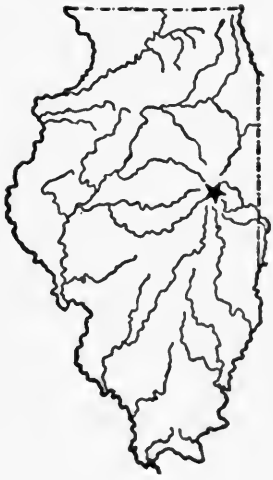
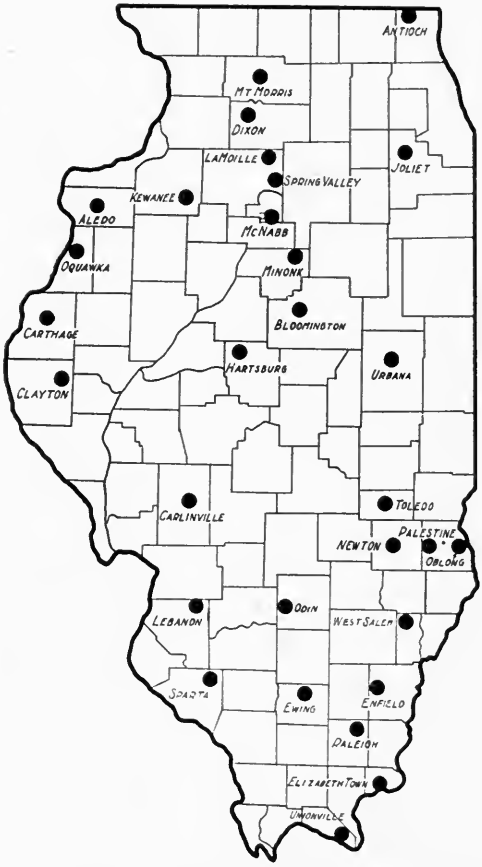
Crop Yields From Illinois Experiment Fields in 1929

Together With a General Summary for the Rotation Periods Ending in 1929

By F. C. Bauer



UNIVERSITY OF ILLINOIS
AGRICULTURAL EXPERIMENT STATION
BULLETIN 347



LOCATION OF THE THIRTY EXPERIMENT FIELDS FROM WHICH RESULTS ARE PRESENTED IN THIS BULLETIN

Urbana, Illinois June, 1930

Publications in the Bulletin series report the results of investigations made or sponsored by the Experiment Station

Crop Yields From Illinois Soil Experiment Fields in 1929

Together With a General Summary for the Rotation Periods Ending in 1929

By F. C. Bauer, Chief, Soil Experiment Fields

AGRICULTURAL SOILS are somewhat like growing and aging human beings; their ability to perform—that is, to produce crops—and their requirements for performance are constantly changing. The rapidity with which these changes take place depends, in a broad sense, on the quality of the materials from which a soil is formed, on the intensity of the weathering forces acting upon these materials, and on the care exercised in management and treatment.

Soil management and treatment practices properly employed can do much to retard the work of the aging influences and to uncover the latent productivity that may have become obscured by the rapid play of aging factors in the past. No single system of management or treatment, however, can be expected to give the best results with all soils. Neither can an effective system at a particular time be expected to give the best results on a particular soil for all time to come. Systems of management and treatment must be adapted to the widely differing nature, maturity, and changeableness of different soils.

In order to test the effectiveness of different systems of soil treatment on the yield of farm crops, the Illinois Agricultural Experiment Station for a number of years has conducted field investigations in all sections of the state on extensive soil types varying widely in productiveness. Some investigations along this line have been in progress at Urbana since 1876; the first of the present outlying soil experiment fields were established in the fall of 1901. Some of the original fields are still in operation. Some have been abandoned at one time or another for various reasons. During the crop season of 1929 thirty of these fields were in operation.

The complete results from all the Illinois soil experiment fields up to and including 1924 were reported in Bulletin 273. Subsequent results have been reported annually—in Bulletins 280, 296, 307, and 327. The present bulletin is a continuation of this series. In these publications the crop yields have been presented as a matter of record without

comment or discussion. In order, however, to give a little better picture of the results as a whole, a general summary for all rotation periods ending in 1929 has been added to this bulletin. The reader is urged to turn to pages 355 to 368 and note the points brought out in tables and text.

Explanation of Symbols

The following symbols are used to denote the soil treatments applied:

0 = No treatment	rP = Rock phosphate
M = Manure	sP = Superphosphate
R = Crop residues	bP = Bone phosphate
Le = Legume catch crop	S = Flowers of sulfur
L = Limestone	KCl = Muriate of potash
K = Potash	$NaNO_3$ = Sodium nitrate
	( ) = Tons

The crop residues are chiefly cornstalks and sweet clover plowed down as a green manure. In some cases the second crop of clover and other legume residues have also been plowed down. When legumes are used as a catch crop, they are seeded in small grain to be plowed down the following year for succeeding crops.

