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Page	Staff Member	(Expt. Sta) or Location (County)	Preceding Crop	Soil Type	Soil Moist in Experiment Year	Soil Test Information pH	OM	P	K
11	Lowell Hanson, J. Grava	given in text							
44	Grava, Rust, etal.	The Necessary information is given in text							
68	Caldwell, Kline	Goodhue County		Fayette si.l.		7.0		M	
69	Caldwell	Rosemount	given in text	Port Byron si.l.		6.5	3.0	M	M
71	Caldwell	Rosemount		Port Byron	si.l.	5.8	4.2	M	M
74	Martin	Nicollet County		Webster c.l.		6.8	—	14	170
81	Caldwell, Kline	Waseca		Nicollet	below normal	5.7	6.9	16-32	175-280
82	Caldwell, Kline	Morris	To complex for appendix	Barnes	very low	7.1	4.6	9	280+
83	Caldwell, Kline	Crookston		Bearden		7.6	5.1	14	280+
95	Overdahl	Wadena County			below normal	given in text			
96	Overdahl	Wadena County			below normal	given in text			
96	Caldwell	Rosemount	corn	Port Byron		6.2	4.0	Low	M
97	Soils Unit (Martin)	Rosemount	corn	Port Byron	si.c.l.	5.8		17	105
99	Lowell Hanson	Meeker County	corn	Wadena l.	below normal	6.5	Med.	15 med.	80 Low
101	Overdahl	S. Western Counties			normal				
104	Burson, Rost	Rosemount	corn	Port Byron	si.l.		Low	Med-Low	M-L

Page	Staff Member	Location	Crop	Soil Type	Year	pH	O.M.	P	K
116	MacGregor etal.	given in text							
124	Blake and MacGregor	Waseca							
127	Blake and MacGregor	Morris							
131	Caldwell and Halverson	Clay County	Alf.	Bearden si.l.				low	high
132	Caldwell and Weber	Rosemount		Port Byron		6.5	5.0	low	low
133	Burson and Rost			Port Byron si.l.		6.5	M	M	L-M
138	Burson, Arneman, etal.	Necessary information is given							
141	MacGregor	Rosemount	Alf.	Port Byron si.l.		5.2 limed to 7.5			
144	Burau and MacGregor	Polk County etal.				All calcareous soils			
148	MacGregor and Hanson	Several areas			Five soils of different pH and fertility.				
151	Hanson, Hrug	Wabasha County		Fayette si.l.	above ave.		high	high	si.l.
152	Burson, etal.	Rosemount	pasture	Port Byron si.l.	—	6.5	M	M	L-M
154	Burson	Rosemount		" "		"	"	"	"
156	Burson, Holcomb	Rosemount		" "		"	"	"	"
159	Caldwell etal.	Grand Rapids		Unclass		6.1		VH	M
159	"	Crookston				given in text			
160	"	R.R. Valley Potato Research Farm				"	"	"	
161	Overdahl	St. Cloud				"	"	"	
163	Arneman	Necessary information is given							
164	Hermanson and Farnham	Wright County		Peat				Low	Low
167	Hermanson and Farnham	Clearwater County	meadow	Peat				V.Low	V.Low
169	Hermanson and Farnham	Aitkin County(1957)		Fibrous Peat	Average	5.7		V.High	M
170	Hermanson and Farnham	Aitkin County (1958)	wild growth	"	below normal	5.1		Low	V.Low
173	Hermanson and Farnham	St. Louis County		Fibrous Peat		5.2		18. Med 35 V.Low	

Page	Staff Member	Location	Crop	Soil Type	Year	pH	O.M.	Page 3 P	K
175	Hermanson and Farnham	Grand Rapids	Virgin Pasture	Peat		3.8		6 Low	50 V.Low
176	Hermanson and Farnham	Aitkin County		Fibrous Peat	Average	5.6		8 Low	48 V.Low
178	Farnham etal.	St. Louis County	Virgin	Fibrous Peat		5.2		18 Med.	35 V.L.
180	MacGregor	Rosemount		Port Byron si.l.	Above Average	6.5	M	M	L-M

A Report on Soils and Soil Fertility

(A compilation of recent experimental results by personnel of the Department of Soils and Extension Specialists and Agronomists at the Branch Stations at Crookston, Duluth, Grand Rapids, Morris, Rosemount, and Waseca).

University of Minnesota

April, 1960

The results herein reported are largely based on experiments carried on in 1959 only, and should not be regarded as the results obtained over a number of years. The investigations are those of a more practical nature, and do not include some of the more theoretical problems presently under study in greenhouse and laboratory. Because these are largely single year results, general conclusions are not in order and results are not for publication. Additional information on field location, soil tests, previous cropping history, and other data from each field are included in the appendix.

Minnesota Weather During the ~~1960~~ 1959 Growing Season

From April through September, temperatures were above normal, the greatest increase occurring in the central portion of the state. At the same time, summer precipitation was above normal in the southern and in the northern sections, with many portions of the central area suffering drouth conditions in late July and August. The elevated temperatures and deficient precipitation resulted in a substantial lowering of possible crop yields in the most seriously moisture deficient central Minnesota areas.

The Recent Climatic Change

Donald G. Baker

Average summer, winter and annual temperatures were determined for several time periods at 19 Minnesota stations. Based on linear regression equation the stations showed an average summer, winter and annual increase of 1.4, 3.7, and 1.3°F., respectively, for the period 1900-1958. It appears that the recent warming began about 100 years ago.

The cause or causes of the warming trend are not yet definitely established. Therefore no prediction can be made whether or not the trend will continue.

For agriculture the essential point is that warmer air can evaporate more water; therefore of the precipitation that does fall more water is evaporated into the atmosphere and less is available for plant growth.

If the warming trend should continue, there may be a gradual shifting of crop boundaries northward, and, assuming precipitation does not change, a greater hardship will be placed upon those areas already in a marginal moisture position.

This study is being continued to determine if equivalent temperature changes have also occurred in the spring and fall, and if there have been any noticeable trends in seasonal and annual precipitation totals.

PRESENT STATUS OF THE MINNESOTA SOIL SURVEY - (1960)

Counties surveyed:	Year of Survey	
Blue Earth (Detailed survey)	1906	Out of print
Rice (Detailed survey)	1909	"
Goodhue (Detailed survey)	1913	"
Ramsey (Detailed survey)	1914	"
Pennington (Detailed survey)	1914	"
Anoka (Detailed survey)	1916	"
Stevens (Detailed survey)	1919	"
Jackson (Detailed survey)	1923	Limited supply
Olmsted (Detailed survey)	1923	"
Lac qui Parle (Detailed survey)	1924	"
Wadena (Detailed survey)	1926	"
Lake of the Woods (Reconnaissance survey)	1926	
Mille Lacs (Part detailed, part reconnaissance)	1927	
Hennepin (Detailed survey)	1929	Out of print
Houston (Detailed survey)	1929	"
Hubbard (Detailed survey)	1930	"
Kanabec (Part detailed, part reconnaissance)	1933	Limited supply
Red River Valley Counties (Reconnaissance survey)	1933	
Traverse, Wilkin, Clay, Norman, Polk, Red Lake, Marshall, Kittson		
Pine (Part detailed, part reconnaissance)	1935	
Roseau (Detailed Reconnaissance survey)	1936	
Winona	1941	Limited supply
Rock (Detailed survey)	1950	
Brown (Semi detailed survey)	1951	
Washington	1952	Limited supply
LeSueur (Semi detailed survey)	1954	
McLeod (Detailed survey)	1955	
Mower (Detailed survey)	1956	
Faribault (Detailed survey)	1957	
Fillmore (Detailed survey)	1958	
Isanti (Detailed survey)	1958	
Nicollet (Detailed survey)	1958	
Scott (Detailed survey)	1959	

Counties being surveyed or maps being published:

Dakota	Crow Wing
Dodge	Wright
Wabasha	Sherburne

The soil maps and reports are published and distributed by the U. S. Department of Agriculture; the Minnesota Agricultural Experiment Station does not generally supply them, but a limited number of copies are on hand and are available as long as the supply lasts. Requests should be made to Department of Soils, Institute of Agriculture, St. Paul 1, Minnesota. Free copies of the maps and reports also may be obtained from a Minnesota representative in Congress as long as his supply lasts or from the Office of Information, U. S. Department of Agriculture, Washington 25, D. C. After their copies are exhausted, copies may be purchased for a fee from the Superintendent of Documents, Government Printing office, Washington 25, D. C. Some of the early reports are now out of print but may be consulted in libraries throughout the state.

Soil Productivity Study

R. H. Rust and J. E. Foss

The soil productivity study which began in 1956 is an attempt to gain reliable estimates of the productivity of major soil types in Minnesota. This productivity is estimated for the major crops under several generally specified soil management programs. The estimates are incorporated in the soil survey reports published for the individual counties by the Soil Conservation Service, USDA, and The Experiment Station, cooperatively.

To date just over 300 farm cooperators are participating by providing annual crop and soil management data on about 325 fields. Of an original selection of about 90 extensive soil types data is being received on some 60 different soils. Examples of the data being recorded are as follows: date and rate of seeding; estimate of stand; soil amendments used in kind and amount; moisture and temperature conditions throughout growing season; weed and insect control measures; date of harvesting; yield and losses to yield from harvesting or abnormal conditions; soil tests for pH, available P and K, organic matter.

Since the estimates are to be based on multiple regression analysis, relatively large numbers of observations (in general more than 30) of each crop on the various soils are necessary in order to establish reliability. In order to reflect some notion of the yield variability associated with weather observations must be spaced geographically and in time (i.e. over some minimum period of years - 5 to 10).

