30	4,990	35.0	.....	.....	.....	65.0	.....
19	5	5	NPK.....	44	7,880	66.0	12.0	14.0	0.5	7.0	0.5	
20	4	9	NPK L.....	48	7,150	70.0	23.0	6.0	1.0	.....	.....
21	4	3	NPL.....	46	5,890	87.0	12.0	.....	1.0	.....	.....
22	3	9	P L.....	42	4,570	81.0	14.0	3.0	2.0	.....	.....
23	3	5	M.....	42	5,880	72.0	11.0	14.0	.....	.....	3.0
24	3	2	None.....	36	4,500	81.5	6.5	10.0	.....	.....	2.0
25	2	11	P.....	40	3,780	76.0	6.0	15.5	.....	1.0	1.5
26	2	8	None.....	42	4,260	88.0	7.0	4.0	.....	.....	1.0
27	2	6	None.....	36	3,960	87.0	8.0	4.0	.....	.....	1.0
28	2	4	None.....	36	3,750	73.0	15.0	11.0	.....	.....	1.0

TABLE XXIV
HAY CROP AND PERCENTAGES BY WEIGHT OF GRASSES AND OTHER PLANTS,* NORTH SERIES B

Plot	Depth of peat		Treatment	Height	Yield per acre	Timothy	Redtop	Alsike	Red clover	Rumex acet.	Other plants
	Ft.	In.									
1	3	4	N.....	24	1,850	8.0	6.0	....	....	85.0	1.0
2	4	1	NP.....	37	3,800	54.0	10.0	....	....	36.0	....
3	4	10	KL.....	40	4,300	66.0	3.0	11.0	16.0	3.0	1.0
4	6	2	L.....	41	4,180	78.0	3.0	6.0	9.0	3.5	0.5
5	8	0	M '11 '12...	36	2,940	59.0	25.0	....	....	16.0	....
6	8	9	K.....	34	2,280	39.0	6.0	....	....	54.0	1.0
7	12	5	NP K.....	40	5,540	47.0	41.0	....	....	12.0	....
8	14	2	P K.....	40	3,980	66.0	21.0	....	....	12.0	1.0
9	15	2	NP K L...	40	4,710	73.0	4.0	12.0	11.0	....	....
10	15	10	N P L.....	40	4,390	58.0	3.0	15.5	23.0	0.5	....
11	14	9	M.....	38	3,250	82.0	12.0	....	....	5.0	1.0
12	14	2	None.....	36	2,960	76.0	3.0	....	....	21.0	....
13	14	5	N K.....	42	4,520	76.0	3.0	0.5	....	20.0	0.5
14	12	11	P L.....	42	3,830	79.5	12.0	2.0	....	4.5	2.0
15	11	10	N K L.....	43	4,990	65.0	2.0	11.0	22.0	....	....
16	10	6	N L.....	42	4,940	83.0	1.0	9.5	5.0	1.0	0.5
17	8	11	M L.....	42	4,160	92.5	2.5	3.0	....	2.0	....
18	8	4	P.....	30	2,910	65.0	8.0	....	....	26.0	1.0
19	8	3	NP K.....	46	4,920	85.0	8.0	....	....	7.0	....
20	7	10	P K L.....	40	4,610	87.0	1.0	8.5	3.0	0.5	....
21	7	1	NP K L...	42	5,930	80.0	1.5	14.0	4.5	....	....
22	6	5	L '11 '12...	40	3,760	88.0	1.0	11.0	....	....	....
23	5	11	M P K.....	42	5,210	87.0	8.0	2.0	....	3.0	....
24	5	6	None.....	30	3,580	87.0	4.0	....	....	8.0	1.0
25	4	11	L.....	38	4,070	79.0	10.0	4.0	3.0	4.0	....
26	4	5	P K.....	47	5,310	82.0	14.5	1.5	....	1.5	0.5
27	3	10	P K.....	45	5,320	94.0	4.5	....	....	1.5	....
28	3	7	P.....	34	2,440	61.0	39.0	....	....	....	....

* Grass was sown April 21, 1915, with no nurse crop, and cut August 19, 1915.

TABLE XXV

HAY CROP AND PERCENTAGES BY WEIGHT OF GRASSES AND OTHER PLANTS,* NORTH SERIES A

Plot	Depth of peat		Treatment	Height	Yield per acre	Timothy	Redtop	Alsike	Red clover	Rumex acet.	Other plants
	Ft.	In.									
1	2	- 4	N	32	3,000	5.0	15.0	....	....	80.0	....
2	2	- 9	N P	36	3,800	11.0	34.0	....	....	55.0	....
3	3	- 0	K L	42	6,280	35.0	62.0	3.0	....	....	....
4	4	- 4	L	38	6,720	29.0	65.0	6.0	....	....	....
5	7	- 3	M '11 '12	37	5,680	7.0	90.0	0.5	....	2.5	....
6	9	- 8	K	30	4,360	1.0	95.0	....	....	4.0	....
7	11	- 8	N P K	40	5,920	2.0	95.0	....	....	3.0	....
8	13	- 8	P K	30	3,840	....	96.0	....	....	4.0	....
9	15	- 8	N P K L	42	8,160	27.5	61.5	10.0	1.0	....	....
10	16	-10	N P L	38	6,640	21.0	76.0	2.0	1.0	....	....
11	17	- 3	M	36	4,640	25.0	57.0	6.0	9.0	2.0	1.0
12	17	- 7	None	12	2,040	....	50.0	....	....	50.0	....
13	15	- 7	N K	18	3,560	0.5	32.5	0.5	....	66.5	....
14	15	-11	P L	30	4,400	14.0	64.5	21.0	0.5	....	....
15	15	- 4	N K L	36	7,280	10.0	81.0	6.0	3.0	....	....
16	14	-10	N L	30	6,200	14.0	76.0	9.0	1.0	....	....
17	14	- 4	M L	36	5,680	50.0	44.0	5.0	1.0	....	....
18	14	- 0	P	24	2,480	0.5	82.5	0.5	....	16.5	....
19	13	- 8	N P K	32	3,760	1.5	83.5	....	....	15.0	....
20	12	-11	P K L	36	6,000	24.0	57.5	13.0	0.5	5.0	....
21	11	-11	N P K L	36	6,200	11.0	61.0	8.0	0.5	19.5	....
22	10	-11	L '11 '12	34	3,640	23.0	51.0	....	....	26.0	....
23	10	- 0	M P K	36	6,720	30.0	68.0	2.0	....	....	....
24	9	- 3	None	34	4,800	11.5	55.0	....	....	31.0	2.5
25	8	- 3	L	38	5,240	13.0	40.0	7.0	....	40.0	....
26	7	- 0	P K	30	5,240	7.0	74.0	....	....	19.0	....
27	5	- 8	P K	34	5,280	6.5	63.0	....	....	30.0	0.5
28	4	-11	P	25	3,560	6.0	45.0	....	....	49.0	....

* Grass was sown in 1914 with no nurse crop and rolled.

TABLE XXVI

HAY CROP AND PERCENTAGES BY WEIGHT OF GRASSES AND OTHER PLANTS,* NORTH SERIES A

Plot	Depth of peat		Treatment	Height	Yield per acre	Timothy	Redtop	Alsike	Red clover	Rumex acet.	Other plants
	Ft.	In.									
1	2	- 1	N.....	30	3,360	3.0	60.5	....	....	36.0	0.5
2	2	- 4	N P.....	34	3,040	14.0	45.0	....	....	41.0	....
3	2	- 11	K L.....	36	4,200	12.0	55.5	2.0	....	25.0	5.5
4	4	- 2	L.....	38	4,720	43.0	40.0	12.0	....	5.0	....
5	7	- 1	M '11 '12...	32	3,520	5.0	37.0	....	....	50.0	8.0
6	9	- 6	K.....	24	3,240	19.0	20.0	....	....	60.0	1.0
7	11	- 5	N P K.....	39	4,760	51.0	23.0	0.5	....	23.0	2.5
8	13	- 6	P K.....	24	2,600	3.0	64.0	8.0	....	24.0	1.0
9	15	- 9	N P K L.....	44	6,880	82.0	1.5	11.0	1.0	4.0	0.5
10	17	- 1	N P L.....	36	6,760	31.0	38.0	26.0	....	1.0	4.0
11	17	- 7	M.....	30	4,040	19.0	24.0	19.0	5.0	33.0	....
12	17	- 7	None.....	18	2,040	7.0	85.0	....	....	7.5	0.5
13	17	- 7	N K.....	24	2,960	....	89.0	....	....	11.0	....
14	16	- 7	P L.....	30	4,720	18.0	65.0	16.0	1.0	....	....
15	16	- 2	N K L.....	36	5,840	22.0	48.0	7.0	20.0	1.5	1.5
16	15	- 9	N L.....	30	3,640	17.0	77.0	5.0	....	0.5	....
17	15	- 6	M L.....	34	4,440	31.0	45.0	5.0	8.0	9.5	1.5
18	15	- 2	P.....	24	2,840	30.0	27.0	....	5.0	41.0	2.0
19	14	- 10	N P K.....	30	2,320	1.5	38.0	....	....	60.0	....
20	14	- 2	P K L.....	30	3,040	32.5	36.5	12.5	5.0	12.5	1.0
21	13	- 0	N P K L.....	32	3,120	9.0	25.5	1.5	....	64.0	....
22	12	- 0	L '11 '12...	34	3,920	16.0	40.0	8.0	4.0	29.0	3.0
23	10	- 10	M P K.....	36	5,200	30.0	38.0	4.0	....	23.5	4.5
24	10	- 1	None.....	30	3,320	10.0	24.0	2.0	....	63.0	1.0
25	9	- 4	L.....	34	4,640	9.0	49.0	10.0	2.0	22.0	8.0
26	7	- 9	P K.....	24	2,960	8.0	32.0	....	....	60.0	....
27	6	- 3	P K.....	30	3,520	7.0	25.0	....	....	68.0	....
28	5	- 1	P.....	28	3,240	28.0	37.0	....	....	35.0	....

* Grass sown in 1914 with no nurse crop, and not rolled.