All yields except those in parentheses indicate acre-yields in bushels; the yields in parentheses indicate acre-yields in tons.

Soil Groups Represented by the Illinois Soil Experiment Fields[1]

The results reported on pages 326 to 354 are for individual fields arranged alphabetically rather than by location or by soil types. The general character of the soils represented by these fields is indicated by the following classification:

Group No.	Description	Location of field	Year established
1	Dark soils with heavy, noncalcareous subsoils		
	Semimature	Bloomington	1902
	Young	Aledo	1910
		LaMoille	1910
		Minonk	1910
2	Dark soils with heavy, calcareous subsoils		
	Young (due to sedimentation)	Hartsburg	1911
	Young (due to erosion)	Joliet	1914
3	Dark soils with noncalcareous subsoils		
	Semimature	Urbana	1895
	Young	Kewanee	1915

[1]This classification was prepared by Dr. R. S. Smith, in charge of Soil Survey Mapping.

4	Dark soils with open, noncalcareous subsoils		
	Semimature	Dixon	1910
		Mt. Morris	1910
	Young	McNabb	1907
5	Dark soils with impervious, noncalcareous subsoils		
	Semimature	Carthage	1911
		Clayton	1911
		Lebanon	1910
	Mature	Carlinville	1910
7	Gray soils with impervious, noncalcareous subsoils		
	Old (moderately well drained)	Ewing	1910
		Oblong	1912
	Old (poorly drained; slick spots numerous)	Newton	1912
		Odin	1902
		Raleigh	1910
		Toledo	1913
	Old (very poorly drained; slick spots numerous)	Sparta	1916
8	Yellow soils with noncalcareous subsoils		
	Mature	Enfield	1912
		Unionville	1911
		West Salem	1912
9	Brownish-yellow soils with open, noncalcareous subsoils		
	Semimature (sedimentation and erosion)	Springvalley	1915
11	Brownish-yellow soils with calcareous subsoils		
	Young	Antioch	1902
14	Sand loams and sands		
	Mature	Palestine	1919
	Semimature	Oquawka	1915
16	Hilly land		
	Mature	Elizabethtown	1917

TABLE 1.—ALEDO FIELD. Rotation: Corn, corn, oats, wheat

Serial plot No.	Soil treatment	Series 100		Series 200		Series 300	Series 400
		Wheat	Stubble clover (sw. cl.)	Oats	Stubble clover (hubam)	First year corn	Second year corn
			WEST HALF				
1	0	23.7	....	72.5	(0)	45.4	48.6
2	M	30.7	....	81.3	(0)	58.6	60.8
3	ML	38.0	....	82.8	(.93)	59.6	63.0
4	MLrP	38.3	....	85.0	(.97)	61.2	66.8
5	0	23.3	....	70.3	(0)	46.2	46.2
6	R	29.3	(0)	71.9	(0)	50.0	50.8
7	RL	24.7	(1.66)	73.4	(.99)	60.6	59.8
8	RLrP	20.8	(1.68)	75.3	(1.03)	60.4	59.6
9	RLrPK	25.8	(1.72)	76.9	(.91)	61.8	67.0
10	0	23.3	....	66.3	(0)	43.0	44.8
			EAST HALF				
1	RL	30.7	(1.33)	64.4	(.32)	53.0	58.0
2	MrP	35.2	....	81.3	(0)	57.6	60.8
3	MLbP	39.2	....	83.1	(.93)	57.8	62.4
4	MLrP	32.5	....	83.1	(1.00)	58.6	61.0
5	RsP	31.3	....	68.8	(0)	50.0	49.6
6	RrP	29.2	....	72.5	(0)	47.8	55.4
7	RLsP	25.0	(1.66)	74.4	(.84)	57.0	60.8
8	RLrP	25.0	(1.60)	75.6	(1.07)	59.4	62.8
9	RLrPK	28.3	(1.72)	78.1	(.93)	63.6	70.2
10	RLrP	30.8	(1.59)	71.9	(.60)	53.2	62.0

Note.—In 1924 the plots on these series were divided into east and west halves in order to provide for additional phosphorus studies. The plots on the west halves of all series continue under the original soil treatment but the plots on the east halves receive the treatment designated above. No more rock phosphate will be applied to the phosphate plots on the west halves for an indefinite period, these plots having received a total of 8,000 pounds an acre.

On the east halves all phosphorus fertilizers will be applied twice in the rotation, ahead of the wheat crop and the first corn crop, at the following annual acre rates: rock phosphate 500 pounds, superphosphate 200 pounds, bone meal 200 pounds.