With the foregoing limitations it is not yet possible to make completely reliable statements about the data. It does, however, seem possible to indicate certain relationships associated with higher yields, particularly of corn. The following comments (except no. 9) are derived from a study of yields reported on Clarion, Hayden, and Webster soils. Clarion soils were developed under grass vegetation with good profile drainage on calcareous clay loam till. Hayden soils are similar in topography and parent material but were developed under forest vegetation. Webster soils developed on similar parent materials as Clarion and Hayden but under slough-grass cover.

1. In the 3 year period 1956-58 the summer rainfall (June through August) ranged in two general amounts (1) a total of about 5-6 inches and (2) a total of 11-13 inches. The difference in corn yields (not adjusted for other factors) was about 30 bushels for the higher amount, or about 3-4 bushels per additional inch.

2. Contrary to expectation, there was no overall increase in yield associated with increased stands (ranging from about 12 to 24,000 plants per acre). This result seems to be due to the part that several stands in excess of 20,000 were found in areas of low rainfall (5-6 inches) and suffered definite yield depression. On the other hand, some stands of about 12,000 plants were in areas of higher rainfall (and coupled with adequate fertility, etc.) produced above average yields. The average stand reported on these three soils for this 3-year period was about 17,000 per acre (near to current recommendations).

3. As regards the use of the major nutrients--N, P, and K--the following relationships appear.

a. There is an apparent increase of about 10 bushels corn yield per acre with the use of about 100 pounds N in the form of legumes or manufactured nitrogen. In the seasons of 11-13 inches rainfall the increase seemed to be about 20 bushels for this amount of N whereas, with 5-6 inches of rainfall there seemed to be less than 5 bushels per acre increase.

b. There is an apparent increase of about 15 bushels per acre for P applications increasing from about 20 to 80 pounds per acre (i.e. no applications below 20 pounds recorded), or about 1 bushel for 4 pounds P_2O_5 equivalent. This is P from manures and manufactured products. Webster soils also show a similar increase for P.

c. There is an apparent increase of about 15 bushels per acre on Clarion and Hayden for K applications increasing from 20 to 120 pounds per acre. This is K applied in manures and commercial fertilizers. The apparent increase is greater on Hayden (timered) than on Clarion (grass-developed) soils.

4. The average harvesting loss is reported as about 5 percent, ranging from a few percent to 15 percent.

5. Approximately 20 percent of the cooperators used chemical weed control.

6. The average maturity rating of corn hybrids planted for grain was about 105 days.

7. The approximate rotation used was R-R-R-G-M on the Clarion soils; R-R-G-M-M on Hayden; and R-R-G-M on the Webster (R=row crop, G=grain, M=meadow).

8. The average corn yields reported for 1956-58 was 73 bushels per acre on Clarion, 95 bushels on Hayden, and 88 bushels on the Webster. There was a wide variation in reported yields, ranging from 48 to 146 bushels per acre.

9. Cooperators were asked to estimate crop production losses from a number of hazards. The following table gives the percentage of fields having significant crop losses (more than about 15% of the crop).

Table 3. Per cent of fields having crop losses from various hazards. (all soils)

	Corn	Oats	Alfalfa	Alfalfa-Brome	Soybeans	Other Small Grains
Disease	3	10	0	0	0	8
Flood	10	10	14	7	10	11
Frost	1	0	0	2	0	0
Hail	3	7	2	2	23	6
Insects	14	0	4	12	3	3
None reported	69	73	80	77	64	72

On about 30 per cent of the fields significant losses were reported and, on the average, flooding reduced yields on about 10 per cent of the fields.

MINNESOTA-TEST DEMONSTRATION PROJECT

Roger Harris

This program will run for five years, 1958 through 1962, in five north central Minnesota counties. They are Crow Wing, Hubbard, East Otter Tail, Todd, and Wadena. Twenty-five cooperating farms are participating.

The Tennessee Valley Authority is cooperating in the project, especially in supplying fertilizing material at a reduced cost. The study will attempt to determine the degree of excellence of newer fertilizing materials in addition to other objectives.

Aims and Objectives

The principal aim of this project is to test and demonstrate the adjustments in farm practices and farm organizations that are expected to improve farm income in the selected area. It is hoped that the economic impact of adjustments in specific farm practices such as fertilizing according to soil test recommendations, improved pasture management, and improved feed rations can be ascertained and demonstrated to other farmers. The impact of improved technology on the over-all crop and livestock organization of an individual farm unit will also be determined and demonstrated.

The soils of the area are generally low to medium in nitrogen, high in phosphorus, and low in potash. They are mostly sandy to sandy loam and were developed under forest conditions. On most farms of the area (dairy) feed production, farm income, and enterprise management pose the more important problems.

In order to meet the fertility requirements in an efficient manner "straight goods" were blended locally in order to supply adaptable grades. They are as follows:

Small grain (oats)	15-5-30
Alfalfa	0-15-45
Corn (starter)	10-20-30
Corn (sidedressing)	30-10-0

With only two crop years completed nothing conclusive has been determined as to results. Low starting fertility level, dry seasons, and financing problems have made for a slow start of the program.

In general, to date (1/1/60) our observations as to fertilizer results are as follows:

Oats - Yield increases ranged from 7 to 15 bushels increase per acre. This is not sufficient to pay for the fertilizer. Fertilizing of oats only when seeded down to hay or pasture mixtures is now the recommendation.

Corn for Silage - The average increase has amounted to three tons per acre. This resulted in a net gain over fertilizer cost of a $10 per acre average. The added forage was much needed.

Corn for Grain - Practically no corn for grain was harvested in 1958 due to extreme drouth. In 1959 the average increase (8 fields) was 15.59 bushels per acre representing more feed and a dollar margin of $4.21 per acre over cost of fertilizer.

Hay - 1960 will be the first year for yield check on tame hay in the program.

Each year of the project the complete farm records of the cooperators have been and will be analyzed by the University Farm Management section.

Out of the program will come results of such farm business reorganization possible from the optimum fertilization and land use changes.

A Few Statistics About Your Soil Testing Laboratory

By John Grava

More than 200,000 samples have been analyzed by the University of Minnesota Soil Testing Laboratory in the last eleven years. Starting with 3000 samples tested in 1949, the volume has grown to more than 30,000 samples in 1959.

Table 1. Soil testing activity in Minnesota as shown by the number of samples tested annually.

Year	Number of Soil Samples
1949	3,054
1950	12,994
1951	10,778
1952	14,357
1953	16,783
1954	20,192
1955	19,108
1956	19,951
1957	23,591
1958	29,855
1959	33,491
	203,958

The distribution of samples received from individual counties is shown in Figure 1.

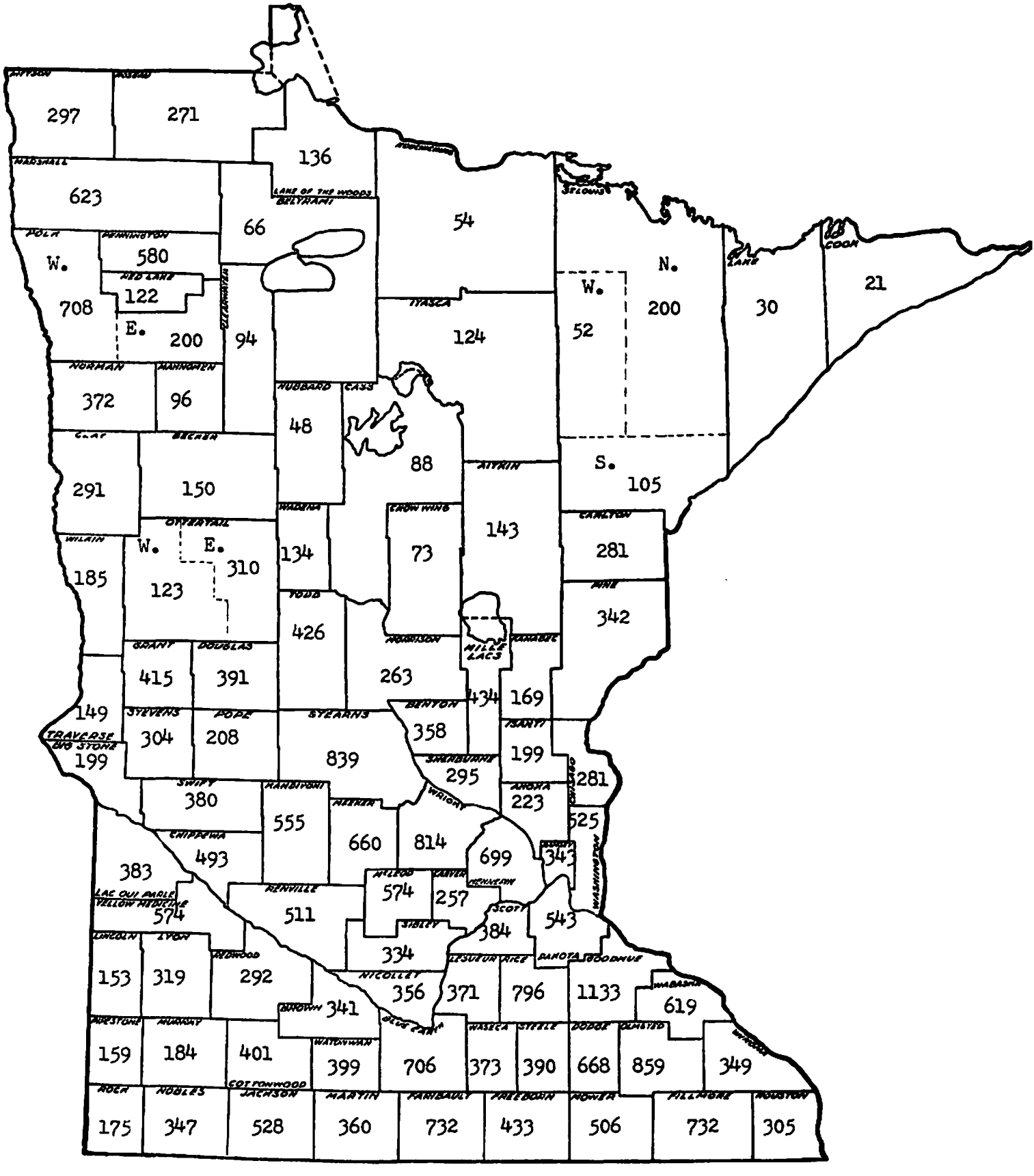

Figure 1. Number of soil samples received per county by University of Minnesota Soil Testing Laboratory during 1959.