TABLE XXVII

HAY CROP AND PERCENTAGES BY WEIGHT OF GRASSES AND OTHER PLANTS,* NORTH SERIES A

Plot	Depth of peat		Treatment	Height	Yield per acre	Timothy	Redtop	Alsike	Red clover	Rumex acet.	Other plants
	Ft.	In.									
1	2	- 6	N.....	28	3,200	7.0	19.0	....	....	72.0	2.0
2	3	- 0	NP.....	34	4,800	1.0	69.0	....	....	30.0	....
3	3	- 4	KL.....	42	6,960	13.0	86.0	....	....	1.0	....
4	4	- 11	L.....	36	4,400	16.0	80.0	1.0	....	1.0	2.0
5	7	- 5	M '11 '12...	34	4,240	3.5	93.5	....	....	3.0	....
6	9	- 9	K.....	31	4,360	....	96.0	....	....	4.0	....
7	11	- 10	NP K.....	37	5,240	....	97.0	....	....	3.0	....
8	13	- 9	PK.....	30	3,520	....	40.0	....	....	60.0	....
9	15	- 6	NP KL...	37	8,080	25.0	71.0	3.0	1.0	....	....
10	16	- 7	NPL.....	36	6,000	16.0	73.0	8.0	3.0	....	....
11	17	- 1	M.....	34	4,640	32.0	68.0	....	....	....	....
12	16	- 11	None.....	12	2,320	1.5	50.0	....	....	48.0	0.5
13	16	- 0	NK.....	30	5,400	....	90.0	....	....	9.7	0.3
14	15	- 3	PL.....	32	5,160	5.0	95.0	....	....	....	....
15	14	- 7	NKL.....	36	5,040	2.0	98.0	....	....	....	....
16	13	- 10	NL.....	30	4,880	2.0	97.0	1.0	....	....	....
17	13	- 1	ML.....	33	5,200	6.7	93.0	....	....	0.3	....
18	12	- 8	P.....	28	3,560	1.0	90.0	....	....	9.0	....
19	12	- 6	NP K.....	33	5,800	....	100.0	....	....	....	....
20	11	- 9	PKL.....	36	5,360	2.5	97.0	....	....	0.5	....
21	10	- 10	NP KL...	36	5,680	19.0	36.0	45.0	....	....	....
22	9	- 8	L '11 '12...	32	3,760	7.5	90.0	1.0	0.5	1.0	....
23	9	- 1	MP K.....	36	6,080	11.0	89.0	....	....	....	....
24	8	- 5	None.....	30	3,800	0.5	90.5	....	....	9.0	....
25	7	- 7	L.....	32	6,200	5.0	90.7	2.0	....	2.3	....
26	6	- 5	PK.....	32	7,400	1.0	95.0	....	....	4.0	....
27	5	- 3	PK.....	30	6,200	2.0	90.0	....	....	8.0	....
28	4	- 7	P.....	27	4,480	0.5	81.0	....	....	17.0	1.5

* Grass sown in 1914 with nurse crop of oats.

TABLE XXVIII

HAY CROP AND PERCENTAGES BY WEIGHT OF GRASSES AND OTHER PLANTS,* NORTH SERIES A

Plot	Depth of peat		Treatment	Height	Yield per acre	Timothy	Redtop	Alsike	Red clover	Rumex acet.	Other plants
	Ft.	In.									
1	2	9	N.....	22	2,800	.....	11.0	.....	.....	89.0	.....
2	3	4	NP.....	34	4,720	2.0	53.0	.....	.....	45.0	.....
3	3	9	KL.....	42	6,320	27.0	64.0	.....	.....	9.0	.....
4	5	3	L.....	38	5,680	46.0	48.0	3.0	.....	3.0	.....
5	7	6	M '11 '12...	34	3,440	3.0	88.0	.....	.....	9.0	.....
6	10	1	K.....	31	2,760	1.0	69.0	.....	.....	30.0	.....
7	12	2	NP K.....	37	4,800	1.0	90.0	.....	.....	9.0	.....
8	13	10	PK.....	30	3,760	.....	50.0	.....	.....	50.0	.....
9	15	5	NP KL.....	42	7,000	34.0	65.0	.....	.....	0.4	0.6
10	16	5	N PL.....	37	6,360	7.0	90.0	2.0	0.5	0.4	0.1
11	16	10	M.....	36	4,400	34.0	62.0	.....	.....	4.0	.....
12	16	6	None.....	13	2,360	1.0	29.0	.....	.....	70.0	.....
13	15	6	NK.....	36	6,000	.....	79.0	.....	.....	21.0	.....
14	14	7	PL.....	36	5,760	2.0	97.0	.....	.....	.....	1.0
15	13	9	NKL.....	34	6,440	7.0	93.0	.....	.....	.....	.....
16	12	10	NL.....	32	5,880	3.0	97.0	.....	.....	.....	.....
17	11	11	ML.....	36	6,640	10.0	88.0	.....	.....	2.0	.....
18	11	5	P.....	30	4,600	1.0	52.0	.....	.....	46.0	1.0
19	11	3	NP K.....	35	5,840	.....	95.0	.....	.....	5.0	.....
20	10	8	PK L.....	36	6,680	2.0	98.0	.....	.....	.....	.....
21	9	9	NP KL.....	38	6,680	24.5	73.0	2.0	0.5	.....	.....
22	8	11	L '11 '12...	34	4,440	2.0	94.0	1.3	1.0	1.7	.....
23	8	2	MP K.....	42	9,120	11.5	88.0	0.5	.....	.....	.....
24	7	7	None.....	32	6,400	1.0	84.0	.....	.....	15.0	.....
25	6	10	L.....	36	5,920	11.0	74.0	1.0	.....	14.0	.....
26	5	10	PK.....	36	6,720	0.7	96.0	.....	.....	1.3	2.0
27	4	10	PK.....	36	7,160	4.0	92.0	.....	.....	4.0	.....
28	3	4	P.....	30	5,600	2.0	96.0	.....	.....	1.0	1.0

* Grass was sown in 1914 with nurse crop of oats, not rolled.

TABLE XXIX

HAY CROP AND PERCENTAGES BY WEIGHT OF GRASSES AND OTHER PLANTS,* SOUTH SERIES D

Plot	Depth of peat		Treatment	Height	Yield per acre	Timothy	Redtop	Alsike	Red clover	Rumex acet.	Other plants
	Pt.	In.				Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
1	5	0	N K.....	34	4,480	0.3	98.0	.....	.....	1.7	.....
2	4	3	P.....	34	4,320	12.5	79.0	.....	.....	8.5	.....
3	4	8	N K L.....	36	6,080	15.5	82.5	1.2	.....	0.2	0.6
4	5	0	N L.....	36	4,880	16.0	76.0	5.0	.....	3.0	.....
5	5	7	M L.....	36	5,040	16.3	79.0	0.3	0.4	4.0	.....
6	6	9	None.....	24	3,280	.....	51.0	.....	.....	49.0	.....
7	8	6	N P K.....	36	5,400	.....	98.0	.....	.....	0.5	1.5
8	7	7	P K.....	34	4,640	15.5	61.5	.....	.....	23.0	.....
9	10	7	P K L.....	38	5,800	47.5	40.0	11.5	1.0	.....	.....
10	10	10	N P K L.....	38	5,200	27.0	72.0	1.0	.....	.....	.....
11	10	9	M P K.....	38	6,080	21.4	77.0	.....	0.1	1.0	0.5
12	8	2	K.....	34	5,320	.....	93.4	.....	.....	5.0	1.6
13	6	10	N.....	30	4,880	3.6	93.0	.....	.....	1.5	1.9
14	7	6	N P.....	38	3,800	4.7	87.0	.....	.....	7.0	1.3
15	6	3	K L.....	38	4,720	53.0	25.0	15.0	2.5	4.0	0.5
16	5	4	L '11 '12.....	30	3,600	15.0	74.0	.....	.....	11.0	.....
17	4	5	M '11 '12.....	18	2,840	6.0	47.0	.....	.....	47.0	.....
18	4	1	None.....	18	2,360	3.0	21.0	.....	.....	76.0	.....
19	4	1	N P K.....	36	6,000	16.0	73.0	1.0	.....	7.5	2.5
20	3	9	N P K L.....	30	4,640	19.0	60.5	17.0	3.0	.....	0.5
21	3	0	N P L.....	36	4,800	23.0	45.0	27.0	1.5	.....	3.5
22	2	4	P L.....	36	5,000	13.5	65.0	18.0	3.0	.....	0.5
23	1	11	M.....	40	4,640	46.0	41.0	11.5	1.5	.....	.....
24	1	8	None.....	40	5,200	38.5	45.5	15.0	0.8	.....	0.2
25	1	8	P.....	42	5,400	60.3	25.5	11.7	.....	.....	2.5
26	1	6	None.....	39	5,600	52.0	30.0	17.5	0.5	.....	.....
27	1	1	None.....	36	4,760	45.5	32.5	21.0	1.0	.....	.....
28	0	9	None.....	36	4,800	30.0	53.6	16.0	0.4	.....	.....

* Grass was sown in 1914 with no nurse crop, and rolled.

TABLE XXX

HAY CROP AND PERCENTAGES BY WEIGHT OF GRASSES AND OTHER PLANTS,* SOUTH SERIES D

Plot	Depth of peat		Treatment	Height	Yield per acre	Timothy	Redtop	Alsike	Red clover	Rumex acet.	Other plants
	Ft.	In.									
1	4	0	N K.....	34	4,440	....	92.4	0.2	....	7.0	0.4
2	4	2	P.....	34	5,520	1.0	84.0	....	....	12.0	3.0
3	4	5	N K L.....	36	6,040	5.0	92.0	3.0	....	....	....
4	4	10	N L.....	36	5,400	6.0	91.0	2.0	0.3	0.3	0.4
5	5	3	M L.....	34	4,840	5.0	87.0	0.6	....	7.0	0.4
6	6	3	None.....	30	2,880	0.5	93.0	....	....	6.5	....
7	7	11	N P K.....	36	5,320	0.5	96.0	....	....	3.5	....
8	9	2	P K.....	34	6,240	0.2	99.5	....	....	0.3	....
9	9	11	P K L.....	36	5,840	4.0	93.0	2.0	1.0	....	....
10	10	2	N P K L.....	36	4,400	0.5	99.0	....	....	....	0.5
11	10	0	M P K.....	34	6,120	....	90.0	3.5	....	4.5	2.0
12	9	1	K.....	30	5,680	....	97.0	....	....	1.0	2.0
13	7	10	N.....	34	3,280	....	99.9	....	....	0.1	....
14	7	0	N P.....	36	3,320	4.0	95.0	....	....	0.5	0.5
15	5	10	K L.....	36	5,160	....	84.0	7.0	1.5	2.0	5.5
16	4	11	L '11 '12....	30	4,000	2.0	95.0	....	....	1.3	1.7
17	4	7	M '11 '12....	24	2,720	1.0	75.0	....	....	22.7	1.3
18	4	3	None.....	24	2,400	1.5	53.0	....	....	45.5	....
19	4	0	N P K.....	36	4,160	1.5	83.0	....	....	14.5	1.0
20	3	5	N P K L.....	36	4,080	13.0	55.0	20.0	....	....	12.0
21	2	7	N P L.....	36	5,600	4.0	64.0	11.0	....	1.0	20.0
22	2	0	P L.....	36	7,400	22.7	68.0	6.0	3.0	....	0.3
23	1	6	M.....	42	6,040	22.0	71.0	6.0	....	1.0	....
24	1	5	None.....	42	5,960	25.0	67.0	6.5	0.5	0.5	0.5
25	1	6	P.....	42	5,360	23.0	69.0	3.0	....	....	5.0
26	1	3	None.....	38	5,840	22.0	54.0	22.0	1.0	....	1.0
27	0	10	None.....	36	5,400	12.0	72.0	13.0	1.5	....	1.5
28	0	4	None.....	36	5,920	15.5	68.5	15.2	0.8	....	....