The minimum amount of limestone necessary for the successful growth of the clover green-manure crop will be applied to Plots 1-E and 10-E, 4,000 pounds an acre having been applied in 1924.

TABLE 2.—ALEDO FIELD: PHOSPHORUS EXPERIMENT
Rotation: Corn, corn, oats, wheat

Serial Plot No.	Series 500			Series 600		
	Soil treatment	Oats	Stubble clover (hubam)	Soil treatment	Oats	Stubble clover (hubam)
1	R	59.7	(.33)	R	62.2	(0)
2	RbP	68.8	(0)	RsP	73.4	(0)
3	RLbP	70.0	(1.16)	RLsP	74.2	(1.10)
4	RL	68.4	(.78)	RL	69.1	(.89)

(*Table is concluded on page 327*)

TABLE 2.—*Concluded*

	Series 700			Series 800		
	Soil treatment	Oats	Stubble clover (hubam)	Soil treatment	Oats	Stubble clover (hubam)
1	R	61.3	(0)	R	58.3	(0)
2	RrP	68.9	(0)	R, slag P	59.4	(0)
3	RLrP	69.7	(1.20)	RL, slag P	67.2	(1.30)
4	RL	70.0	(1.00)	RL	60.2	(.93)

TABLE 3.—ANTIOCH FIELD
Rotation: Corn, oats, clover, wheat

Plot No.	Soil treatment	Mixed hay	Plot No.	Soil treatment	Mixed hay
1	0	(1.62)	6	LRbP	(2.81)
2	LrP	(2.80)	7	LRK	(2.17)
3	LRrP	(2.62)	8	LKbP	(2.56)
4	LbP	(2.80)	9	LRKbP	(2.87)
5	LKrP	(2.41)	10	LKbP	(2.31)

Note.—At Antioch, beginning with 1924, rock phosphate has been applied to Plots 2, 3, and 5 at the annual acre rate of 500 pounds; one-half of the rotation application is made ahead of the oats crop and one-half ahead of the wheat crop. The soil treatment remains unchanged on the other plots.

TABLE 4.—BLOOMINGTON FIELD
Rotation: Corn, corn, oats, clover, wheat

Plot No.	NORTH HALF		SOUTH HALF	
	Soil treatment	Oats	Soil treatment	Oats
1	R	62.8	0	60.3
2	RLbP	60.6	RL	51.6
3	RLrP	57.2	RLsP	66.9
4	RLbP	58.4	RLbP	65.0
5	RLKrP	57.2	RLKsP	65.3
6	RLbP	66.9	RLbP	73.4
7	RLKrP	64.1	RLKsP	69.4
8	RLKbP	64.1	RLKbP	70.9
9	RLKbP	67.2	RLKbP	71.6
10	RKbP	60.3	RKbP	68.4
11	RrP	60.6	RsP	69.7

Note.—At Bloomington in 1924 an additional plot was laid out at the east end of the series. All plots were divided into north and south halves and the soil treatment planned as follows: Residues (cornstalks, the second crop of red clover, legume green-manure crops) to be turned under on all plots except Plot 1-S. Different phosphorus carriers to be applied at the following acre rates per rotation: bone meal, 1,000 pounds, to Plots 2-N, 4-N, 6-N, 8-N, 9-N, and 10-N; rock phosphate, 2,500 pounds, to Plots 3-N, 5-N, 7-N, and 11-N; superphosphate, 1,000 pounds, to Plots 3-S, 5-S, 7-S, and 11-S. Two-fifths of the rotation application of these phosphates is to be made ahead of the oats crop, two-fifths ahead of the wheat crop, and one-fifth ahead of the first corn crop.

TABLE 5.—CARLINVILLE FIELD
Rotation: Corn, oats, wheat, clover-alfalfa

Serial plot No.	Soil treatment	Series 100 Oats	Series 200 Wheat	Series 300 Clover-alfalfa	Series 400 Corn
1	0	12.2	19.7	(1.27)	36.7
2	M	33.0	25.5	(1.78)	48.8
3	ML	39.7	25.8	(3.76)	54.2
4	MLrP	40.3	28.4	(4.40)	54.3
5	0	20.5	19.9	(2.27)	38.8
6	R	17.0	19.5	(3.11)	41.0
7	RL	33.1	23.4	(3.47)	43.0
8	RLrP	32.0	22.7	(3.86)	44.1
9	RLrPK	32.0	21.8	(3.87)	47.0
10	0	17.3	16.2	(2.23)	35.7

TABLE 6.—CARLINVILLE FIELD
Rotation: Corn, wheat

Serial plot No.	Series 700		Series 800	
	Soil treatment[1]	Corn	Soil treatment[1]	Corn
1	LeL (1,000)	26.6	LeL (5,000)	17.0
2	LeL (4,000)	25.2	LeL (20,000)	25.6
3	LeL (2,000)	29.2	LeL (10,000)	35.8
4	LeL (2,000), treble sP	26.0	LeL (10,000), treble sP	32.2
5	LeL (2,000), sP	28.8	LeL (10,000), sP	33.6
6	LeL (2,000), rP	27.0	LeL (10,000), rP	29.6
7	L (2,000)	23.8	L (10,000)	24.4

[1]The figures in parentheses refer to the total amounts of limestone applied per acre since 1921.