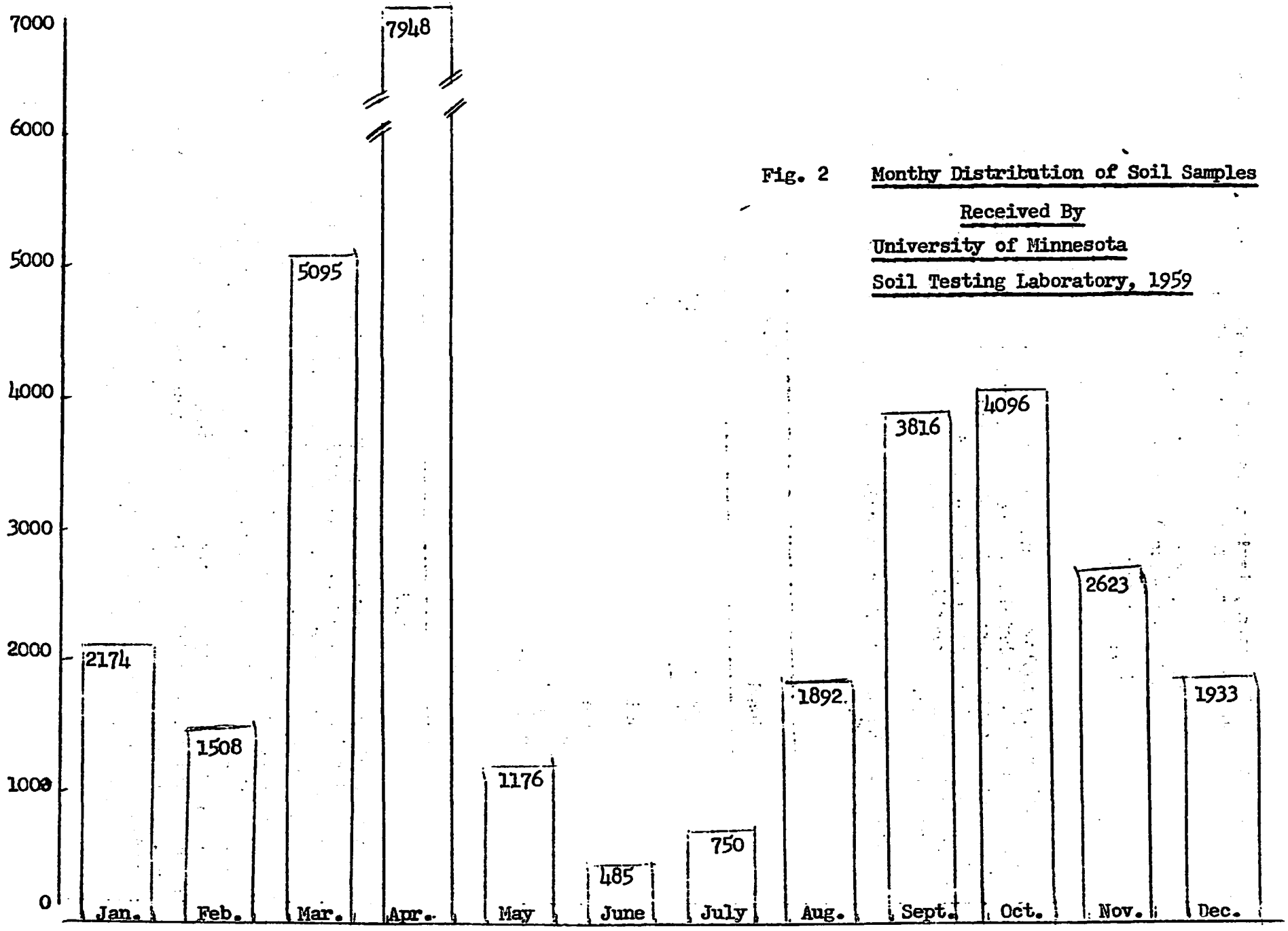

Fig. 2 Monthy Distribution of Soil Samples Received By University of Minnesota Soil Testing Laboratory, 1959

Currently the laboratory tests about 37,000 samples annually. The following data show the number of various samples analyzed in 1959:

Regular farm, garden and lawn samples	33,491
Florist (Greenhouse) samples	923
Limestone samples	217
Departmental research samples	2,368
Total	36,941

The laboratory employs one full-time senior technician, a secretary, and 5 to 12 student part-time technicians. The present capacity of samples that can be processed each month is about 8000. About nine days are required for sample processing. This includes preparation, drying, testing and reporting. Test reports together with sample information forms are mailed to county extension agents, who make recommendations.

Table 2. The number of days required for soil sample processing in 1959.

Month	Monthly Average Days
January	12
February	14
March	10
April	9
May	8
June	6
July	6
August	7
September	8
October	9
November	10
December	10
Year 1959	9

A very serious problem encountered in the operation of the laboratory is the uneven distribution of workload. Soil testing in Minnesota as indicated in Fig. 2 is extremely seasonal and characterized by rush periods and slack seasons. The spring rush of samples generally starts in March and lasts until the first week of May. September, October and the first half of November usually show the greatest influx of samples in the fall. Nearly 70 per cent of all samples tested each year are received during five months of the spring and fall rush periods. Past records also show that soil sampling activities in Minnesota are greatly affected by weather conditions, especially in the early spring and in the fall just before freeze-up. It would be advantageous for everybody concerned to work towards a more uniform sample distribution throughout the year. This could be accomplished by putting more emphasis on sampling in late summer and fall.

A Preliminary Report of the 1959 Soil Test Correlation Study on Corn

L. D. Hanson and John Greva

In order to obtain additional information on the relationship of corn growth and yield to applied fertilizer and soil test values a program of field fertilizer plots was carried out in 1959 by the extension service and the soil testing laboratory. County agricultural and soils agents in 47 counties established 77 experimental fields in cooperation with the extension soils specialists and Soils Department staff.

In addition to the objective of obtaining information on the correlation of yields with the soil test, the fields were used as demonstrations and teaching material by county agents and cooperating vo-ag teachers.

Procedure Followed

Materials used for establishing the plots were assembled and packed into fiber drums at the Soils Department and delivered to agents in April and May.

A uniform randomized block design of 5 treatments and 3 replications was used on all fields, with the exception of 20 which received an additional minor element treatment.

Following are the fertilizer treatments and the rates of application:

Treatment	Lbs. N/A	Lbs. P_2O_5/A	Lbs. K_2O/A
Check	0	0	0
PK	0	100	100
NK	100	0	100
NP	100	100	0
NPK	100	100	100
NPK+ minor elements	100	100	100
	plus 84 lbs. $MnSO_4$, 30 lbs. $MgSO_4$, 20 lbs. $ZnSO_4$, 30 lbs. $CuSO_4$, 30 lbs. $FeSO_4$, and 3 lbs. of Borax per acre.		

The 100-pound rate of nutrients is not to be interpreted as a recommended rate. The high rate was used to be reasonably sure that an individual nutrient was not limiting yield on specific plots.

Before fertilizer treatments were applied 3 surface soil samples were collected from each site, and shipped to the laboratory in a field moist condition.

The fertilizer was broadcast by hand and worked into the surface soil with cultivators. The farmer followed his normal corn planting procedure on the plot area with the exception that a population of between 16,000 and 18,000 was aimed for.

The fields were selected on the basis of representing important county soil types. Information was recorded regarding soil type, past crops for 3 years, past

fertilization and manure, time of plowing, kind and maturity of hybrid, and moisture conditions at planting. A rain gauge was provided to each farmer and rainfall was recorded daily from June through September by almost all farmers.

Observations on growth differences and appearance were made by agents during the first two weeks in July, and leaf samples were collected from some fields at tasseling time. Yields were checked by agents and other cooperators on 67 fields.

Weather Conditions and Effect of Rainfall

With the exception of the southeast counties very dry weather prevailed on many fields during the months of June and July. The average July rainfall varies from an average of 3.01 inches in southwest Minnesota to 3.63 in the northeast. The extent of the drouth in 1959 is indicated by the fact that 67% of the plots had less than 2 inches of rainfall in July. Another measure of the effect of low rainfall is a summary of agents evaluation of drouth in limiting yields. This shows that 70% of all fields were moderately or severely limited in yield by drouth.

Important as moisture is in determining yield, there is no close relationship apparent between total rainfall of June, July, and August and yields. There are a number of other factors such as time of rainfall, soil type, subsoil moisture, and past crop which have to be considered. A summary of the information taking these factors into account has not yet been made with the exception of the following table showing average NPK treatment yields on corn following different crops.

Table 1. Average corn yields on NPK plots with low rainfall in 1959 following various 1958 crops.*

Past Crop	Corn Yield	Average Rain June & July
Alfalfa	45.2	3.7"
Corn	84.3	3.7"
Soybeans	85.0	3.1"
Small grain	65.1	3.8"

* Only fields with less than 5" of rain during June and July were averaged.

The lower yield following alfalfa probably reflects the lower soil moisture following that crop.