* Grass was sown in 1914 with no nurse crop, and not rolled.

TABLE XXXI

HAY CROP AND PERCENTAGES BY WEIGHT OF GRASSES AND OTHER PLANTS * SOUTH SERIES D

Plot	Depth of peat		Treatment	Height	Yield per acre	Timothy	Redtop	Alsike	Red clover	Rumex acet.	Other plants
	Pt.	In.									
1	4	0	N K.....	34	4,360	....	87.0	....	....	13.0	....
2	4	5	P.....	32	4,960	5.0	72.0	....	....	23.0	....
3	4	10	N K L.....	36	6,000	34.0	49.0	7.0	....	10.0	....
4	5	4	N L.....	36	4,320	....	99.0	....	....	....	1.0
5	6	1	M L.....	36	4,600	12.0	85.0	....	....	3.0	....
6	7	5	None.....	28	2,600	....	86.0	....	....	14.0	....
7	9	3	N P K.....	34	5,400	....	99.0	....	....	1.0	....
8	10	6	P K.....	34	3,920	0.4	98.0	....	....	1.6	....
9	11	3	P K L.....	36	6,880	7.0	89.0	3.0	0.6	....	0.4
10	11	7	N P K L.....	36	7,360	22.5	72.0	0.5	....	....	5.0
11	11	6	M P K.....	36	6,840	26.0	70.0	2.0	....	....	2.0
12	10	10	K.....	32	5,680	2.5	97.5	....	....	....	....
13	9	5	N.....	32	4,480	....	99.8	....	....	0.2	....
14	8	2	N P.....	32	5,680	....	97.6	....	....	0.7	1.7
15	6	11	K L.....	36	6,200	19.0	70.0	8.0	2.0	1.0	....
16	5	10	L '11 '12.....	32	3,160	16.0	83.0	....	....	....	1.0
17	4	5	M '11 '12.....	24	1,400	1.0	28.8	....	....	70.0	0.2
18	3	8	None.....	24	1,920	....	62.5	....	....	37.0	0.5
19	4	0	N P K.....	36	6,640	0.5	85.5	....	....	13.6	0.4
20	4	0	N P K L.....	36	7,240	26.0	68.0	....	....	1.0	5.0
21	3	1	N P L.....	38	7,000	27.0	49.0	1.0	....	....	23.0
22	2	9	P L.....	40	7,120	31.0	66.0	2.0	....	....	1.0
23	2	3	M.....	44	7,360	60.0	36.0	....	....	....	4.0
24	2	0	None.....	38	5,800	63.0	34.0	1.0	....	2.0	....
25	1	10	P.....	42	5,880	10.0	78.0	....	....	....	12.0
26	1	9	None.....	38	5,800	58.5	32.5	1.0	....	1.0	7.0
27	1	5	None.....	34	5,520	43.0	51.0	3.0	....	....	3.0
28	1	1	None.....	36	6,600	30.0	64.0	6.0	....	....	....

* Grass was sown in 1914 with nurse crop of oats, and rolled.

TABLE XXXII

HAY CROP AND PERCENTAGES BY WEIGHT OF GRASSES AND OTHER PLANTS* SOUTH SERIES D

Plot	Depth of peat		Treatment	Height	Yield per acre	Timothy	Redtop	Alsike	Red clover	Rumex acet.	Other plants
	Ft.	In.				Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
1	4	- 1	N K.....	36	4,640	0.7	96.5	.....	.....	2.3	0.5
2	4	- 6	P.....	34	4,440	1.6	98.0	.....	.....	0.4	.....
3	5	- 0	N K L.....	35	6,440	1.0	94.5	.....	.....	3.0	1.5
4	5	- 8	N L.....	36	3,240	9.5	90.5	.....	.....	.....	.....
5	6	- 5	M L.....	38	4,880	11.0	88.0	0.5	.....	0.5	.....
6	7	- 11	None.....	28	2,520	2.5	56.0	.....	.....	41.0	0.5
7	10	- 1	N P K.....	34	5,720	.....	99.8	.....	.....	0.2	.....
8	11	- 6	P K.....	34	4,480	1.0	98.0	.....	.....	.....	1.0
9	11	- 11	P K L.....	36	5,520	4.0	95.3	0.7	.....	.....	.....
10	12	- 2	N P K L.....	36	7,040	2.4	96.8	0.2	.....	.....	0.6
11	12	- 2	M P K.....	40	5,760	21.0	75.0	2.5	.....	.....	1.5
12	11	- 4	K.....	32	5,600	0.7	98.0	.....	.....	0.5	8.8
13	9	- 10	N.....	30	5,760	.....	97.0	.....	.....	1.5	1.5
14	8	- 8	N P.....	30	4,960	3.0	92.0	.....	.....	.....	5.0
15	7	- 6	K L.....	36	6,720	14.5	72.0	5.0	8.0	0.5	.....
16	6	- 4	L '11 '12...	32	3,960	4.0	83.0	.....	.....	13.0	.....
17	5	- 1	M '11 '12...	30	1,960	2.0	73.5	.....	.....	24.5	.....
18	4	- 3	None.....	30	2,160	5.0	58.0	.....	.....	37.0	.....
19	4	- 4	N P K.....	36	6,600	4.0	57.0	.....	.....	38.2	0.8
20	4	- 1	N P K L...	40	7,400	20.3	79.0	0.4	.....	.....	0.3
21	3	- 8	N P L.....	40	6,040	9.0	83.0	.....	.....	.....	8.0
22	3	- 1	P L.....	42	6,200	27.0	66.0	.....	.....	0.9	6.1
23	2	- 7	M.....	44	7,920	0.5	92.0	.....	.....	0.5	7.0
24	2	- 4	None.....	36	5,360	7.0	91.3	.....	.....	0.2	1.5
25	2	- 2	P.....	42	5,760	14.0	73.0	.....	.....	5.0	8.0
26	2	- 0	None.....	38	7,240	3.0	76.0	.....	.....	8.0	13.0
27	1	- 9	None.....	36	6,280	22.0	75.0	.....	.....	1.8	1.2
28	1	- 5	None.....	36	6,840	67.0	29.5	3.5	.....	.....	.....

* Grass was sown in 1914 with nurse crop of oats, and not rolled.

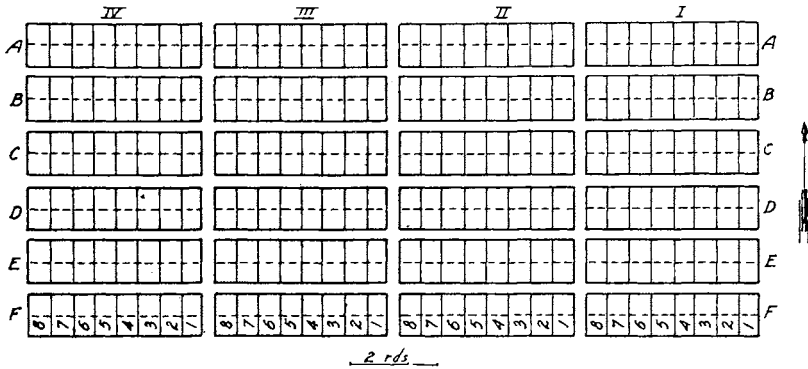


Fig. 19. Plan of Fertilizer Treatment on Muskeg Fertilizer Variety Truck Crop Project
 Treatments given were:
 A. Upland soil, 200 tons per acre
 B. Check
 C. Potassium chloride, 400 pounds per acre
 D. Potassium chloride, 400 pounds per acre and steamed bone meal, 800 pounds.
 E. Potassium chloride, 400 pounds per acre; steamed bone meal, 800 pounds; and sodium nitrate, 400 pounds
 F. Barnyard manure, 20 tons per acre
 Series V and VII also received limestone, 4,000 pounds per acre. The upland soil, manure and limestone were applied in the fall of 1915, all other fertilizers in the spring of 1916.

FERTILIZERS FOR GARDEN CROPS ON MUSKEG

TABLE XXXIII

COMPARATIVE YIELD OF TRUCK CROPS UNDER DIFFERENT TREATMENTS ON DEEP PEAT*

Treatment	Turn-ips		Onions		Car-rots	Pota-toes	Ruta-bagas	Winter rad-ishes	Cab-bages	Kohl-Rabi	Mang-els	Sugar beets	Total
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.		
Upland soil...	293	150.5	426.0	237.0	270	296	616	172	256	356	2,972.5		
No treatment...	117	0.0	156.0	149.5	72	196	407	96	92	130	1,415.5		
Potassium...	269	3.75	129.25	264.0	126	284	684	179	558	583	3,080.0		
Potassium and phosphates...	275	0.0	61.5	302.0	176	334	813	72	518	566	3,117.5		
Potassium, phosphates, and nitrates...	341	0.0	49.0	301.0	248	332	540	156	690	696	3,353.0		
Manure.....	200	0.0	57.5	162.0	121	136	310	48	92	143	1,269.5		

* Peat 5 to 15 feet deep.

TABLE XXXIV

COMPARATIVE YIELD OF TRUCK CROPS UNDER DIFFERENT TREATMENTS ON SHALLOW PEAT*

Treatment	Turn-ips		Onions		Car-rots	Pota-toes	Ruta-bagas	Winter rad-ishes	Cab-bages	Kohl-Rabi	Mang-els	Sugar beets	Total
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.		
Upland soil...	349	117.0	836	322.0	413	286	724	216	495	484	4,242.0		
No treatment...	352	29.0	265	208.5	253	322	505	156	221	344	2,655.5		
Potassium...	320	11.5	238	311.0	204	379	546	220	719	868	3,816.25		
Potassium and phosphates...	340	0.0	233	446.0	596	350	707	134	600	824	4,230.0		
Potassium, phosphates, and nitrates...	441	0.0	193	440.0	580	426	156	216	692	824	3,968.0		
Manure.....	263	0.5	277	251.0	278	268	316	112	96	244	2,105.5		

* Peat from 1 to 5 feet deep.