TABLE 7.—CARTHAGE FIELD
Rotation: Corn, oats, clover, wheat

Serial plot No.	Soil treatment	Series 100 Clover	Series 200 Oats	Series 300 Corn	Series 400 Soybeans[1]
1	0	(1.60)	35.0	30.3	32.0
2	M	(2.48)	61.3	48.5	33.3
3	ML	(2.39)	63.8	67.8	30.0
4	MLrP	(2.67)	68.1	70.5	32.3
5	0	(1.45)	48.8	34.5	30.0
6	R	(.78)	52.5	56.0	28.3
7	RL	(.93)	57.5	79.3	26.7
8	RLrP	(1.32)	61.9	78.8	31.3
9	RLrPK	(1.66)	65.0	85.5	30.0
10	0	(.80)	49.4	36.1	21.7

[1]Soybeans grown as a substitute for wheat, which winterkilled badly.

TABLE 8.—CARTHAGE FIELD: SPECIAL FERTILIZER STUDIES ON SERIES 300 AND 400[1]

Rotation: Corn, oats, clover, wheat

Serial plot No.	Basal treatment	Section A		Section B		Section C		Section D	
		Corn	Soybeans[2]	Corn	Soybeans[2]	Corn	Soybeans[2]	Corn	Soybeans[2]
1	0	30.3	32.0	32.5	30.0	28.7	16.7	28.9	17.3
2	M	48.5	33.3	51.5	35.0	40.1	28.3	38.0	31.0
3	ML	67.8	30.0	74.8	30.7	65.2	30.0	52.5	32.7
4	MLrP	70.5	32.3	70.2	32.0	66.0	31.3	71.2	31.7
5	0	34.5	30.0	30.8	31.3	24.6	30.3	24.6	30.0
6	R	56.0	28.3	54.6	31.3	47.6	26.7	46.8	28.3
7	RL	79.3	26.7	85.8	31.7	78.4	29.7	83.0	26.7
8	RLrP	78.8	31.3	84.9	36.0	85.7	31.3	87.9	34.7
9	RLrPK	85.5	30.0	88.4	31.7	90.2	32.7	77.2	31.7
10	0	36.1	21.7	29.3	16.7	26.1	30.7	30.4	31.7

[1]For the purpose of studying the relative values of finely processed rock phosphate, superphosphate, and mixed fertilizers when used in addition to different basal soil treatments which have been common to all sections since 1912, these series of plots in 1929 were divided into four sections extending across all plots.

Section A receives the basal treatment only.

Section B receives the basal treatment plus finely processed rock phosphate, 500 pounds per acre for wheat and 250 pounds for corn.

Section C receives the basal treatment plus superphosphate, 200 pounds per acre for wheat and 150 pounds for corn.

Section D receives the basal treatment plus a mixed fertilizer: namely, 250 pounds of 5-15-5 per acre for wheat and 250 pounds of 2-12-6 for corn.

[2]Wheat winterkilled, soybeans grown as a substitute crop.

TABLE 9.—CARTHAGE FIELD

Rotation: Corn, corn, oats

Serial plot No.	Soil treatment[1]	Series 500		Series 600		Series 700	
		Second-year corn		First-year corn		Oats	Stubble clover (sw. cl.)
		West	East	West	East		West[2]
1	RL	37.8	44.1	65.3	85.0	50.3	(1.17)
2	RLrP (100)	44.5	50.7	67.4	91.1	48.1	(1.13)
3	RLrP (100), gypsum (100)	44.8	49.8	69.5	87.2	48.8	(1.13)
4	RLrP (200)	44.5	53.2	66.1	83.6	48.1	(1.17)
5	RLrP (200), gypsum (200)	41.1	53.5	67.0	80.9	44.1	(1.21)
6	RLrP (400)	39.6	49.4	61.1	84.8	40.9	(1.36)
7	RLrP (400), gypsum (400)	46.1	53.5	63.2	80.9	41.9	(1.45)
8	RL	45.4	52.9	60.4	76.4	43.4	(1.32)

[1]The figures in parentheses indicate the annual acre rates (pounds) at which rock phosphate and gypsum are applied. [2]The fall growth of sweet clover is regularly removed from the west halves of the series and the corn following is harvested by half plots.