Effect of Past Crop on Nitrogen Response

Table 2. Average bushel increase from 100 pounds of nitrogen on corn following various crops.

Crop in 1958	Yield Diff. from N	Number of fields
Alfalfa or clover	- 1.9	14
Corn	+ 14.0	22
Soybeans	+ 12.8	13
Oats	+ 15.5	5

Of the three primary nutrients nitrogen was the most important in affecting corn yields. Corn yields were increased an average of about 14 bushels following a nonlegume crop. This was greater than either the phosphate or potash response at the low test level.

The importance of the past crop in determining nitrogen response is illustrated in table 2. In general, corn following a good legume does not need nitrogen beyond that provided in a starter fertilizer.

Phosphate Response and Phosphorus Soil Test

Table 3. Yield difference from 100 pounds P_2O_5 and P level by Bray's #1 method.

P Soil Test Level		Yield Difference	Number of yields
0 - 10	low	+ 10.2	17
11 - 20	medium	+ 2.6	22
21 - 30	high	- 0.5	15
30 +	very high	+ 1.2	11

The average yield response agrees in general with the phosphorus test. However, there is considerable variation within each category indicating need for further study on a number of soils. Soils in Steele and Waseca County, for example, show small phosphate response in spite of low tests.

Potash Response and Potassium Test

Table 4. Yield difference from 100 lbs. K_2O/A and K level of dried samples.

Exchangeable K and relative level	Yield difference	Number of fields
0 - 90 low	+7.0	13
91 - 150 low-medium	+2.3	33
151 - 220 high-medium	+1.9	8
220 + high	+0.6	13

As with phosphate, potash response follows the potassium level as indicated by soil test. The size of the increase on the low and low-medium categories is considerably less than has been observed in research plots over the past few years. Drouth conditions on many of the low testing fields account for part of this difference.

Barren Stalks and Lodging

Data is reported on the number of barren stalks and lodged stalks by treatment. Both of these problems were very severe in 1959. No analysis has been made as yet on the relationship of these to fertilizer treatment. Corn leaf aphid was important in causing barren stalks on some fields. Fields in Freeborn, Kandiyohi, Rice, Sibley, and Jackson counties were reported as having barren stalks associated with corn leaf aphid occurrence. Severe corn rootworm damage was reported on a field in Nobles County.

Effect of Minor Elements on Corn Yield

On all but two fields the addition of a number of minor elements had no effect on corn yield. On two fields, one is Pope County and one in McLeod County, the effect of the minor elements on yield was highly significant. On the County field the NPK plus minor elements plot averaged 65.3 bushels compared to 53.3 with NPK alone. On the McLeod field the yield on the minor element plot was 111.0 compared to 97.3 on the NPK alone plot. Further work is planned in McLeod County.

Evaluation of Recommended Fertilizer Rates

In considering the results in economic terms of the cost of the fertilizer which would have been recommended and the yield response to the recommended combination of fertilizer, a rather large number did not get an economic increase in yield. Of 67 fields 23 showed an economic response while 41 did not. A number of factors are involved but probably the most important are the low rainfall on a number of fields and the limiting of yields by such factors as weed competition, poor drainage, and insect damage and stand.

This points out the fact that a large number of farmers are probably not getting a good return from fertilizer because other production factors are not taken care of.

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Counties Cooperating in Soil Test Correlation Program - 1959

County	Number of fields	Fields not harvested	County	Number of fields	Fields not harvested
Anoka	2	2	Murray	1	
Benton	1		Nobles	2	
Big Stone	2		Olmsted	2	1 (erosion)
Blue Earth	1		Pine	1	
Brown	1		Pipestone	1	
Chippewa	1		Pope	1	
Dakota	1		Redwood	1	
Dodge	4		Renville	1	
Fillmore	2		Rice	1	
Freeborn	1		Rock	2	
Goodhue	1		Scott	1	1 (drouth)
Hennepin	1		Sherburne	1	
Houston	1		Sibley	2	1 (flooding)
Isanti	1		Stearns	1	
Jackson	2		Steele	4	1
Kanabec	1		Swift	1	
Kandiyohi	1		Wabasha	2	
Lac qui Parle	1		Waseca	1	
Lincoln	1	1 (drouth)	Washington	2	
Lyon	1		Watonwan	2	
McLeod	2		Wright	1	
Meeker	2		Yellow Medicine	1	1 (harvested not reported)
Mille Lacs	1				
Morrison	4				
Mower	9	1 (poor stand)			
			TOTAL	77	9

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(3) Benton County - Cornelius Stob										
Alfalfa-Brome	3.4	3.0	7.2	13.6	+2.3	6.3	3.2M	18M-H	58L	Milaca s.l.
This field represents a typical situation on Milaca soils where P is quite high and K is low. The alfalfa-brome did not provide adequate nitrogen on this field. The combination of N & K gave a 32-bushel increase on this low potassium soil.										
(4) Big Stone - Leo Taffe										
	4.3	1.4	2.4	8.1	-2.3	7.4	3.6L	10L	317VH	c.l.
This field was in a very dry area which is the cause of the very low yields.										
(5) Big Stone - Mel Steen										
	6.2	1.9	3.3	11.4	+1.0	7.1	5.5M	7L	560VH	Si.c.l.
Rainfall was higher at this field resulting in good yields and fertilizer response.										
(6) Blue Earth County - Sig Rassmussen and Son										
Wheat	3.0	1.3	7.6	11.9	+0.2	6.1	3.6M	29H	483VH	Clarion l.
Drouth in July limited yields, but a large yield increase would not be expected with this soil test. Number of barren stalks helps explain yield decrease. Corn leaf aphids and drouth apparently hampered pollination.										
(7) Brown County - Arthur W. Schultz										
Soybeans	4.5	2.5	7.5	14.5	+2.8	6.0	4.8M	15M	307VH	Nicollet clay loam
This soil test is typical of the Nicollet soil in this area. Growth differences were not apparent in July but phosphate and nitrogen gave expected response in yield. Hail, wind, and July drouth limited yield. Farmer's yield was 70 with no fertilizer.										

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	55	75	87	73	82	
Population	14,600	15,400	15,700	16,700	15,400	
Number Barren Stalks	600	1,100	400	1,000	500	
Number Lodged Stalks	1,600	1,000	800	1,800	300	
		Increase	Decrease			
Yield difference due to N =		7 bu.				
" " " " P =			5 bu.			
" " " " K =		9 bu.				
Yield.	23	19	14	13	11	
Population	13,100	11,500	13,900	12,500	13,900	
Number Barren Stalks	5,000	5,000	8,400	6,300	8,100	
Number Lodged Stalks	0	0	0	0	0	
		Increase	Decrease			
Yield difference due to N =			8 bu.			
" " " " P =			3 bu.			
" " " " K =			2 bu.			
Yield	62	63	68	73	78	
Population	14,100	13,600	14,400	14,100	13,300	
Number Barren Stalks	700	800	700	900	1,600	
Number Lodged Stalks	0	0	0	0	0	
		Increase	Decrease			
Yield difference due to N =		15 bu.				
" " " " P =		10 bu.				
" " " " K =		4 bu.				
Yield	54	46	33	46	28	50
Population	15,900	14,900	15,200	14,900	14,600	15,400
Number Barren Stalks	6,800	6,800	9,500	5,200	9.700	7,300
Number Lodged Stalks	0	100	0	0	0	0
		Increase	Decrease			
Yield difference due to N =			18 bu.			
" " " " P =			5 bu.			
" " " " K =			18 bu.			
" " " " M.E. =		22 bu.				
Yield	78	74	77	83	86	
Population	18,800	19,100	19,300	19,300	18,600	
Number Barren Stalks	3,200	5,500	4,000	4,500	3,700	
Number Lodged Stalks	2,800	4,200	4,700	4,300	3,200	
		Increase	Decrease			
Yield difference due to N =		12 bu.				
" " " " P =		9 bu.				
" " " " K =		3 bu.				

Past Crop (1958)	Rainfall (inches) June	July	August	Total of Rain 3 mo.	diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(8) Chippewa County - Merlin Tjagen										
Soybeans	2.1	1.9				7.8	5.2M	10L	220M	Flom si.c.l.

A large increase due to phosphate; rainfall was limited but the low lying Flom soil had a good supply of subsoil moisture. August rainfall was not reported. Part of the plots were not harvested because of an alkali effect on corn growth.

(9) Dakota County - David Kamin										
Soybeans	7.2	3.4	12.3	22.9	+11.2	5.5	2.2L	12M	97M	Outwash s.l.

Farmer's own yield = 104 (100# 6-24-12 + 40#N)
Nitrogen was the only limiting nutrient here in spite of medium and low tests for P & K. Additional population may have brought out increases from phosphate and potash.

(10) Dodge County - Ed Cutting										
Alfalfa-Brome	6.4	1.9	3.6	11.9	+0.2	7.2	4.9H	8L	80L	Racine l.

Farmer's own yield = 87
Dodge County rainfall was generally good in June which carried the fields through a dry July. This field tested low in P and K but only potash showed an effect. A small nitrogen response resulted in spite of following alfalfa-brome. Fertilizer apparently caused more barren stalks.

(11) Dodge - C. C. Gray										
Soybeans	6.2	1.7	7.3	15.2	+3.5	5.6	4.5M	11M	107M	Kasson si.l.

Farmer's own yield = 71 (250# 5-20-20 + 100# 33-0-0 + 150# starter)
All nutrients caused yield increases with potassium being most important. Stand was down 25% from that planted. As in the case of other fields following soybeans, a good increase resulted from nitrogen.

(12) Dodge County - Howard Scripture										
Soybeans	5.8	2.3	4.0	12.1	+0.4	5.6	3.4M	14M	93M	Kasson si.l.