REPORT OF WORK AND GUIDE TO PLOTS

Peas	Peas	Peas	Peas	Peas	Peas	Peas	Peas	1
#1270	#1285	#1330	#1338	#1350	#1352	#1370	#1390	
Onions	Onions	Onions	Onions	Onions	Onions	Onions	Onions	2
#1010	#1035	#1005	#1100	#1032	#1125	#1025	#1015	
Radish	Radish	Radish	Radish	Lettuce	Lettuce	Lettuce	Lettuce	3
#1405-1425	#1482-1495	#1515-1510	1520-1525	#765-770	787-835	#815-775	#805-817	
Carrot	Carrot	Carrot	Carrot	Carrot	Carrot	Carrot	Carrot	4
#415	#420	#425	#430	#435	#445	#450	#455	
Salsify	Salsify	Parsley	Parsley	Parsnips	Parsnips	Spinach	Spinach	5
#1550	#1560	#1150-1155	#1170-1175	#1135	#1145	#1565-1572	#1570-1590	
Rape	Rape	Kale	Kale	Swiss	Endive	Sunflower	Sunflower	6
		headed	#742	Chard-238	#718			
Beets	Beets	Beets	Beets	Turnips	Turnips	Turnips	Turnips	7
#175	#180	#230	#235	#1775-1780	#1790-800	#1810-1815	#1815-1817	
Rutabaga	Rutabaga	Rutabaga	Rutabaga	Rutabaga	Rutabaga	Rutabaga	Rutabaga	8
#905	#905	#1910	#1910	#1915	#1915	#1900	#1900	
Mangel	Mangel	Mangel	Mangel	Mangel	Mangel	Mangel	Mangel	9
#250	#250	#258	#258	#260	#260	#270	#270	
Sugar Beet	"	"	"	1/2 Sugar Beet	"	"	"	10
#285	#285	#290	#290	#275	#275	#277	#277	
Corn	"	"	"	"	"	"	Corn	11
Minn #13	Minn #13	Minn #13	Minn #13	Golden	Bantam	Late	Evergreen	
Celery	Plants in hot bed failed and no plants could be gotten						Celery	12
Potato	"	"	"	"	"	"	Potato	13
6 Min	6 Min	King	King	R NY	R NY	Russet	Russet	
Potato	"	"	"	"	"	"	"	14
E Ohio	E Ohio	Irish C'br	Irish C'br	Bliss	Triumph	Burbank	Burbank	
Cabbage	"	"	"	"	"	"	Cabbage	15
#305	#305	#330	#330	#390	#390	#320	#320	
Cauliflower	Kohl Rabi	"	"	Brussels Sprouts	Broccoli	"	"	16
#470	#470	#745	#745	#242	#242	#245	#245	
Strawberry	"	"	"	"	"	"	"	17
Everbearing	Everbearing		Everbearing		Everbearing		Everbearing	
HERBS	Coriander	Fennel	Lavender	Mentha	Rosemary	Savary	Balm	18
Coraway	Dill	Herehound	Borage	Pennyroyal	Anise	Thyme	Basel	
Catnip	"	"	"	"	"	"	"	
Garlic	Chives	Spearmint	Sage	Sage	Artichoke	Water-	19	
#739	#495	"	(Seeds)	(Plant)	"	cross		
Blueberry	"	Asparagus	"	Horse	Radish	Rhubarb	"	20
Black	Champion	Gooseberry	"	Raspberry	High Bush	"	"	21
		Downing	"	Herbert	Cranberry			

Note Rows 1 rod long - 3' between rows

Fig. 20. Plan of Muskeg Truck Crop Project
The rows were one rod long with three feet between rows.

TABLE XXXV

COMPARATIVE YIELDS OF TRUCK CROPS ON LIMED AND UNLIMED DEEP PEAT*

Treatment	Turnips	Onions	Carrots	Potatoes	Rutabagas	Winter radishes	Cabbages	Kohlrabi	Mangels	Sugar beets	Total
Limed	Lbs. 1,063	Lbs. 41.5	Lbs. 595	Lbs. 867.0	Lbs. 737	Lbs. 965	Lbs. 2,884	Lbs. 456	Lbs. 1,340	Lbs. 1,672	Lbs. 10,620.5
Unlimed	432	112.25	284	548.5	276	613	486	267	866	802	4,402.5
Difference	631	-71.25	311	318.5	461	352	2,398	189	474	870	6,218.0

Total for limed plots, 10,620.5; for unlimed plots, 4,402.5; an increase of 241 per cent in favor of liming.

* Peat from 5 to 15 feet deep.

TABLE XXXVI

VARIETY TEST OF TRUCK CROPS

Variety	Relative Yield by Weight
Potatoes:	Lbs.
Early Ohio	780.0
Bliss Triumph	529.0
Rural New Yorker	528.0
Russet	387.0
Green Mountain	376.0
Burbank	331.0
King	239.5
Irish Cobbler	224.5
Carrots:	
Oxheart	448.5
Long Scarlet	444.0
Chantenay	428.5
Danvers Half Long	399.5
Long Orange	388.0
Victoria	351.0
Early Scarlet	244.5
Mastodon	217.0
Rutabagas:	
American Purple Top	1,842.0
Prize Winner	672.0
Carter's Hardy Swede	528.0
Hearst's Monarch	297.0
Turnips:	
Cowhorn	733.0
Yellow Aberdeen	571.0
Early White Milan	538.0
Early White Flat Dutch	451.0
Amber Globe	369.0
White Globe	322.0
Purple Top	301.0
White Egg	275.0

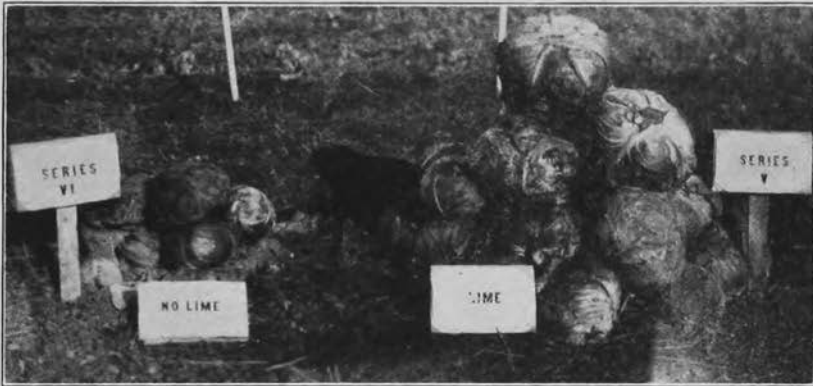


Fig. 21. Effect of Lime on Growth of Cabbage on Deep Peat Land

TABLE XXXVI—Continued

VARIETY TEST OF TRUCK CROPS

Variety	Relative Yield by weight Lbs.
Cabbage:	
All Head Early.....	1,739.0
Early Spring.....	1,755.0
Danish Round Head.....	1,667.0
Hollander.....	1,323.0
Kohl Rabi:	
Early White Vienna.....	1,777.0
Mangels:	
Improved Mammoth Long Red.....	636.0
Giant Red Eckindorf.....	612.0
Yellow Globe.....	570.0
Danish Studstrup.....	519.0
Sugar Beets:	
J. V. Elite.....	1,863.0
K. Wanzelbemer.....	1,621.0
Giant Feeding.....	1,305.0
Royal Giant.....	1,173.0
Winter Radishes:	
White Icicle.....	.....
Round Black Spanish.....	1,908.0
Long Black Spanish.....	742.0
Crimson Rose.....	486.0
White Icicle.....	473.0
Onions:	
Large Red Weathersfield.....	86.0
Large Red Globe.....	65.5
White Bunching.....	55.0
Danvers Flat.....	46.0
Minnesota Silver Skin.....	27.0
Minnesota White Globe.....	16.75
Yellow Globe.....	14.5
White Bermuda.....	1.5

VARIETY TEST OF GARDEN VEGETABLES

Garden variety tests are carried on with practically all of the common vegetables. The varieties of the various crops are listed in the order of most promise. However, further tests are necessary before definite and detailed recommendations can be made.

TABLE XXXVII

UPLAND VARIETY TEST, 1916

Variety	Relative Yield Lbs.
Carrots:	
Mastodon.....	230
Danvers Half Long.....	183
Victoria.....	155
Chantenay.....	152
Oxheart.....	133
Long Orange.....	110
Half Long Scarlet.....	108
Early Scarlet.....	96
Beets:	
N. K. & Co. Sterling.....	125
Detroit Dark Red.....	115
Early Blood Turnip.....	105
Early Model.....	120
Half Long Blood.....	92
Long Blood.....	80
Crimson Globe.....	75
Crosby's Egyptian.....	75
Sugar Beets:	
Velmorin Elite.....	580
Royal Giant.....	420
Klein Wanzlebemer.....	400
Giant Feeding.....	390
Rutabagas:	
American Purple Top.....	1,150
Sweet Russian.....	970
Sweet German.....	940
N. K. & Co. Prize Winner.....	890
Hearst's Monarch.....	720
Carter's Hardy Swede.....	660
Turnips:	
White Egg.....	1,070
Yellow Aberdeen.....	1,040
Amber Globe Green Top.....	925
Purple Top White Globe.....	860
N. K. & Co. Early Model.....	800
Cow Horn.....	790
Purple Top Strap Leaved.....	770
Early White Milan.....	660
White Globe.....	630

TABLE XXXVII—Continued

Variety	Relative Yield Lbs.
Early White Flat Dutch.....	510
Golden Ball.....	440
Early Purple Top Milan.....	430
Parsnips:	
Guernsey.....	140
Hollow Crown.....	130
Sweet Marrow.....	93
Mangels:	
Improved Mammoth Red Long.....	750
Yellow Globe.....	740
Mammoth Golden Giant.....	660
Danish Studstrup.....	600
Giant Yellow Eckindorf.....	580
Golden Tankard.....	580
Giant Red Eckindorf.....	400
Crimson Tankard.....	140



Fig. 22. Effect of Lime on Growth of Root Crops on Deep Peat
Stock roots in foreground, carrots in background

From results obtained at this Station we can recommend varieties of garden vegetables in the following order. Factors considered are: quality and yield; also earliness in the case of radishes, lettuce, sweet corn, and others.