TABLE 10.—CLAYTON FIELD
Rotation: Corn, oats, clover, wheat

Serial plot No.	Soil treatment	Series 100 Clover	Series 200 Oats	Series 300 Corn[1]		Series 400	
				North	South	Wheat	Stubble clover (sw. cl.)
1	0	(1.76)	56.3	26.2	29.6	19.2	....
2	M	(3.21)	62.2	58.0	48.0	24.4	....
3	ML	(4.23)	73.4	67.8	60.4	30.7	....
4	MLrP	(4.40)	74.2	70.0	64.4	31.0	....
5	0	(2.40)	57.5	38.0	41.4	20.8	....
6	R	(1.52)	57.8	53.2	45.2	22.9	(0)
7	RL	(2.45)	67.2	62.0	59.2	28.3	(1.46)
8	RLrP	(2.48)	70.3	59.2	61.4	28.5	(1.32)
9	RLrPK	(2.60)	86.3	64.8	66.2	31.7	(1.22)
10	0	(2.70)	45.3	28.2	24.8	21.7	....

[1]The north half of the series was plowed on April 17 and the south half on May 9.

(*See opposite page for Table 11*)

TABLE 12.—DIXON FIELD
Rotation: Corn, corn, oats, alfalfa

Serial plot No.	Soil treatment	Series 500 Alfalfa	Series 600 Oats	Series 700 Second-year corn	Series 800 First-year corn
1–N	RK	(1.18)	46.6	49.0	49.6
1–S	R	(.77)	59.4	42.6	55.4
2–N	RMK	(2.24)	48.4	53.0	57.2
2–S	RM	(2.09)	65.0	51.6	67.2
3–N	RMLK	(4.80)	65.0	52.6	61.0
3–S	RML	(4.41)	60.0	50.2	58.6
4–N	RMLrPK	(4.96)	66.3	61.4	64.6
4–S	RMLrP	(4.91)	58.1	52.6	59.0

TABLE 11.—DIXON FIELD
Rotation: Corn, oats, clover, wheat

Serial plot No.	Soil treatment	Series 100 Clover	Series 200 Oats	Series 300 Corn	Series 400 Wheat
	SOUTH HALF				
1	0	(2.58)	50.0	40.6	32.5
2	M	(2.70)	77.2	62.6	39.5
3	ML	(2.36)	83.4	72.0	38.5
4	MLrP	(2.50)	85.6	75.4	37.8
5	0	(2.32)	71.6	43.8	32.8
6	R	(2.66)	70.3	46.6	35.3
7	RL	(2.89)	78.0	59.0	39.0
8	RLrP	(2.90)	80.0	61.2	39.2
9	RLrPK	(2.57)	77.8	70.0	39.0
10	0	(2.73)	65.6	50.0	32.3
	NORTH HALF				
1	RL	(2.56)	73.1	46.6	30.8
2	MrP	(2.34)	82.2	63.2	40.8
3	MLbP	(2.57)	85.3	73.2	41.5
4	MLrP	(2.56)	88.8	74.2	40.8
5	RsP	(2.14)	70.0	46.4	28.5
6	RrP	(2.73)	75.9	52.2	39.5
7	RLsP	(2.84)	77.8	53.2	39.3
8	RLrP	(3.09)	87.5	60.0	39.2
9	RLrPK, gypsum	(2.66)	78.0	67.2	41.0
10	RLrP	(2.91)	78.0	54.2	37.3

Note.—In 1924 the plots on these series were divided into north and south halves, and some additional investigations were begun. The plots on the south halves of all series continue under the original soil treatment, but the plots on the north halves receive the treatment designated above. No more rock phosphate will be applied to the phosphate plots on the south halves for an indefinite period, these having received a total of 8,000 pounds an acre. The same holds true for the north half of Plot 9 of all series.

On the north halves the phosphatic fertilizers and gypsum are applied twice in the rotation, one-half of the rotation quota ahead of wheat, and one-half ahead of corn, at the following annual acre rates: rock phosphate 500 pounds, superphosphate 200 pounds, bone meal 200 pounds, gypsum 200 pounds.

The minimum amount of limestone necessary for the successful growth of clovers will be applied to Plots 1-N and 10-N on all series, 4,000 pounds an acre having been applied in 1924.