Farmers own yield = 84 (200# 5-20-20 starter)
All nutrients gave yield increases which are common with medium fertility levels. Fertilizer seemed to decrease the number of lodged stalks.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	76	90	67	107	101	
Population	17,300	20,100	19,600	18,000	16,700	
Number Barren Stalks	1,800	3,400	3,700	2,400	2,900	
Number Lodged Stalks	500	500	3,700	5,200	1,600	

	Increase	Decrease
Yield differences due to N =	11 bu.	
" " " " P =	34 "	
" " " " K =		6 bu.

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	80	68	101	101	97	
Population	14,600	15,200	15,200	15,200	14,600	
Number Barren Stalks	400	900	400	300	800	
Number Lodged Stalks	2,400	900	3,200	1,200	2,400	

	Increase	Decrease
Yield Difference due to N =	29 bu.	
" " " " P =		4 bu.
" " " " K =		4 "

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	90	87	99	79	93	
Population	14,100	14,400	15,400	14,900	15,400	
Number Barren Stalks	0	1,000	500	1,000	600	
Number Lodged Stalks	800	500	1,200	2,900	800	

	Increase	Decrease
Yield differences due to N =	6 bu.	
" " " " P =		6 bu.
" " " " K =	14 bu.	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	53	65	69	54	76	
Population	13,900	13,900	13,300	12,500	14,100	
Number Barren Stalks	1,200	1,400	100	1,400	1,600	
Number Lodged Stalks	600	400	1,000	2,000	400	

	Increase	Decrease
Yield differences due to N =	11 bu.	
" " " " P =	7 "	
" " " " K =	22 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	81	87	91	89	96	
Population	19,600	16,200	16,200	15,700	16,700	
Number Barren Stalks	1,400	800	600	300	400	
Number Lodged Stalks	5,000	2,300	7,300	1,000	1,500	

	Increase	Decrease
Yield differences due to N =	9 bu.	
" " " " P =	5 "	
" " " " K =	7 "	

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(13) Dodge County - Kasson Mantorville F.F.A. (E. Knudson Farm)										
Oats	9.6	1.5	3.2	14.3	+2.6	7.0	3.4M	13M	147M	Kenyon si.l.

Farmer's own yield = 89 (80# N sidedressed)
Nitrogen caused a large increase on corn following oats. As in most other fields in this soil area, potassium is more limiting than phosphorus.

(14) Fillmore County - Virgil Henry										
Corn	8.7	1.6	9.8	20.1	+8.4	6.4	1.7L	22H	147M	Fayette si.l.

On this low organic matter Fayette soil nitrogen gave a large increase in yield.

(15) Fillmore County - Roger Carson										
Soybeans	8.8	1.5	9.0	19.3	+7.6	6.2	6.5H	10L	107M	Floyd si.c.l.

As with the fields of similar soil types in Dodge and Mower counties, this field showed little difference in yield from phosphate. Nitrogen and potash caused substantial increase. Potash seemed to decrease lodging. Minor elements had no effect.

(16) Freeborn County - John Jordon										
Corn	4.5	1.7	6.5	12.7	+1.0	6.4	3.7M	13M	83L	Webster l.

With low P and K tests and corn following corn all nutrients gave substantial increases. Corn leaf aphid was important in causing a large number of barren stalks. Minor elements had no effect.

(17) Goodhue County - George Dickinson										
Pasture	7.5	1.8	19.6	29.0	+17.3	7.0	2.5L	29H	140M	Fayette si.l.

Farmer's own yield = 104 (125# 8-24-12 starter)
Nitrogen was not needed on this field following legume pasture. Phosphorus effect follows the high test. The high yield on PK plots may be due to higher stand as well as fertility.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	59	50	84	77	87	
Population	18,800	17,000	17,300	17,300	17,300	
Number Barren Stalks	1,000	1,000	900	600	300	
Number Lodged Stalks	700	900	700	1,400	1,000	

	Increase	Decrease
Yield differences due to N =	37 bu.	
" " " " P =	3 "	
" " " " K =	10 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	85	80	102	115	106	109
Population	19,900	19,600	18,800	19,100	18,800	19,300
Number Barren Stalks	2,900	2,900	1,900	1,100	2,100	2,100
Number Lodged Stalks	2,300	1,000	2,400	800	600	1,100

	Increase	Decrease
Yield differences due to N =	26 bu.	
" " " " P =	4 "	
" " " " K =		9 bu.
" " " " M.E. =	3 bu.	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	75	43	100	78	97	95
Population	19,300	19,100	17,500	18,000	18,800	19,600
Number Barren Stalks	700	3,500	0	400	200	200
Number Lodged Stalks	4,900	2,800	1,800	5,000	1,500	1,800

	Increase	Decrease
Yield differences due to N =	54 bu.	
" " " " P =		3 bu.
" " " " K =	19 bu.	
" " " " M.E. =		2 bu.

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	44	49	58	46	77	72
Population	16,500	18,300	16,700	15,900	19,100	19,300
Number Barren Stalks	4,400	5,200	3,500	3,700	2,600	2,900
Number Lodged Stalks	5,400	3,400	5,300	6,400	2,600	3,100

	Increase	Decrease
Yield differences due to N =	28 bu.	
" " " " P =	19 "	
" " " " K =	31 "	
" " " " M.E. =		5 bu.

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	94	119	111	103	106	
Population	15,400	17,500	15,900	15,400	15,200	
Number Barren Stalks	2,100	1,600	1,500	1,000	1,500	
Number Lodged Stalks	3,700	2,300	2,400	2,800	1,600	

	Increase	Decrease
Yield differences due to N =		13 bu.
" " " " P =		5 "
" " " " K =	3 bu.	

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain. diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(18) Hennepin County - Glenard Tessmer										
Corn						6.2	2.6L	25H	123M	LeSueur l.

Farmer's own yield = 78 (185# 8-16-16 + 60# N sidedressed)
Fertilized plots yielded more than the check but when treatments are compared to the NPK yield there is little difference in yield. An increase from potash and nitrogen would normally be expected on this field.

(19) Houston County - Donald Schroeder										
Alfalfa	7.6	1.5	11.3	20.4	+8.7	7.1	1.6L	51VH	110M	Fayette si.l.

Farmer's own yield = 120 (100# 8-16-16)
With a high yield on the check plot there is essentially no difference in yields due to fertilizer. The 12-bushel difference between the NK and NPK treatments is probably due to stand difference.

(20) Isanti County - Albert Erickson										
Alfalfa	1.0	3.4	6.5	10.9	-1.4	5.8	2.0L	50VH	80L	s.l.

Farmer's own yield = 49 (125# of 8-16-16).
Drouth in June on this sandy loam soil limited yields and fertilizer response. A large number of barren stalks indicates poor pollination.

(21) Jackson County - Eston Rixmann										
Soybeans	2.0	0.0	5.0	7.0	-3.6	5.4	3.5L	12M	167M	Clarion c.l.

This field was severely limited in yield by drouth (no rainfall in July), corn leaf aphid and a wind storm.

(22) Jackson County - William Freking										
Soybeans	3.0	0.8	5.6	9.4	-1.2	7.8	4.3L	9L	163M	Webster c.l.

Although this Jackson County field was also in a low rainfall area, the Webster soil type supplied subsoil moisture sufficient for good yields. Minor elements apparently increased yields as the effect was consistent in all replicates.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	76	88	94	100	90	
Population	17,800	17,800	18,000	18,000	16,200	
Number Barren Stalks	1,800	2,900	2,100	1,800	1,600	
Number Lodged Stalks	300	300	300	300	300	

	Increase	Decrease
Yield difference due to N =	2 bu.	
" " " " P =		4 bu.
" " " " K =		10 "

Yield	127	130	117	123	129	
Population	16,700	17,000	15,700	16,500	16,700	
Number Barren Stalks	300	500	300	300	300	
Number Lodged Stalks	1,300	400	1,000	800	1,500	

	Increase	Decrease
Yield difference due to N =		1 bu.
" " " " P =	12 bu.	
" " " " K =	6 "	

Yield	47	52	51	42	42	
Population	14,100	16,200	14,100	14,600	16,200	
Number Barren Stalks	3,000	5,800	3,200	6,600	7,700	
Number Lodged Stalks	2,300	300	1,900	3,800	400	

	Increase	Decrease
Yield difference due to N =		10 bu.
" " " " P =		9 "
" " " " K =	No difference	

Yield	43	55	39	41	42	41
Population	13,900	14,100	14,100	14,900	12,500	13,600
Number Barren Stalks	2,600	3.500	4,500	5,400	3,500	3,700
Number Lodged Stalks	Wind storm in late August.					

	Increase	Decrease
Yield difference due to N =		13 bu.
" " " " P =	3 bu.	
" " " " K =	1 "	
" " " " M.E=		1 bu.