Cabbage:

Early

Charleston Wakefield
Washington Wakefield
Express
Early Spring
Early Jersey Wakefield
Danish Ballhead

Danish Roundhead

Glory of Enkhuizen

Late

Hollander
All Seasons
Long Keeping
Autumn King
Volga

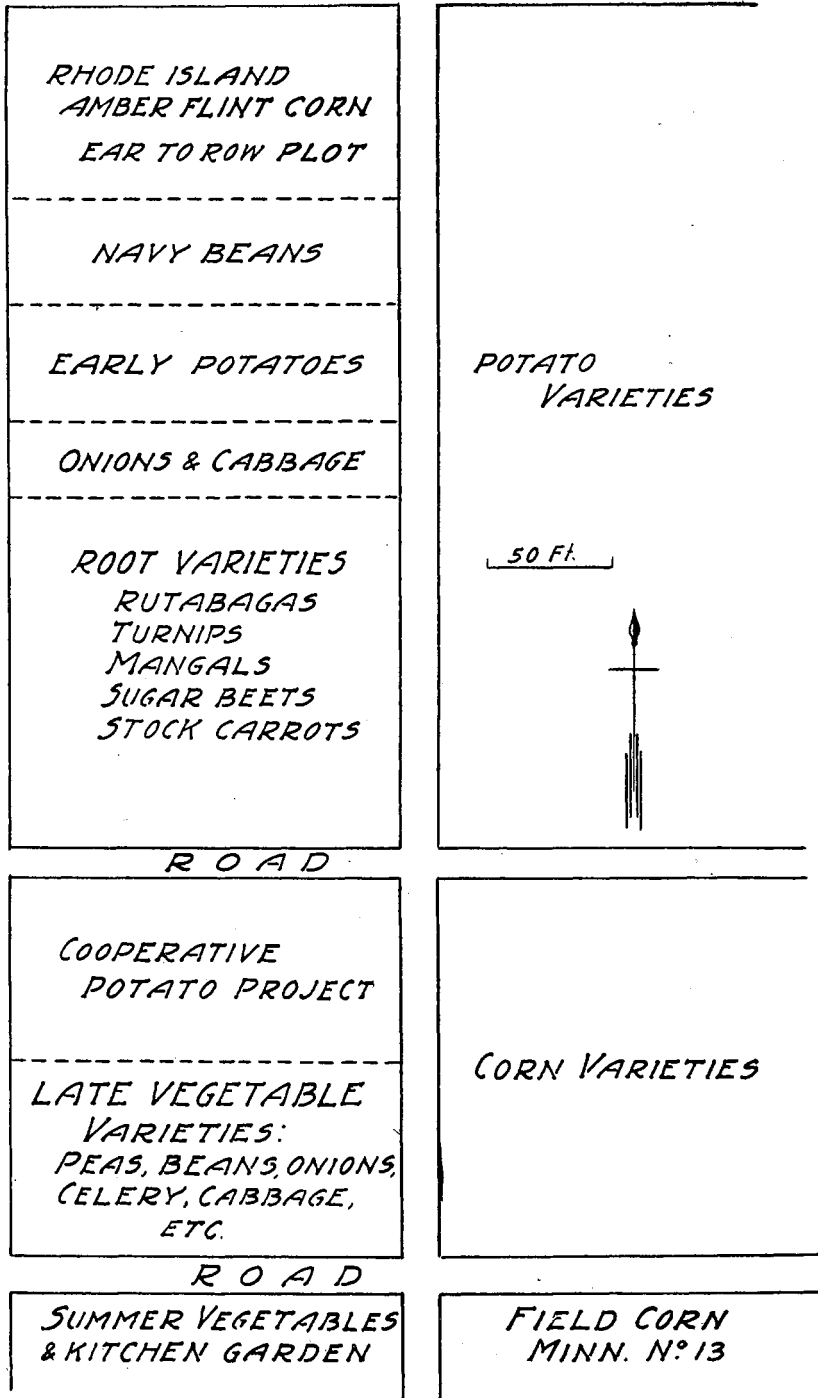


Fig. 23. Plan of North Garden Variety Project

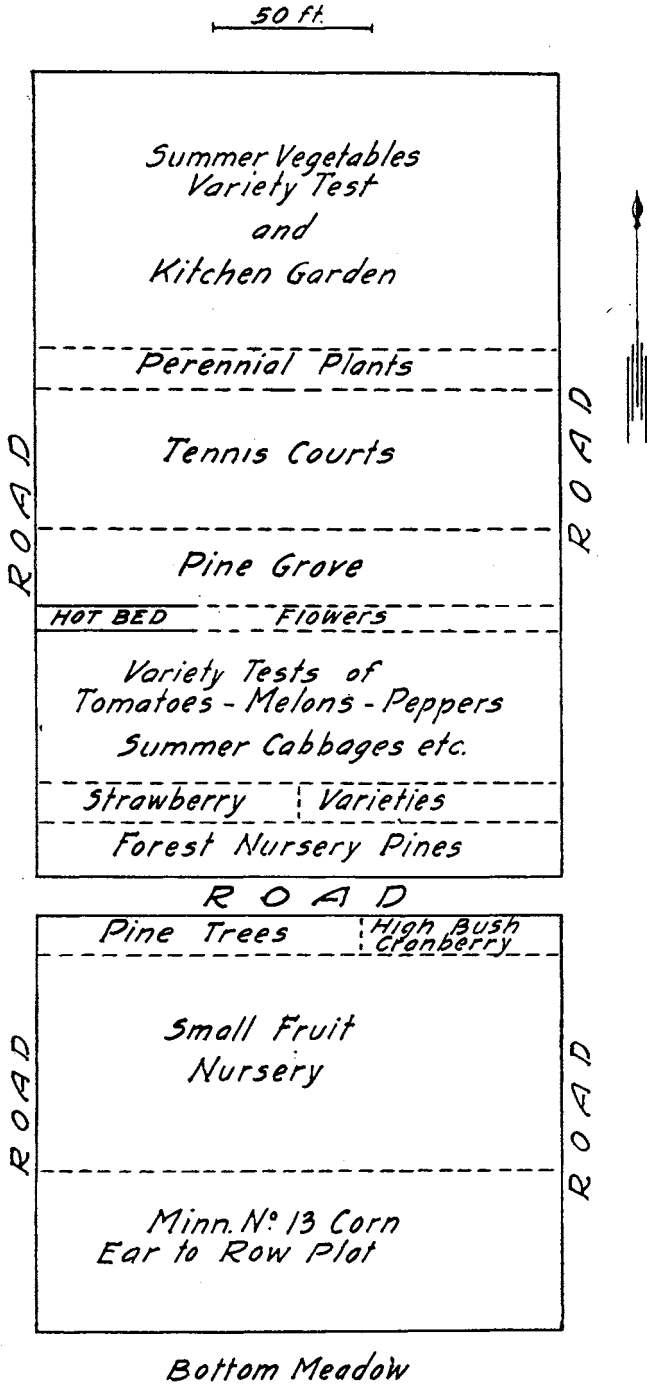


Fig. 24. Plan of South Garden Variety Project, Including Small Fruit Project

N. K. & Co. Premium Late Flat	Prize Head
Dutch	Tender Heart
Late Large Drumhead	Deacon
Improved American Drumhead	Salamander
Savoy	May King
Cauliflower:	Hanson Head
N. K. & Co. Drought Resistant	Big Boston
Snowball	Onions:
N. K. & Co. Model	Red:
Extra Early Dwarf	Minnesota Red Globe
Extra Early Paris	Early Red Flat
Kohlrabi:	Large Red Globe
White Vienna	Large Red Weatherfield
Radish:	Yellow:
White Olive	Australian Brown
Lady Finger	Ohio Yellow Globe
White Icicle	Yellow Globe
N. K. French Breakfast	Danvers Flat
Yellow Ball	Danvers Globe
Scarlet Olive	Prize Taker
Long Scarlet	Yellow Dutch
White Tip	White:
Scarlet Globe	Minnesota White Globe
Scarlet Turnip	White Silver Skin
Pearl	White Bermuda
Deep Scarlet	White Barletta
Sparkler	White Bunching
White Strasburg	White Lisbon
White Box	Southport White Globe
Early Frame	White Welsch
Rosy Gem	Minnesota Silver Skin
Shepherd	Peas:
Long Cardinal	Little Marvel
White Turnip	Surprise
Winter Radish:	American Wonder
Large Black Spanish	Abundance
China Rose	Telephone
Round Black Spanish	Alderman
Mammoth White	N. K. Summit
Lettuce:	Stratagem
Loose-leaf:	Alaska
Grand Rapids	Advancer
Early Curled	Champion of England
Black Seeded	Honey Sweets
White Cosmos	Teddy Roosevelt
Head:	Colossus
Golden Queen	Potlatch
Market Gardener	Delicatess
N. K. Sterling	White Marrowfat
Tennis Ball	Dwarf Defiance
All Seasons	Richard Seddan
As Crisp As Ice	Early Dwarf Telephone

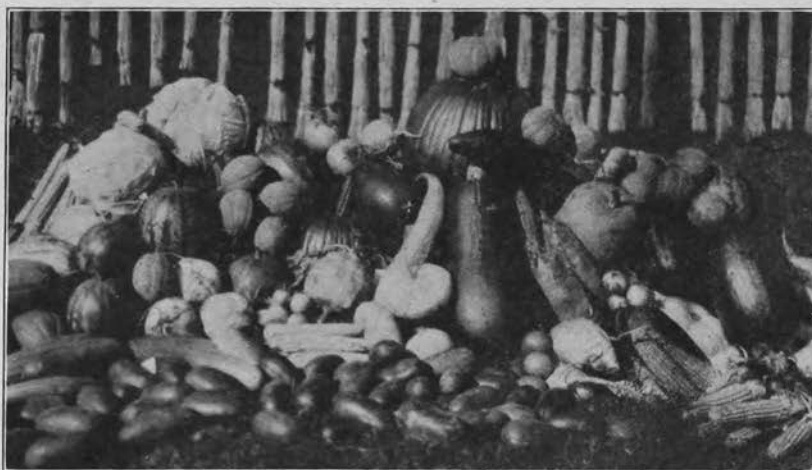


Fig. 25. Specimens from 1916 Variety Tests of Garden Crops

Beans:

Curries Black Wax
 Davis Kidney Wax
 Choice Navy
 Long Yellow Six Weeks
 Improved Golden Wax
 Extra Early Red Valentine
 Brown or Swedish
 White Tepary
 Red Kidney
 Boston Yellow Eye
 Burpees Kidney
 Henderson or Sieva
 New Wonder Bush Lima

Sweet Corn:

Golden Bantam
 N. K. & Co. Peep o' Day
 N. K. & Co. Portland
 Early Minnesota
 Early White Mexican
 Howling Mob
 Extra Early White Cory
 Extra Early Red Cory
 Perry's Hybrid
 Pocahontas
 Early Evergreen
 Early Crosby

Cucumber:

N. K. & Co. Siberian
 Early Green Cluster
 White Spine Evergreen
 White Spine Improved

White Spine Peerless
 Chicago or Westerfield
 Long Green
 Boston Pickling
 N. K. & Co. Early Long
 White Spine
 Klondike
 N. K. & Co. Sterling
 Ak-sar-ben
 Green Prolific
 Early Frame or Short Green
 Chinese Climbing
 Davis Perfect
 N. K. & Co. Pickling
 Cool and Crisp
 Improved Arlington White Spine

Muskmelon:

Improved Yellow Cantaloupe
 Long Island Beauty
 Osage or Miller's Cream
 Jenny Lind
 Extra Early Hackensack

Other varieties under test, results so far unsatisfactory, are:
 N.K. & Co. Yellow Meated Japan
 Rust Resistant Pollock
 Netted Rock
 Early Waters Improved
 Burrels Gem
 Defender
 Early Netted Gem
 Emerald Gem

Hoodoo	Neapolitan
Paul Rose or Petosky	Red Cherry
Tip Top	Tomatoes:
Extra Early Citron or Early Nutmeg	Earliana, Private Stock
Extra Early Hackensack	Sparks Earliana
Grand	Earliana Select
Hackensack or Turks-Cap	John Baer
Melon Peach	Crimson Cushion
Garden Lemon	Chalk's Early Jewell
Casabe Melon	N. K. & Co. Peerless
Watermelon:	N. K. & Co. Sterling
N. K. & Co. Klondike	Earlibell
N. K. & Co. Kentucky Wonder	Golden Queen
Fordhook Early	Early Dwarf Champion
Dixie	June Pink
Harris Earliest	Stone
Other varieties under test, results so far unsatisfactory, are: -	Livingston's Beauty
Dark Icing	Acme
Ice Cream or Peerless	Ponderosa
Kleckleys Sweets	Favorite
Kolb's Gem	Perfection (Livingston's)
Mammoth Ironclad	N. K. & Co. Early Minnesota
Phinney's Early	Livingston's Globe
Sweetheart	Fordhook Early
Tom Watson	Truckers Favorite
Golden Honey	Livingston's Coreless
Pumpkin:	Small:
Connecticut Field	Red Pear
N. K. & Co. Mammoth Prize	Yellow Cherry
Japanese Pie	Red Cherry
Large Cheese or Kentucky Field	Peach
Winter Luxury	Yellow Pear
Pepper:	Yellow Plum
Golden Dawn	Husk Tomato
Large Bell or Bull Nose	Squash:
Chinese Giant	N. K. & Co. Improved Hubbard
Long Red Cayenne	White Bush Scallop
Ruby King	Mammoth Chili
Red Chile	Citron:
	Have given good results and are recommended for preserves.

REPORT ON ORCHARD FOR 1916

The variety test of bush and tree fruits at this Station has been enlarged considerably the last year. The plantings were made the latter part of May, as soon as the frost was out of the ground. The cool, wet weather through June was exceedingly favorable for starting a new plantation, and the new stock made an exceptionally good growth and is going into the coming winter in fine condition. A very low percentage of the new plantings died during the summer when the stock was received in good order.

	1 (18)	16	1 (13)	M	12	K		1		G*	6					A	25	
	17		15		13	U		J*		H*	7		5	D	3	1	24	
18*	1 (17)	16	N		M	12	K	10	1	B	6*	6	K	4	C	2	A	23
	17		15		13	U		J*		H*	7		5	D	3	1	22	
18*	1 (350)	16	N	14	M	12	K	10	1	B	6*	6	E	A	C	2	A	21
	17		15		13	U		J*		H*	7		5	D	3	1	20	
18*	1 (3)	16	N	14	M	12	K	10	1	B	6*	6	E	4	C	2	A	19
	17		15		13	L		J*		H*	7		5	D	3	1	18	
18*	1 (12)	16	N	14	M	12	K	10	1	B	6*	6		4	C	2	A	17
	17		15		13	U		J*		H*	7		5	D	3	1	16	
18*	1 (7)	16	N	14	M	12	K	10	1	B	6*	6	E	4	C	2	A	15
	17		15		13	U		J*		H*	7		5	D	3	1	14	
18*	1 (32)	16	N	14	M	12	K	10	1	B	6*	6	E	4	C	2	A	13
	17		15		13	U		J*		H*	7		5	D	3	1	12	
18*	1 (12)	16	N	14	M	12	K	10	1	B	6*	6	E	4	C	2	A	11
	17		15		13	U		J*		H*	7		5	D	3	1	10	
18*	1 (38)	16	N	14	M	12	K	10		B		6	E	4	C	2	A	9
	17		15		13	U		J*		H*	7		5	D	3	1	8	
18*	1 (38)	16	N	14	M	12	K	10	1	B	6*	6	E	4	C	2	A	7
	17		15		13	U		J*		H*	7		5	D	3	1	6	
18*	1 (3)	16	N	14	M	12	K	10	1	B	6*	6	E	4	C	2	A	5
	17		15		13	U		J*		H*	7		5	D	3	1	4	
18*	1 (29)	16	N	14	M	12	K	10	1	B	6*	6	E	4	C	2	A	3
	17		15		13	U		J*		H*	7		5	D	3	1	2	
18*	1 (29)	16	N	14	M	12	K	10	1	B	6*	6	E	4	C	2	A	1

18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Limed 4000 per A
Manure 20 tons per A.

Dynamited
No Manure

Fig. 26. Plan of Tree Fruit Orchard
Plums and Cherries

- | | | |
|------------------|---------------------------|------------------------|
| 1. Cheresota | 7. Toka | 13. Yuttecca |
| 2. Opata | 8. Kahinta | 14. Wyant |
| 3. Hanska | 9. Wachampa | 15. Terry |
| 4. Sapa | 10. Etopa | 16. Topa |
| 5. San Sota | 11. Surprise | 17. Wastessa |
| 6. Egama | 12. Zekanta | 18. Compass Cherry* |
| A. Wealthy | Apples and Crabs | |
| B. (Vacant) | G.* Whitney crab | L. Gilbert Winesap |
| C. Duchess | H.* Early Strawberry crab | M. Delicious |
| D. Jewell Winter | I. Malinda | N. King David |
| E. Hibernial | J.* Sweet Russet crab | O. (Vacant) |
| F. (Vacant) | K. Charlamoff | U. University Seedling |

The new plantations include the following fruits:

GRAPES

Campbell's Early, Alpha, Hungarian, Dakota, Suelter, and Worden's Early. All of these made fair growth, and some vines of Campbell's Early produced four bunches of fruit.

RASPBERRIES

Herbert, Minnesota No. 30, Minnesota No. 31, Shipper's Pride, Golden Queen, Marlboro, Worthy, Shaffer, King, St. Regis, Cuthbert, Miller, Minnetonka Ironclad, Sunbeam, Gregg, and Columbian. All of these varieties made a very good growth and produced considerable fruit during August and early September.

BLACKBERRIES

Wilson Early, Snyder, Stone Hardy, Eldorado, Early Harvest, Blower, Watt, Erie, Iceberg, Ward, Mersereau, Kittatining, and Ancient Briton. The most of these varieties made exceptionally sturdy growths, some vines exceeding six feet in length. A few produced fruit.

DEWBERRIES

Premo, Lucretia, and Austin all made a good growth and bore some fruit which ripened the latter part of August.

GOOSEBERRIES

Red Jacket, Champion, Downing, Houghton, Keepsake, Portage, and Josselyn. Compared with other bush fruits the gooseberries made the least growth; however, in a few instances fruit was produced. The berries were of exceptionally large size.

CURRANTS

Victoria, North Star, Lee Prolific, White Grape, Red Dutch, Long Bunch Holland, Wilder, and Black Champion. In most cases these made satisfactory growth.

STRAWBERRIES

A few plants of the following strawberries were included in our variety tests this year: Bederwood, Brandywine, Chesapeake, Clyde, Inhance, Enormous, Early Ozark, Haverland, Lovett, Senator Dunlap, Marshall, Sample, Wm. Belt, Wolverton, and Warfield. This stock was in poor condition when planted. However, when the stock was in good condition the results were very encouraging.

TREE FRUITS

A new orchard of tree fruits was set out this year on a hill west of the Station buildings. This is a more exposed location and will afford better soil and air drainage than was available in the old

orchard. This change was made in order to safeguard the new plantation against blight and other diseases, which have almost destroyed the old orchard. The soil condition in the old orchard is also very poor. There is considerable seepage from the hillside where it is located, which we believe is the main cause of a lack of success in the past in growing tree fruits at this Station.

The new orchard includes the following fruits:

PLUMS

Variety	Trees	In poor condition when planted	Condition at beginning of winter	
			Weak	Dead
Cheresota.....	12	0	0	0
Opata.....	12	5	1	2
Hanska.....	12	1	3	2
Sapa.....	12	2	0	0
San Soto.....	12	0	0	0
Egama.....	12	0	0	0
Toka.....	12	0	0	0
Kahinta.....	12	0	0	1
Wachampa.....	3	0	0	0
Etopa.....	12	4	1	1
Surprise.....	5	1	0	0
Zekanta.....	13	1	0	2
Yutteca.....	12	0	2	0
Wyant.....	11	1	0	1
Terry.....	12	0	0	0
Topa.....	13	5	1	2
Wastessa.....	12	4	7	1
Compass Cherry.....	12	0	0	0

APPLES

Wealthy.....	13	0	1	1
Duchess.....	12	4	0	0
Jewell Winter.....	12	0	2	0
Hibernal.....	10	0	0	0
Malinda.....	12	6	1	0
Charlamoff.....	14	4	0	0
Delicious.....	13	5	0	0
King David.....	12	6	1	3

UNIVERSITY SEEDLING APPLES

Minnesota No.				
36.....	1	0	0	0
100.....	1	0	0	0
79.....	1	0	0	0
A-1.....	1	0	0	0
81.....	1	0	0	0
269.....	1	0	0	0
104.....	1	0	0	0
82.....	1	0	0	0
20.....	1	0	0	0
20-G.....	1	0	0	0
?.....	4	0	0	0
132.....	1	0	0	0
272.....	1	0	0	0
135.....	1	0	0	0

UNIVERSITY SEEDLING APPLES

Variety	Trees	In poor condition when planted	Condition at beginning of winter	
			Weak	Dead
Malinda No.				
29.....	2	1	0	0
3.....	2	0	1	0
38.....	2	0	0	0
12.....	1	0	0	0
32.....	1	0	0	0
7.....	1	0	0	0
12.....	1	0	0	0
35.....	1	1	0	0
17.....	1	0	0	0
18.....	1	0	0	0
13.....	1	0	0	0
Gilbert Winesap.....	1	0	0	0

CRAB APPLES

Whitney.....	12	0	0	1
Early Strawberry.....	12	4	0	2
Sweet Russet.....	12	1	0	0

The total number of trees planted was 369, of which 59 were in poor condition when planted, either from dry roots or dry tops or both. Three hundred and fifty lived throughout the season, 21 made a weak growth, and 19 died during the summer, leaving 329 out of 369 trees to go into the winter in good condition.