TABLE 13.—ELIZABETHTOWN FIELD
Rotation: Corn, wheat, mixed hay, wheat

Serial[1] plot No.	Soil treatment	Series 100 Wheat	Series 200 Corn	Series 300 Wheat	Series 400 Mixed hay	Series[2] 500 Alfalfa
1	0	6.4	3.8	10.7	(.70)	(0)
2	M	3.7	6.0	8.8	(1.07)	(0)
3	ML	12.3	24.8	18.7	(2.16)	(1.23)
4	MLrP	21.6	44.6	26.2	(2.65)	(1.61)
5	0	1.0	3.0	1.8	(.82)	(0)
6	R	1.0	18.3	2.2	(1.27)	(0)
7	RL	7.4	41.2	9.8	(1.57)	(1.13)
8	RLrP	19.3	50.2	21.0	(2.04)	(.78)
9	RLrPK	22.1	54.8	28.5	(2.32)	(1.80)
10	0	4.5	26.7	7.1	(.68)	(0)

[1]Plot 1 on Series 100, 300, and 400, and Plot 10 on Series 100 and 200 lie on lower ground and are naturally more productive. [2]Series 500 is a permanent alfalfa series.

TABLE 14.—ELIZABETHTOWN FIELD
Rotation: Corn, soybeans, wheat

Soil treatment	Plot A Soybeans	Plot B Wheat	Plot C Corn
RLsP	(1.35)	12.0	34.8
RLrP	(1.30)	7.0	38.2

TABLE 15.—ENFIELD FIELD
Rotation: Corn, oats, mixed hay, wheat

Serial plot No.	Soil treatment	Series 100 Mixed hay	Series 200 Oats	Series 300 Corn	Series 400 Wheat
1	0	(.14)	13.3	14.3	9.2
2	M	(.90)	18.6	23.4	13.4
3	ML	(2.96)	35.2	48.5	26.3
4	MLrP	(3.27)	37.0	42.9	26.7
5	0	(.54)	15.2	13.9	9.2
6	R	(.45)	14.2	17.5	9.5
7	RL	(2.34)	27.3	39.7	17.9
8	RLrP	(2.50)	37.3	30.9	18.2
9	RLrPK	(3.18)	25.5	46.7	21.9
10	0	(.61)	17.5	27.1	11.2

TABLE 16.—ENFIELD FIELD
Rotation: Corn, wheat

Serial plot No.	Soil treatment[1]	Series 700 Corn	Series 800 Wheat
1-W	L	25.6	3.8
1-E	L	13.7	6.0
2-W	LrP (2,000) sP (100), sweet clover	36.0	5.2
2-E	LrP (2,000) sP (100), red clover	11.4	9.5
3-W	LrP (2,000), sweet clover	33.2	5.7
3-E	LrP (2,000), red clover	10.4	11.3
4-W	LrP (2,000) sP (200), sweet clover	32.0	7.0
4-E	LrP (2,000) sP (200), red clover	18.8	11.2
5-W	LrP (2,000), sweet clover	28.1	8.7
5-E	LrP (2,000), red clover	12.6	12.7
6-W	L, sweet clover	19.8	7.5
6-E	L, red clover	14.8	9.2

[1]The figures in parentheses indicate the total applications of phosphates since 1923.

TABLE 17.—EWING FIELD
Rotation: Corn, oats, mixed hay, wheat

Serial plot No.	Soil treatment	Series 100 Mixed hay	Series 200 Oats	Series 300 Corn	Series 400	
					Wheat	Stubble hay (sw. cl.)
1	0	(.62)	5.8	1.6	2.0	....
2	M	(.80)	10.8	12.7	4.7	....
3	ML	(3.36)	40.5	37.1	37.0	....
4	MLrP	(3.20)	44.2	37.4	36.7	....
5	0	(.81)	10.6	2.7	1.0	....
6	R	(.91)	10.8	4.4	.7	(0)
7	RL	(1.59)	33.6	14.5	20.3	(.32)
8	RLrP	(2.09)	33.1	21.7	23.7	(.51)
9	RLrPK	(3.00)	36.1	53.0	29.7	(.94)
10	0	(.94)	10.2	16.7	1.0	....

TABLE 18.—EWING FIELD: SPECIAL FERTILIZER STUDIES ON SERIES 300 AND 400[1]
Rotation: Corn, oats, mixed hay, wheat

Serial plot No.	Basal treatment	Section A		Section B		Section C		Section D	
		Corn	Wheat	Corn	Wheat	Corn	Wheat	Corn	Wheat
1	0	8.5	2.7	8.4	1.3	1.6	2.0	1.1	.7
2	M	17.8	4.3	23.6	3.0	12.7	4.7	1.6	4.3
3	ML	36.5	31.7	44.9	36.7	37.1	37.0	17.9	32.0
4	MLrP	42.2	35.0	46.9	37.3	37.4	36.7	18.1	33.0
5	0	20.9	3.3	9.7	1.0	2.7	1.0	5.2	2.7
6	R	25.6	6.0	20.0	1.7	4.4	.7	4.5	1.3
7	RL	38.6	29.3	49.5	24.3	14.5	20.3	17.4	21.0
8	RLrP	42.9	28.0	45.3	32.7	21.7	23.7	35.8	25.0
9	RLrPK	51.6	36.0	54.5	32.3	53.0	29.7	44.0	25.0
10	0	17.5	8.7	17.0	1.3	16.7	1.0	22.2	4.0

[1]In order to study the relative values of different methods of fertilization when added to the basal soil treatments that have been common on these series since 1911, the series in 1929 were divided into four sections extending across all plots.