Yield	76	82	76	82	89	97
Population	13,600	14,100	13,900	14,100	14,400	14,400
Number Barren Stalks	300	500	300	200	600	0
Number Lodged Stalks	4,900	3,000	4,600	4,700	3,700	4,300

	Increase	Decrease
Yield difference due to N =	7 bu.	
" " " " P =	13 "	
" " " " K =	7 "	
" " " " ME.=	8 "	

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(23) Kanabec County - W. D. enger										
Clover Hay	2.1	2.6	5.6	10.3	-2.0	5.8	2.1L	27H	43VL	Milaca l.
Farmer's own yield = 24 (150# 8-16-16 + 150# 0-0-60)										
(24) Kandiyohi County - Harold Taajtes										
Corn	3.7	0.9	6.5	11.1	-0.2	7.8	8.2VH	15M	243H	Webster c.l.
Farmer's own yield = 126 (150# 8-24-12 + 40# 82-0-0)										
Manure has been applied on this field each of the last 3 years which apparently helped supply needed nutrients, especially nitrogen. Comparison of the check to fertilized plots shows a yield difference but it is not possible to attribute it to P or K alone. Corn leaf aphid occurrence was common and associated with barren stalks. The field has been in corn for 7 years.										
(25) LacQuiParle County - Galen Baldwin										
Corn	1.8	1.6	0.8	4.2	-6.2	6.7	1.8L	8L	123M	Rothsay s.l.
Timely rainfall made possible good yields despite low total rainfall. Increases from P and K corresponded with soil test values.										
(27) Lyon County - Robert Olson										
Soybeans	2.7	1.2	3.9	7.8	-2.8	7.8	4.2M	7L	240H	Flom l.
Farmer's own yield = 55 (5-40-10 starter + 40# N) This field was located on a high lime rim on which a potash response is often observed in spite of a high K test.										
(28) McLeod County - Leonard Grenke										
Oats	5.0	1.7	7.4	14.1	+2.8	7.8	6.8H	7L	140M	Glencoe c.l.
All nutrients increased yields with nitrogen being most important.										

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	39	34	27	30	34	28
Population	12,300	14,100	13,600	12,800	13,600	13,600
Number Barren Stalks	1,300	4,000	4,400	3,200	3,700	4,000
Number Lodged Stalks	1,000	1,100	1,400	1,100	2,600	1,300

	Increase	Decrease
Yield difference due to N =	No difference	
" " " " P =	7 bu.	
" " " " K =	4 "	
" " " " M.E. =		6 bu.

Yield	101	126	119	121	119
Population	21,400	22,200	21,200	20.900	20,900
Number Barren Stalks	1,400	2,000	1,100	800	1,900
Number Lodged Stalks	900	700	600	400	1,100

	Increase	Decrease
Yield difference due to N =		7 bu.
" " " " P =	No difference	
" " " " K =		2 bu.

Yield	55	88	82	91	96

	Increase	Decrease
Yield difference due to N =	8 bu.	
" " " " P =	14 "	
" " " " K =	5 "	

Yield	37	50	41	47	58

	Increase	Decrease
Yield difference due to N =	8 bu.	
" " " " P =	17 "	
" " " " K =	11 "	

Yield	83	94	100	100	109
Population	14,900	12,800	12,800	12,800	15,200
Number Barren Stalks	700	300	200	600	1,400
Number Lodged Stalks	300	0	700	600	400

	Increase	Decrease
Yield difference due to N =	15 bu.	
" " " " P =	9 "	
" " " " K =	9 "	

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(29) McLeod County - John Lietz										
Soybeans	2.8	2.2	4.6	9.6	-1.7	7.1	4.9M	26H	225H	Nicollet c.l.

Minor elements increased yields on all three replicates over the NPK treatments.

(30) Meeker County - Leroy McGuire										
Corn	1.3	1.9	3.4	6.6	-4.7	5.5	1.9L	13M	127M	s.l. sandy acid outwash

Farmer's own yield - 55 (165# 6-24-24)

Nitrogen was the most limiting element. Yields were limited by low rainfall and a sandy soil.

(31) Meeker County - Walter Johnson										
Corn	2.4	3.1	5.3	10.8	-0.5	8.0	6.0M	5L	143M	Webster c.l.

Available phosphorus was low as indicated by yields and soil test. Nitrogen as usual gave a good increase when the preceding cropwas corn.

(32) Mille Lacs County - Harold O. Thorsbakken										
Oats	2.0	2.5	8.1	12.6	+0.3	5.1	1.9L	24H	93M	Milaca si.l.

Lack of moisture on this Milaca soil restricted yields and fertilizer response.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	90	86	97	87	98	111
Population	15,490	16,500	15,900	16,500	17,800	17,300
Number Barren Stalks	2,800	4,000	3,700	5,200	4,400	3,100
Number Lodged Stalks	300	300	200	300	600	600

	Increase	Decrease
Yield difference due to N =	12 bu.	
" " " " P =	1 "	
" " " " K =	11 "	
" " " " M.E. =	13 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	54	33	78	66	67	70
Population	15,700	13,900	16,500	14,600	15,200	16,200
Number Barren Stalks	800	1,100	1,500	500	700	900
Number Lodged Stalks	100	0	0	800	0	0

	Increase	Decrease
Yield difference due to N =	34 bu.	
" " " " P =		11 bu.
" " " " K =	1 bu.	
" " " " M.E. =	3 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	62	72	67	87	96	89
Population	14,900	13,300	13,100	13,900	14,600	15,200
Number Barren Stalks	1,000	0	100	0	300	900
Number Lodged Stalks	1,500	600	1,600	3,100	1,800	1,400

	Increase	Decrease
Yield difference due to N =	24 bu.	
" " " " P =	29 "	
" " " " K =	9 "	
" " " " M.E. =		7 bu.

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	27	16	36	27	30	25
Population	13,600	14,600	14,100	12,300	17,300	14,900
Number Barren Stalks	3,000	5,500	1,900	1,300	5,200	4,200
Number Lodged Stalks	400	600	900	2,700	1,300	900

	Increase	Decrease
Yield difference due to N =	14 bu.	
" " " " P =		6 bu.
" " " " K =	3 bu.	
" " " " M.E. =		5 bu.

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(33) Morrison County - William C. Gablenz, Jr.										
Corn	3.9	1.0	5.9	10.8	-0.5	5.4	1.6L	41VH	147M	Sandy acid outwash

Farmer's own yield = 52 (100# 5-20-20 + 40# 82-0-0)

Nitrogen and potash were most important on this sandy soil which had a typical soil test for this area of the state. The low pH may be restricting the availability of the phosphorus which is indicated as high by test.

(34) Morrison County - Melvin Hippe										
Hay & pasture	0.8	1.9	4.6	7.3	-4.0	6.3	3.9M	15M	83L	si.l.

Farmer's own yield = 70 (250# 5-20-20)

Observations on growth difference in July showed a potash response but yields were lower on the fertilized plots. Rainfall was very low in June and July.

(35) Morrison County - E. H. Ostrum										
Corn	4.0	1.6	3.4	9.0	-2.3	5.3	1.6L	44VH	57VL	Sandy acid outwash s.l.

Large increases in yield here substantiate the low fertility status in nitrogen and potash as indicated by soil test. Phosphorus response was contrary to that expected with this phosphorus test. Note that the plant population was unreasonably high.

(36) Morrison County - Flicker & O'Brien										
Oats	No rainfall records					5.6	1.8L	36VH	90L	Milaca s.l.

No yield differences were measured here despite a low potash test. There was considerable variation in the soil within the plot area.

(37) Mower County - Wallace Shoedean (LeRoy F.F.A.)										
Corn	4.2	1.8	11.5	17.5	+5.8	6.7	2.4L	19M	97M	Skyberg l.

Nitrogen and potash accounted for moderate increases in yield. A high incidence of barren stalks interferred with fertilizer response.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	24	36	44	41	49	43
Population	19,800	19,500	19,300	19,500	20,100	21,500
Number Barren Stalks	3,700	1,700	1,700	1,000	1,800	1,600
Number Lodged Stalks	100	100	200	400	1,700	500

	Increase	Decrease
Yield difference due to N =	13 bu.	
" " " " P =	5 "	
" " " " K =	8 "	
" " " " M.E.=		6 bu.

Yield	70	60	63	64	56
Population	16,700	15,700	16,200	15,900	17,000
Number Barren Stalks	1,500	1,300	4,000	2,400	2,100
Number Lodged Stalks	0	0	300	300	0

	Increase	Decrease
Yield difference due to N =		4 bu.
" " " " P =		7 "
" " " " K =		8 "

Yield	8	7	13	19	46
Population	33,600	34,700	35,800	30,000	32,200
Number Barren Stalks	23,400	22,800	18,700	12,700	10,200
Number Lodged Stalks	0	400	0	700	700

	Increase	Decrease
Yield difference due to N =	39 bu.	
" " " " P =	33 "	
" " " " K =	27 "	

Yield	45	48	43	43	43	45

	Increase	Decrease
Yield difference due to N =		5 bu.
" " " " P =	No difference	
" " " " K =	No difference	
" " " " M.E.=	2 bu.	

Yield	62	75	84	74	80
Population	17,800	20,400	20,700	19,100	21,700
Number Barren Stalks	2,800	4,500	5,000	2,400	5,800
Number Lodged Stalks	1,300	1,600	2,000	1,900	1,600

	Increase	Decrease
Yield difference due to N =	5 bu.	
" " " " P =		4 bu.
" " " " K =	6 bu.	

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(39) Mower County - Ralph Waters										
Alfalfa	6.7	0.4		Not recorded		5.7	2.3L	83VH	303VH	Renova s.l.

July rainfall and alfalfa preceding the corn apparently limited yields. Increases would not be expected with the high tests.

(40) Mower County - Delmar Tapp										
Corn	9.0	2.5	12.0	23.5	+11.8	6.4	3.9M	11M	120M	Kenyon si.l.

Farmer's own yield = 78 (200# 5-20-20)

As in the case of 27 other fields the PK treatment was less than the check. Balanced fertilization provided a 14 bushel increase.

(41) Mower County - Wayne Skov										
Corn	5.3	1.9	6.6	13.8	+2.1	5.1	3.4M	23H	113M	Floyd si.l.

Again nitrogen was most important in yield difference. Poor drainage affected growth.

(42) Mower County - Gay Morrell										
Soybeans	8.3	2.2	10.7	21.2	+9.5	5.2	2.6L	23H	123M	Sargeant si.l.

Poor drainage was also a factor in this field. Phosphate and potash response does not follow the soil test levels.