FORESTRY INVESTIGATIONS

Forestry work dates back to 1897, when seedlings were purchased and planted in nursery rows by Warren Pendergast, then superintendent at this Station. These seedlings included white, Norway, Scotch, and jack pine. The Norway and jack pine seedlings were wild stock. In 1899, thirty-two acres on a rough and stony cut-over area were platted into one-acre tracts of 10 by 16 rods. Most of these plots were planted in 1900 and 1901 to Norway, white, and jack pine at varying distances as follows: 4x4, 6x6, 8x8, and 10x10 feet. In some of these plots only one kind was planted, in others the rows were alternated between the different kinds of pines. This planting was done under the supervision of Herman H. Chapman, who was then superintendent.

The entire tract was burned over in the spring of 1905. The south plots containing most of the white pine and some of the Norway were severely injured. The portion of the plantation not greatly injured by fire shows good growth, as indicated by the records below, showing results of measurements taken in 1916.

TABLE XXXVIII
GROWTH OF PINES PLANTED AT VARYING DISTANCES, ALONE
AND IN COMBINATION

Species	Spacing	Diameter			Height
		Max.	Min.	Av.	
White pine.....	4 x 4	4.0	3.0	3.5	16 - 22
White pine.....	6 x 6	4.3	3.8	4.0	16 - 20
Norway pine.....	4 x 4	7.0	3.5	5.0	15 - 20
Norway pine.....	6 x 6	6.0	5.0	5.3	19 - 22
Norway pine.....	8 x 8	6.0	5.5	6.0	18 - 20
Norway pine.....	10 x 10	7.0	5.5	6.4	22 - 26
Norway pine alternating with white					
White.....	6 x 6	5.0	3.0	4.1	16 - 20
Norway.....	6 x 6	5.5	2.5	4.7	16 - 24
Norway pine alternating with jack					
Jack.....	6 x 6	7.0	5.5	5.8	20 - 28
Norway.....	6 x 6	6.0	4.5	4.6	18 - 24
White pine alternating with jack					
Jack.....	6 x 6	7.5	4.0	5.8	20 - 28
White pine.....	6 x 6	5.0	3.5	4.2	18 - 22
Scotch pine alternating with Norway					
Scotch.....	6 x 6	6.0	4.5	5.5	20 - 26
Norway.....	6 x 6	6.0	4.0	5.1	20 - 26
Scotch.....	6 x 6	6.0	3.0	5.1	18 - 24

White pine has suffered somewhat from tip-worm, and Scotch pine has been considerably injured by branch-knot. The Norway and jack pines are in perfect condition.



Fig. 27. Forestry Plantation
Norway pines 6 feet apart each way, fifteen years after planting

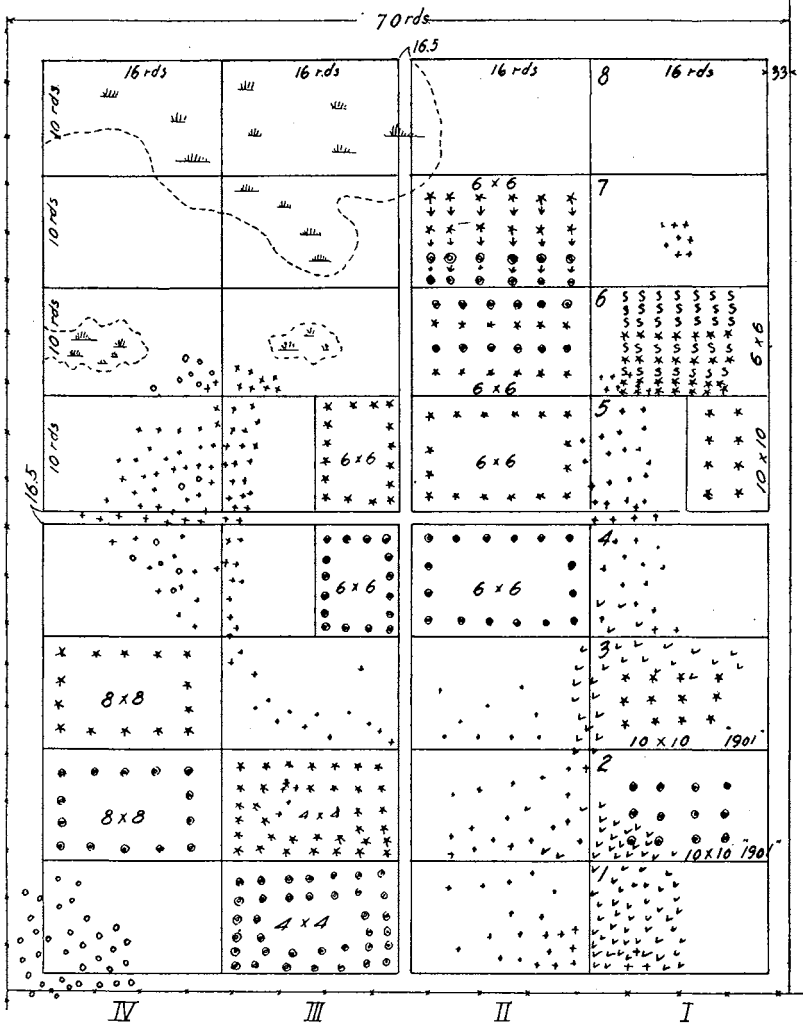
In 1916 the regents of the University approved setting aside fifty acres for forest plantation and wood lot. This fifty acres included the

present plantation, which will be increased from time to time by transplanting seedlings of different kinds of pine that have already been planted in nursery rows for that purpose.



Fig. 28. Native Woodlot

In 1916 three thousand pines of the various kinds were set out north of the Station grounds as a windbreak. Part of this windbreak area will receive cultivation. The remainder was planted on cut-over land among stumps, the object being to compare the growth of pine windbreak plantations under tillage and with no tillage.



KEY TO PLAT

Original Timber { <ul style="list-style-type: none"> White pine ○ Norway × Jack △ 	Planted areas { <ul style="list-style-type: none"> White pine ● Norway * Jack ↓ Scotch 5
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Fig. 29. Forestry Project
 Series numbered in Roman numerals from east to west.
 Series numbered in Arabic numerals from south to north.

THE DAIRY RECORD

The Station is carrying a herd of grade Guernseys, including from 40 to 50 milk cows, and from 60 to 80 head of young stock, averaging approximately one hundred and twenty head in all. This herd is headed by registered Guernsey sires.

The project of breeding up a herd of grade Guernseys from common and mixed blood cows with registered Guernsey sires was begun in

1905. Since that time a complete record of the feed and production of each cow has been kept. In 1905 the average butterfat production per cow was 196 pounds. In 1916 this production had increased to 300.7 pounds of butterfat, showing the results that can be obtained by using a sire backed by high production, and by careful elimination of the poor individuals based on the Babcock test and feeding records.

Of the original cows, Bell, a grade Red Polled, is the only one now in the herd, so that with this exception the herd is composed of grades with Guernsey blood of one half and up. No females have been bought in the last seven years. The maximum record in 1913 was held by Grace 4th, one half Guernsey, her annual record being 397 pounds butterfat. Since then 12 cows have surpassed this record. We have now in the herd ten cows having a yearly record of more than 400 pounds of butterfat. Spot, a fifteen-sixteenths Guernsey, stands at the head of the herd with a record of 492.6 pounds of butterfat.

No registered females have ever been owned by this Station. However, the time has now arrived when this policy should be abandoned, as many farmers in this region have included registered Guernsey females in their herds; for which reason the Station can no longer serve them by supplying them with breeding stock.

For several years our dairy herd has been subjected annually to the tuberculin test, and the late tests indicate that the herd is absolutely free from tuberculosis.

TABLE XXXIX
DAIRY HERD RECORD

	1911	1912	1913	1914	1915	1916
Average number of cows milking.....	30	44	47	34	41	41
Average number of weeks milking per cow.....	43	45	48	47	45	49
Average pounds of milk per cow.....	5,300.9	5,370.6	5,312.5	5,518.7	5,721.2	6,281.0
Average pounds of butterfat per cow.....	226.6	235.8	236.6	259.0	279.8	300.7
Average percentage of butterfat.....	4.27	4.39	4.4	4.7	4.9	4.78
Average value of butterfat per cow*.....	\$67.98	\$70.74	\$70.98	\$77.70	\$83.95	\$90.21
Average pounds of grain per cow.....	1,189	1,183	1,674	1,416	1,949	2,298
Average cost of grain per cow†.....	\$14.86	\$14.97	\$20.92	\$17.70	\$24.36	\$28.72
Average pounds roughage per cow.....	1,962	2,192	2,217	2,094	2,978	4,406
Average cost of roughage per cow†.....	\$9.86	\$10.96	\$11.08	\$10.47	\$14.89	\$22.03
Average pounds succulence per cow.....	6,596	5,549	5,741	4,827	4,861	1,385‡
Average cost of succulence per cow.....	\$8.25	\$6.93	\$7.18	\$6.03	\$6.08	\$1.73
Average pounds fodder corn per cow.....			686			292
Average cost of fodder corn per cow.....			\$1.71			\$0.73
Average total cost of feed per cow.....	\$32.97	\$32.68	\$40.89	\$34.20	\$45.33	\$53.40
Average value of butterfat above cost of feed.....	\$35.01	\$38.06	\$30.09	\$43.50	\$38.62	\$36.81
Date put into pasture.....	May 6	April 28	May 18	May 17	May 16	May 20
Date taken from pasture.....	Nov. 5	Nov. 4	Oct. 12	Nov. 9	Oct. 4	Oct. 9
Days stall fed.....	182	176	218	189	224	224
Days part stall fed and part pastured.....	15	34	14	21	16	7
Days pastured.....	168	156	133	155	125	135

* Butterfat valued at 35 cents per pound.

† Cost of feed per ton: grain, \$30; hay, \$10; ensilage, \$2.50; corn fodder, \$5; roots, \$2.

‡ Plus 188 pounds of roots, 19 cents.