Section A of each plot receives the basal treatment plus KCl at the rate of 160 pounds per acre for wheat and 200 pounds for corn; also superphosphate at the rate of 300 pounds per acre for wheat and 150 pounds for corn.

Section B receives KCl as on Section A.

Section C continues under the basal treatment except for Plot 10, which receives superphosphate as on Section A.

Section D of the various plots is treated as follows: Plot 1 receives 100 pounds per acre of $NaNO_3$ as a top dressing for wheat and 100 pounds as a side dressing for corn. On Plots 2, 3, and 4 of this section all soil treatments are discontinued. Plot 5 receives $NaNO_3$ as on Plot 1 and KCl as on Section A. On Plot 7 the sweet-clover catch crop is omitted. On Plot 8 oats straw is plowed down for corn at the rate of 2 tons an acre. On Plot 9 kainit is discontinued. Plot 10 receives $NaNO_3$ as on Plot 1 and KCl and superphosphate as on Section A.

Plot 6 in Sections A, B, and D received a 9-ton application of limestone in 1929. No sweet clover will be seeded on this plot in Sections A and B.

TABLE 19.—EWING FIELD
Rotation: Corn, oats, wheat

Serial plot No.	Soil treatment	Series 500-N Corn	Series 500-S Wheat	Series 600 Oats
1	MLrPK, no clover	18.9	9.3	26.5
2	MLrPK, white biennial sweet clover	13.0	13.3	39.5
3	MLrPK, red clover	13.9	14.4	47.5
4	MLrPK, hubam clover	9.5	17.6	40.0
5	MLrPK, alsike clover	9.4	13.9	45.0
6	MLrPK, yellow biennial sweet clover	8.3	9.1	40.0

Note.—These series were replotted in 1927 from what were formerly Plots A and B. Prior to 1917 fertilizers had been applied as follows: manure 8 tons, limestone 8 tons, rock phosphate 6,000 pounds, and kainit 2,400 pounds per acre. With the exception of limestone used when necessary to grow the clovers, no more fertilizing materials will be added. A study will be made of relative value of different clovers as the source of organic manure in a rotation of corn, oats, and wheat (clover catch crop)

TABLE 20.—EWING FIELD
Rotation: Corn, oats, wheat

Serial plot No.	Soil treatment[1]	Series 700 Corn	Series 800 Oats	Series 900 Wheat
1	Le	20.5	9.4	3.2
2	LeL	23.3	20.6	9.3
3	LeLsP (100)	27.1	21.3	11.3
4	LeLrP (200)	30.8	15.6	14.7
5	LeL	26.3	9.4	8.3
6	LeLsP (200)	25.7	9.4	11.0
7	LeLrP (400)	19.4	18.8	10.3

[1]The figures in parentheses indicate the annual acre rate at which the phosphates are applied.

TABLE 21.—HARTSBURG FIELD
Rotation: Corn, corn, oats, wheat

Serial plot No.	Soil treatment	Series 100 Wheat	Series 200 Oats	Series 300 Second-year corn	Series 400 First-year corn
	WEST HALF				
1	0	24.3	41.9	27.4	25.4
2	M	13.3	39.7	29.6	38.0
3	ML	31.3	49.7	43.8	66.8
4	MLrP	30.0	41.3	39.0	61.8
5	0	12.7	43.4	22.6	30.4
6	R	22.2	36.9	34.4	72.8
7	RL	21.0	43.8	44.2	80.0
8	RLrP	24.2	42.8	48.0	76.4
9	RLrPK	29.8	46.9	50.4	80.2
10	0	20.8	38.1	37.2	38.6
	EAST HALF				
1	RL	26.5	47.5	47.6	66.6
2	MrP	27.0	42.5	37.6	49.2
3	MLbP	32.5	48.1	49.4	69.6
4	MLrP	35.7	43.4	52.8	63.0
5	RsP	13.2	46.3	39.8	68.6
6	RrP	18.0	47.5	36.4	65.8
7	RLsP	16.0	46.3	37.4	73.8
8	RLrP	27.5	41.9	43.8	87.8
9	RLrPK, gypsum	27.5	46.9	49.0	85.2
10	RLrP	29.2	41.6	48.0	69.8

Note.—In 1924 the plots on these series were divided into west and east halves and additional investigations were begun. The plots on the west halves of all series continue under the original soil treatment but the plots on the east halves receive the treatment designated above. No more rock phosphate will be applied to the phosphate plots on the west halves for an indefinite period, these plots having received a total of 8,000 pounds an acre. The same holds true for the east half of Plot 9 on all series. (*Note is concluded on page 336*)