(43) Mower County - Adams F.F.A.										
Corn	6.7	1.6	9.7	18.0	+6.3	6.4	1.7L	12M	107M	Skyberg l.

Nitrogen gave a large yield increase with phosphate and potash affects less than expected.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	62	52	57	50	47	
Population	12,500	13,300	13,300	13,100	12,300	
Number Barren Stalks	1,800	3,100	2,400	3,800	3,500	
Number Lodged Stalks	700	400	600	800	400	

	Increase	Decrease
Yield difference due to N =		5 bu.
" " " " P =		10 "
" " " " K =		3 "

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	90	75	100	98	104	
Population	14,600	14,600	15,700	15,900	14,900	
Number Barren Stalks	0	400	500	600	0	
Number Lodged Stalks	3,100	2,400	2,800	5,500	2,400	

	Increase	Decrease
Yield difference due to N =	29 bu.	
" " " " P =	4 "	
" " " " K =	6 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	68	60	73	72	75	
Population	15,400	15,400	15,900	15,200	15,900	
Number Barren Stalks	1,300	1,200	600	2,000	1,400	
Number Lodged Stalks	1,000	1,100	900	1,000	800	

	Increase	Decrease
Yield difference due to N =	15 bu.	
" " " " P =	2 "	
" " " " K =	3 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	69	76	80	90	93	
Population	14,900	15,200	14,900	15,700	15,700	
Number Barren Stalks	700	1,000	400	700	900	
Number Lodged Stalks	700	700	500	1,300	700	

	Increase	Decrease
Yield difference due to N =	17 bu.	
" " " " P =	13 "	
" " " " K =	3 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	71	65	101	101	105	
Population	19,300	20,600	19,100	19,100	20,900	
Number Barren Stalks	2,500	2,800	1,400	800	1,000	
Number Lodged Stalks	1,300	1,600	1,100	1,500	2,400	

	Increase	Decrease
Yield difference due to N =	40 bu.	
" " " " P =	4 "	
" " " " K =	4 "	

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(44) Mower County - Lyle F.F.A.										
Alfalfa	5.7 (est)	2.0	7.0 (est)	14.7 (est)	+3.0	6.6	4.1M	12M	90L	Skyberg si.l.

Nitrogen increased yields despite previous alfalfa crop. Yields although good were limited by weed competitions and wind damage.

(45) Mower County - Irving Nagel										
Clover	5.7	3.0	7.0	15.7	+4.0	6.1	3.4M	11M	107M	Floyd si.l.

Potash accounted for a substantial increase. Adequate rainfall and good weed control made high yields possible. A heavier population could have been used as ears were large.

(46) Murray County - Elmer Smith										
Flax	2.3	1.8	9.7	13.8	+3.2	7.6	5.5M	9L	177M	Webster-Glencoe c.l.

Farmer's own yield = 82 (100# 6-24-12)

Nitrogen and phosphate were needed on this field. Dry July weather limited yields.

(47) Nobles County - Ed Lenz										
Corn	3.0	2.5	9.2	14.7	+4.1	5.8	4.0M	8L	250H	Moody Kranzberg si.l.

Farmer's own yield = 71

Dry conditions in 1958 probably accounted for greater than average N carryover. Phosphorus response expected with test but K response greater than expected with test.

(48) Nobles County - Herman Danneman										
Corn	1.8	2.4	9.2	13.4	+2.8	6.8	5.0M	12M	173M	Webster c.l.

Farmer's own yield = 86 (100# 5-20-20 + 60# N sidedressed)

Root worm limited yields, but all nutrients increased yields.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	93	80	87	92	100	
Population	16,500	15,700	15,400	15,900	16,500	
Number Barren Stalks	800	2,000	1,000	100	500	
Number Lodged Stalks	2,600	1,800	1,800	2,800	3,600	

	Increase	Decrease
Yield difference due to N =	20 bu.	
" " " " P =	13 "	
" " " " K =	8 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	108	120	112	106	125	
Population	13,100	14,100	13,600	12,800	13,900	
Number Barren Stalks	200	200	100	100	0	
Number Lodged Stalks	1,300	900	1,000	800	1,100	

	Increase	Decrease
Yield difference due to N =	5 bu.	
" " " " P =	13 "	
" " " " K =	19 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	77	87	93	101	98	
Population	14,600	15,700	14,700	15,200	16,500	
Number Barren Stalks	1,900	2,600	1,800	2,400	3,500	
Number Lodged Stalks	1,200	2,600	700	2,200	2,900	

	Increase	Decrease
Yield difference due to N =	11 bu.	
" " " " P =	5 "	
" " " " K =		3 bu.

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	65	75	62	68	80	
Population	15,400	15,400	15,900	14,400	15,200	
Number Barren Stalks	2,000	1,800	1,800	1,000	1,800	
Number Lodged Stalks	1,800	1,000	1,000	2,800	3,500	

	Increase	Decrease
Yield difference due to N =	5 bu.	
" " " " P =	18 "	
" " " " K =	12 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	74	61	81	81	87	
Population	15,700	15,900	16,500	15,200	15,700	
Number Barren Stalks	1,400	3,000	1,400	800	600	
Number Lodged Stalks	0	0	0	0	0	

	Increase	Decrease
Yield difference due to N =	26 bu.	
" " " " P =	6 "	
" " " " K =	6 "	

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(49) Olmsted County - Stanley Eggler										
Pasture	5.4	1.8	8.3	15.5	+3.8	6.9	2.6L	27H	103M	Tama si. l.

Farmer's own yield = 103 (168# 5-20-20)

When treatments are compared to check, fertilizer did not increase yields. A greater K response would be expected.

(51) Pine County - Raymond Barringer										
Corn	3.3	2.7	6.6	12.6	+0.3	5.6	1.9L	18M	97M	Milaca s.l.

Weed competition and drouth limited yields. Growth response was evident in July on NPK along with phosphorus deficiency on plots which did not receive phosphate. Earlier pollination on NP plot during adverse weather probably accounts for yield reduction from phosphate.

(52) Pipestone County - Chris B. Pedersen										
Oats	3.0	1.2	4.8	9.0	-1.6	5.9	4.4M	14M	207M	Kranzberg si.l.

Fertilizer treatments did not affect yields. Dry subsoil and low July rainfall limited yields.

(53) Pope County - Bennie Gregerson										
Soybeans	4.1	1.3	8.0	13.4	+3.0	6.9	4.1M	7L	163M	Barnes si.l.

Farmer's own yield = 44 (different variety)

Hail and drouth were reported as limiting yield. Early growth response; nitrogen and phosphate was noted. Yields on minor element plots were higher in all replicates than NPK alone.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	110	101	98	103	105	
Population	19,300	19,900	18,800	19,100	19,100	
Number Barren Stalks	2,000	1,300	1,600	900	1,300	
Number Lodged Stalks	7,100	3,100	5,000	4,400	4,400	

	Increase	Decrease
Yield difference due to N =	4 bu.	
" " " " P =	7 "	
" " " " K =	2 "	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	34	30	47	26	31	
Population	17,500	18,800	19,100	17,500	20,600	
Number Barren Stalks	4,400	7,900	4,000	6,800	9,100	
Number Lodged Stalks	7,800	1,000	2,700	1,000	6,500	

	Increase	Decrease
Yield difference due to N =	1 bu.	
" " " " P =		16 bu.
" " " " K =	5 bu.	

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	55	53	57	55	51	47
Population	12,300	12,300	12,000	12,500	12,000	12,000
Number Barren Stalks	1,800	1,100	1,000	2,100	1,800	1,600
Number Lodged Stalks	0	0	0	0	0	0

	Increase	Decrease
Yield difference due to N =		2 bu.
" " " " P =		6 "
" " " " K =		4 "
" " " " M.E. =		4 "

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	47	56	52	53	54	65
Population	15,900	16,500	16,200	16,200	15,200	15,700
Number Barren Stalks	3,900	4,400	4,100	4,400	3,400	4,600
Number Lodged Stalks	600	1,200	1,600	800	1,000	700

	Increase	Decrease
Yield difference due to N =		2 bu.
" " " " P =	2 bu.	
" " " " K =	1 "	
" " " " M.E. =	11 "	

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(54) Redwood County - Earl Fridley										
Oats	1.8	0.8	7.7	10.3	-0.3	6.4	3.9M	20M	137M	Nicollet si.l.

Farmer's own yield = 57

Fertilizer treatments reduced final yields although there was an early growth response. Rainfall was very low in June and July.

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(55) Renville County - Marvin Sunvold										
Oats	1.9	1.0	7.7	10.6	-0.7	6.9	4.8M	5VL	193M	Nicollet c.l.

In spite of low June and July rainfall yields were good and increases corresponded to soil test. NPK plus minor elements outyielded NPK alone on all replicates by 9 to 11 bushels.

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(56) Rice County - Ralph Le Mieux										
Corn	7.1	2.4	6.4	15.9	+4.2	6.3	2.7L	41VH	137M	s.l.

Farmer's own yield = 77 (200# 5-20-20 starter + 75# N sidedressed).

Nitrogen was the only element giving a yield increase. Corn leaf aphids caused a high number of barren stalks especially on the fertilized plots.

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(57) Rock County - Ray O'Toole										
Soybeans	2.0	0.0	7.0	9.0	-1.6	5.9	4.1M	13M	283VH	Moody si.l.

Nitrogen and phosphate apparently increased yields somewhat. Lack of rain in July apparently limited response.

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(58) Rock County - Albert Baker										
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Yield differences were small although phosphorus test was low.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	55	38	24	34	28	
Population	19,900	19,100	20,900	19,900	19,100	
Number Barren Stalks	8,100	12,200	13,600	11,500	12,600	
Number Lodged Stalks	100	0	0	400	200	

	Increase	Decrease
Yield difference due to N =		10 bu.
" " " " P =	4 bu.	
" " " " K =		6 bu.