The summarized dairy herd record for the years 1911 to 1916 inclusive show the comparative production and the value of feeds. Common factors have been used, as follows: Butterfat 35 cents per

pound, mill feeds \$30 per ton, hay \$10 per ton, ensilage \$2.50 per ton, corn fodder \$5 per ton, and roots \$2 per ton. During these six years the production has increased as follows: Average milk per cow from 5,300.9 pounds to 6,281.0; butterfat from 226.6 pounds to 300.7. The percentage of butterfat in milk has also increased from 4.27 per cent to 4.78, which shows the increasing Guernsey characteristic in the higher butterfat content in the milk. The average total cost of feed per cow, not including pasture, was \$39.93. The average number of days on pasture for the six years has been 145 days.

The value of the butterfat in excess of cost of feed is taken as the net profit. Assuming that the skim-milk, manure, and offspring will cancel the cost of labor, interest on investment, housing, and land rental for pasture, the values per cow are approximately as follows: skim-milk \$21; manure \$15 to \$60 per cow, based on the value of the increased crop returns in a rotation of oats, clover and timothy meadow, and corn or potatoes; calf or offspring \$9 to \$30, the value of the calf varying according to the production of its dam. The total credit to each cow besides value of butterfat is from \$40 to \$90.

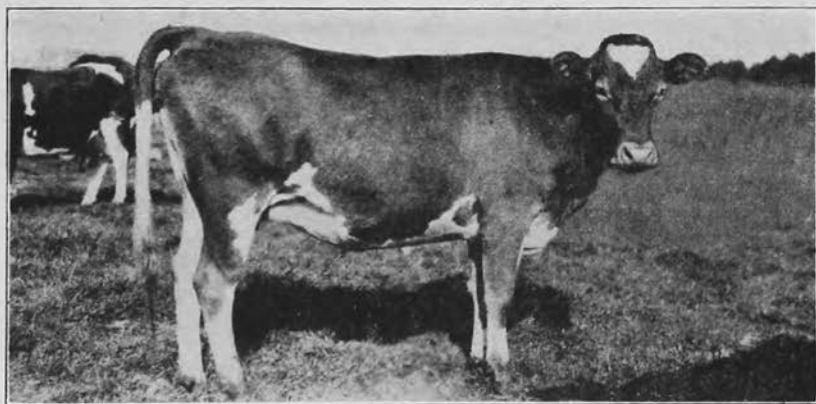


Fig. 30. Ida 2322, Three fourths Guernsey
Bred at North Central Experiment Station.

Expenses of cow besides feed: rental for pasture \$3 to \$8; labor \$40 to \$60; interest on investment \$8 to \$10; total \$51 to \$78. However, on many farms the land rental for pasture should be cancelled as the soil is improved and the cost of clearing is lessened by pasturing.

The data on stump-land pasture included in Table XLI emphasize the advisability of brushing and seeding down stump lands, as the net profit per acre from stump lands after being seeded down to grass for several years will almost equal the original cost of brushing and seeding, when grazed by dairy cows.

TABLE XL
INDIVIDUAL DAIRY HERD RECORD, 1916

Name of cow	Breed	Years milking	Weeks milking since Jan. 1, 1916	Weeks in lactation Jan. 1, 1917	Milk	Butterfat	Value of butterfat*	Grain	Roughage	Ensilage	Corn fodder	Roots	Total cost of feed†	Value of butterfat above feed
					Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.		
Spot	Fifteen sixteenths Guernsey	5	50	5	11,119.0	479.4	\$167.79	3,140	4,899	1,190	210	434	\$74.03	\$93.76
Brindle	Four fifths Guernsey	6	52	2	8,373.8	416.2	145.67	2,881	5,333	770	210	218	71.57	74.10
Ida 2-3-2	Three fourths Guernsey	3	44	4	7,735.8	356.9	124.92	2,500	3,387	2,286	385	175	58.44	66.48
Bell	Grade Red Polled	11	52	55	7,533.0	285.6	99.96	2,734	4,942	630	525	190	68.00	31.96
Stuffy 5	One half Guernsey	2	42	3	2,823.1	158.3	55.41	1,230	3,380	2,677	210	140	39.36	16.05
Sawyer	One half Guernsey	5	48	40	7,199.2	398.1	139.34	2,968	4,866	700	210	190	70.44	68.90
Grace	Common	16	52	74	4,444.3	183.8	64.33	1,727	4,489	805	385	190	50.52	13.81
Ida 2-2-2	One half Guernsey	2	51	20	5,700.9	298.2	104.37	2,261	4,614	805	385	190	59.15	45.22
Garden 3	Three fourths Guernsey	1	51	20	3,455.2	195.0	68.25	1,856	4,295	665	385	190	51.30	16.95
Ida 2-2	Grade Red Polled	7	52	73	5,047.1	258.8	90.58	2,051	4,691	840	385	190	56.43	34.15
Exelda	Four fifths Guernsey	7	51	35	7,425.2	365.2	127.82	2,791	4,684	910	385	175	67.56	60.26
Bell 4	One half Guernsey	3	49	49	5,972.3	284.3	99.51	2,513	4,663	770	385	190	63.13	36.38
Lily	Three fourths Guernsey	1	52	85	4,827.9*	255.2	89.32	1,937	4,347	700	210	218	52.41	36.91
Price	One half Guernsey	6	51	18	4,805.4	240.4	84.14	2,139	4,537	700	210	218	56.38	27.76
Grace 5	One half Guernsey	5	51	18	5,284.2	278.1	97.34	2,182	4,789	910	385	190	58.96	38.38
Tou 2	Pure bred Guernsey	2	49	13	6,592.8	316.1	110.64	2,211	5,010	910	385	190	60.50	50.14
Lou 2	Common	4	38	..	3,130.7	155.5	54.43	1,405	4,481	735*	210	218	45.15	9.28
B. & White	Grade Holstein	4	49	..	5,697.8	237.6	83.16	1,808	3,803	2,668	455	175	50.79	32.37
Bell 3-2	Three fourths Guernsey	1	44	39	5,144.4	246.8	86.38	1,837	4,125	1,435	210	175	50.68	35.70
Judy 3-2	Three fourths Guernsey	6	49	47	5,828.6	285.9	100.07	2,220	4,782	910	385	190	59.50	40.57
Grace 4	One half Guernsey	7	50	..	2,973.1	144.8	50.68	1,440	4,572	735	385	190	46.53	4.15
Judy 3-2	Seven eighths Guernsey	1	52	86	3,569.2	180.3	63.11	1,652	4,293	735	210	218	47.91	15.20
Mary 2	Common	7	46	1	5,161.8	228.8	80.08	2,204	4,691	910	385	190	58.81	21.27
Stuffy 4	One half Guernsey	3	52	27	5,386.3	290.1	101.54	2,064	4,123	2,830	210	175	55.82	45.72
Lucy 2	One half Guernsey	7	50	..	5,795.7	223.5	78.22	2,011	4,912	720	385	190	56.78	21.44
Mary 2-2	One half Guernsey	2	47	17	5,099.8	229.9	80.47	2,270	5,017	910	385	190	61.43	19.04
Sawyer 2	Three fourths Guernsey	3	51	8	7,865.8	354.9	124.22	2,900	5,006	350	385	190	70.12	54.10
Four 3	Pure bred Guernsey	3	49	43	6,726.9	335.1	117.28	2,164	3,379	1,633	210	175	52.09	65.19
Four 2	Pure bred Guernsey	4	52	..	7,177.8	338.7	118.55	2,151	4,401	1,864	210	140	57.27	61.28
Garden 2	Seven eighths Guernsey	2	49	47	7,736.2	399.4	139.79	3,260	5,332	350	385	195	77.16	62.63
Grace 4-2	One fourth Guernsey	4	50	19	7,413.2	328.6	115.01	2,620	3,941	2,375	210	175	62.68	52.33
Jersey	Half Jersey, half Guernsey	6	52	39	8,455.8	387.2	135.52	2,323	3,822	2,305	210	175	57.54	77.98
Grace 7	One half Guernsey	3	47	47	6,466.2	278.6	97.51	2,009	3,541	1,595	210	175	50.53	46.98
Stella 5	One half Guernsey	4	52	41	7,172.3	345.2	120.82	2,620	3,923	1,958	210	75	61.97	58.85
Roxy 3-2	One half Guernsey	4	50	6	5,885.3	301.6	105.56	2,347	3,965	1,961	210	175	58.19	47.37
Roxy 4	One half Guernsey	6	45	33	6,964.1	374.9	131.22	2,459	4,318	2,130	210	175	61.83	69.39
Bell 3	One half Guernsey	4	47	38	8,635.0	395.8	138.53	2,823	4,315	2,246	210	175	67.44	71.09
Ida 2-4	One half Guernsey	4	52	56	7,042.5*	393.8	137.83	2,680	4,269	2,528	210	175	65.40	72.43
Distant 2	One half Guernsey	4	49	4	7,766.0*	396.7	138.85	2,729	4,362	2,423	210	175	66.47	72.38
Brindle 2	Eight ninths Guernsey	3	50	50	8,870.8	409.5	143.33	2,771	4,346	2,323	210	175	66.89	76.44
Spot 2	Thirty-one thirty-seconds Guernsey	1	49	49	7,216.9	297.6	104.16	2,323	3,986	1,850	210	175	57.79	46.37

* Butterfat valued at 35 cents per pound.

† Cost of feeds: Grain \$30 per ton, hay \$10, ensilage \$2.50, corn fodder \$5, roots \$2.

The individual dairy herd record for 1916 follows:

TABLE XLI
PRODUCTION OF 55 DAIRY COWS ON STUMP-LAND PASTURE
FOR 4 MONTHS, 17 DAYS, 1915

Pasture, 79 acres of stump-land, brushed and seeded, 19 acres of timber, and 15 acres of muskeg. Total, 113 acres.		
Average number pastured.....		55.4 cows
Average number milking.....		49.8 cows
Production from May 16 to October 3—4 months, 17 days:		
Milk 134,650.1 pounds. 134,650.1 pounds less 21,509.0 pounds cream equals 113,141.1 pounds skim-milk.		
Cream, 21,509.0 pounds, contained 6,597.5 pounds of butterfat.		
Value:		
Butterfat 6,597.5 pounds at \$0.28, equals.....	\$1,847.30	
Skim-milk 113,141.1 pounds at \$0.35 per hundred weight	395.99	
		\$2,243.29
Cost of feed (concentrates).....	609.50	
Cost of labor.....	477.85	
		1,087.35
Net.....		\$1,155.94
Gross production per cow, 4 months, 17 days.....	\$40.49	
Net profit above cost of labor and concentrates.....	20.87	
Net profit per acre on stump-land pasture.....	14.63	
Net profit per acre on whole pasture.....	10.23	
Gross profit per cow per month (less concentrated feed).....	6.46	
Gross profit per acre, per month (less concentrated feed) on stump-land	\$4.53	
Gross profit per acre, per month (less concentrated feed) on whole pasture	3.17	