Yield	64	65	70	98	81	91
Population	14,600	15,700	14,600	14,600	14,400	15,400
Number Barren Stalks	800	700	600	900	600	1,100
Number Lodged Stalks	5,200	4,500	4,200	4,100	3,800	3,800

	Increase	Decrease
Yield difference due to N =	16 bu.	
" " " " P =	11 "	
" " " " K =		17 bu.
" " " " M.E. =	10 bu.	

Yield	54	46	60	60	54	60
Population	17,500	17,800	16,200	17,500	18,300	17,500
Number Barren Stalks	3,700	5,000	3,600	4,900	5,800	3,700
Number Lodged Stalks	1,900	1,000	300	900	600	800

	Increase	Decrease
Yield difference due to N =	8 bu.	
" " " " P =		6 bu.
" " " " K =		6 "
" " " " M.E. =	6 bu.	

Yield	74	74	75	82	77
Population	17,500	15,400	14,400	15,200	15,400
Number Barren Stalks	300	100	0	200	500
Number Lodged Stalks	4,400	3,800	2,900	5,500	4,100

	Increase	Decrease
Yield difference due to N =	3 bu.	
" " " " P =	2 "	
" " " " K =		5 bu.

Yield	85	80	82	80	84
Population	14,100	10,500	13,600	14,600	12,300
Number Barren Stalks	800	400	500	400	500
Number Lodged Stalks	1,800	1,800	1,800	1,700	2,000

	Increase	Decrease
Yield difference due to N =	4 bu.	
" " " " P =	2 "	
" " " " K =	4 "	

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(60) Sherburne County - Charles Anderson										
None	2.7	2.9	5.0	10.6	-0.7	5.8	0.6L	50VH	87L	Zimmerman l.s.

Farmer's own yield - 6 (120# 0-0-60 + 100# 6-24-12)

Yields were low because of cutworm damage and necessity of a second planting. Field was very deficient in nitrogen. Although the potassium level was low, it was apparently adequate for these yields.

(62) Sibley County - Mauritz Hanson										
Soybeans	4.7	1.0	9.8	15.5	+4.2	7.1	5.7M	51VH	290VH	Webster c.l.

Farmer's own yield = 115 (200# 6-24-12)

Yield increases would not be expected on this high fertility soil. Corn leaf aphids were prevalent the first of August which corresponded to incidence of barren stalks.

(64) Stearns County - Henry Berling										
Corn	1.4	0.8	5.0	7.2	-4.1	7.1	5.1H	29H	123M	Nicollet l.

Although fertilizer increased yields over the check, NPK yield was lower than the NP yield.

(65) Steele County - Victor Calverly										
Corn	7.7	1.1	7.1	15.9	+4.2	6.2	2.7L	36VH	137M	Nicollet si.l.

Nitrogen was the only element causing a yield increase.

(66) Steele County - Eugene Sorg										
Corn	4.8	0.8	1.8	7.4	-4.3	7.5	4.3M	6L	97M	Nicollet l.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	10	8	27	29	26	26
Population	14,600	14,600	15,700	15,200	15,400	16,500
Number Barren Stalks	7,400	7,400	6,800	5,200	6,200	6,700
Number Lodged Stalks	5,400	3,400	5,300	6,400	2,600	3,100

	Increase	Decrease
Yield difference due to N =	18 bu.	
" " " " P =		1 bu.
" " " " K =		3 "
" " " " M.E.=	No difference	

Yield	100	100	89	94	93
Population	19,300	17,500	18,600	19,600	20,400
Number Barren Stalks	3,200	1,600	3,900	3,900	5,400
Number Lodged Stalks	600	1,000	1,200	500	2,900

	Increase	Decrease
Yield difference due to N =		7 bu.
" " " " P =	4 bu.	
" " " " K =		1 bu.

Yield	51	57	61	72	61
Population	19,300	18,000	18,800	18,800	18,600
Number Barren Stalks	4,500	2,900	4,000	2,800	3,400
Number Lodged Stalks	7,000	1,200	3,800	5,200	3,300

	Increase	Decrease
Yield difference due to N =	4 bu.	
" " " " P =	No difference	
" " " " K =		11 bu.

Yield	65	57	77	75	72
Population	16,500	16,700	16,500	16,500	14,600
Number Barren Stalks	10,500	11,300	9,500	9,900	9,500
Number Lodged Stalks	0	0	0	0	0

	Increase	Decrease
Yield difference due to N =	15 bu.	
" " " " P =		5 bu.
" " " " K =		3 bu.

Yield	100	101	96	96	90
Population	15,900	15,900	15,400	15,400	15,700
Number Barren Stalks	1,300	1,300	300	400	700
Number Lodged Stalks	1,200	1,100	2,200	900	2,600

	Increase	Decrease
Yield difference due to N =		11 bu.
" " " " P =		6 "
" " " " K =		6 "

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(68) Steele County - Lester Oeltjenbruns										
Corn	4.7	2.4	3.0	10.1	-1.6	7.8	7.7VH	4VL	97M	Webster si.c.l.

Phosphate and potash increased the yield over no fertilizer but increases cannot be attributed to P or K individually.
NOTE: NP yield represents average of only two replications.

(69) Swift County - Irvin Janson										
Soybeans	-	-	-	-	-	7.7	5.1M	12M	223H	Colvin c.l.

Nitrogen accounted for a large increase, but phosphate accounted for little difference despite a low medium test.

(70) Wabasha County - Ed Freese										
Peas	3.5	0.6	9.8	13.9	+2.2	7.1	1.6L	42VH	90L	Fayette si.l.

Again nitrogen was the most important element. Yields are higher than normally expected with a 90 lb. K test.

(71) Wabasha County - Roscoe Moyer										
Hay	4.9	3.0	13.9	21.8	+10.1	6.6	1.7L	19M	90L	Fayette si.l.

Potassium was most important which corresponds to the P and K tests.

(72) Waseca County - Eugene Scheffert										
Wheat	5.3	0.9	6.7	12.9	+1.2	6.5	4.6H	5VL	127M	Webster l.

Some phosphate response is indicated by the difference between the NK and NP yields, but most of the yield increase is due to nitrogen.

Treatment Information

	Check	PK	NK	NP	NPK	NPK+ M.E.
Yield	85	105	106	103	105	
Population	16,500	17,800	17,300	16,700	17,800	
Number Barren Stalks	700	1,100	1,800	1,200	1,500	
Number Lodged Stalks	1,400	1,100	1,400	3,400	2,200	

	Increase	Decrease
Yield difference due to N =	No difference	
" " " " P =		1 bu.
" " " " K =	2 bu.	

Yield	83	88	123	127	121
Population	18,300	19,100	19,300	20,100	18,600
Number Barren Stalks	800	1,600	1,500	1,000	1,100
Number Lodged Stalks	-	-	-	-	-

	Increase	Decrease
Yield difference due to N =	33 bu.	
" " " " P =		2 bu.
" " " " K =		6 bu.

Yield	87	89	124	114	112
Population	14,900	15,200	14,900	14,400	14,600
Number Barren Stalks	700	600	600	1,000	800
Number Lodged Stalks	600	400	400	800	800

	Increase	Decrease
Yield difference due to N =	23 bu.	
" " " " P =		12 bu.
" " " " K =		2 "

Yield	93	131	112	107	115
Population	17,500	19,300	19,100	17,800	18,300
Number Barren Stalks	1,000	400	500	700	800
Number Lodged Stalks	4,100	4,000	4,100	4,300	3,300

	Increase	Decrease
Yield difference due to N =		16 bu.
" " " " P =	3 bu.	
" " " " K =	8 "	

Yield	73	61	106	114	107
Population	20,100	19,600	20,100	19,300	20,400
Number Barren Stalks	1,500	2,700	1,000	1,500	1,800
Number Lodged Stalks	2,200	7,300	1,800	2,200	1,100

	Increase	Decrease
Yield difference due to N =	46 bu.	
" " " " P =	1 "	
" " " " K =		7 bu.

Past Crop (1958)	Rainfall (inches) June	July	August	Total 3 mo.	Rain diff. from normal	Soil Test Results pH	O.M.%	P	K	Soil Type Texture
(73) Washington County - Irving Nickelson										
Hay and pasture	0.8	4.0	7.0	11.8	-0.5	6.3	0.9L	20M	57VL	Sandy acid outwash l.s.

Observations by soils agent, Cliff Halsey, were that fertilizer gave early response but that pollination was poor on fertilized plots.

(74) Washington County - Walter and Herman Herzfeld										
Soybeans	2.8	1.6	7.5	11.9	-0.4	5.7	3.0L	23H	103M	Waukegan l.

This field showed a larger early growth response to fertilizer than the Nickelson field but yield decreased from fertilizer.

(75) Watonwan County - Peter F. Stoesz										
Soybeans	3.1	1.5	6.5	11.1	-0.6	7.8	3.7M	5VL	120M	Webster clay loam

This field was very phosphorus deficient as shown by the effect of phosphate fertilizer. Yields were good in spite of high population and low rainfall.

(76) Watonwan County - Robert Johnson										
Corn	7.0	0.4	4.5	11.9	+0.2	7.7	5.7M	10L	130M	Nicollet c.l.

The 18-bushel response to phosphate agrees with the phosphorus test. Good rainfall in June apparently carried corn through a dry July.

(77) Wright County - Howard Hess (Comer Farm)										
Alfalfa	3.1	2.6	4.7	10.4	-0.9	6.4	2.9L	24H	117M	Clarion l.

Small phosphorus effect agrees with soil test. As in a number of other fields, the 120 K level appeared adequate for 100 bushel yields.