TABLE 22.—HARTSBURG FIELD
Rotation: Corn, oats, wheat, clover-alfalfa

Plot No.	Soil treatment	Wheat	Stubble hay (cl.-alf.)	Plot No.	Soil treatment	Wheat	Stubble hay (cl.-alf.)
1	0.....	20.8	(1.02)	9	RLrPK.....	25.0	(1.32)
2	M.....	21.2	(1.30)	10	0.....	19.4	(.86)
3	ML.....	29.9	(1.32)	11	LeM.....	18.8	(.80)
4	MLrP.....	30.4	(1.33)	12	LeML.....	25.4	(.88)
5	0.....	20.3	(1.04)	13	LeMLrP....	26.3	(1.33)
6	R.....	19.8	(1.28)	14	LeMrP.....	18.3	(1.40)
7	RL.....	19.8	(.73)	15	0.....	10.9	(1.00)
8	RLrP.....	25.2	(1.16)				

TABLE 23.—JOLIET FIELD
Rotation: Corn, barley, wheat, legumes

Serial plot No.[1]	Soil treatment	Series 700 Legume hay	Series 800 Wheat	Series 900 Barley	Series 1000 Corn
1	L, red clover.....	(1.21)	20.5	30.4	37.6
2	LrP, red clover.....	(1.49)	21.7	35.4	42.6
3	LrP, gypsum, red clover.....	(1.62)	26.8	37.3	45.0
4	L, red clover.....	(1.82)	19.3	32.9	39.6
5	L, alfalfa.....	(1.23)	21.5	30.4	38.8
6	LrP, alfalfa.....	(2.34)	27.0	34.2	48.4
7	LrPL (8,000), alfalfa.....	(3.36)	25.5	33.8	47.6
8	LrP, KCl, alfalfa.....	(3.47)	29.3	32.7	55.4
9	L, KCl, alfalfa.....	(1.62)	23.7	27.1	40.8
10	L, alfalfa.....	(1.57)	26.2	28.5	37.4
11	L, red clover.....	(.72)	....	35.6	....
12	LsP, red clover.....	(1.83)	....	35.4	....
13	LsP, red clover.....	(.95)	....	36.2	....

Note.—In 1924 the rotation on the minor series at Joliet was changed to corn, barley, wheat, and biennial legumes (red clover on Plots 1 to 4 on all series and on Plots 11, 12, and 13 on Series 700 and 900; alfalfa on Plots 5 to 10.) All plots had received limestone at the rate of 5,000 pounds an acre prior to 1924. At that time Plot 7 on all series received 8,000 pounds of limestone an acre. Fertilizers as designated above are applied at the following annual acre rates: rock phosphate 400 pounds, potassium chlorid 100 pounds, gypsum 100 pounds. These fertilizers are applied twice in the rotation, ahead of the wheat and corn crops. Superphosphate is applied for the wheat crop at the rate of 250 pounds an acre.

[1]Plots 11, 12, and 13 appear only on Series 700 and 900.

(*Note to Table 21 concluded*)

On the east halves the phosphatic fertilizers and gypsum are applied twice in the rotation, one-half ahead of the wheat crop and one-half ahead of the first corn crop, at the following annual acre rates: rock phosphate 500 pounds, superphosphate 200 pounds, bone meal 200 pounds, gypsum 200 pounds.

The minimum amount of limestone necessary to secure successful growth of the legume catch crop will be applied to Plots 1-E and 10-E on all series, 4,000 pounds an acre having been applied in 1924.

TABLE 24.—JOLIET FIELD
Rotation: Corn, corn, oats, clover-alfalfa, wheat, alfafa

Serial plot No.	Soil treatment	Series 100 Mixed hay	Series 200 Alfalfa[1]	Series 300 Oats	Series 400 Second-year corn	Series 500 First-year corn	Series 600 Wheat
1	0	(1.91)	(.87)	55.3	38.9	37.9	12.5
2	M	(2.31)	(.98)	57.5	50.3	47.7	16.5
3	ML	(2.87)	(1.18)	59.8	54.3	53.9	17.7
4	MLrP	(3.78)	(1.57)	60.0	55.3	49.5	24.7
5	0	(1.73)	(.82)	50.0	38.3	35.6	13.9
6	R	(1.45)	(.98)	43.3	41.8	38.5	15.4
7	RL	(1.61)	(1.50)	46.9	43.4	47.4	16.7
8	RLrP	(2.85)	(1.50)	56.3	50.5	56.6	25.9
9	RLrPK	(3.20)	(1.99)	56.3	58.5	58.7	27.8
10	0	(2.18)	(.92)	48.8	38.8	31.0	9.1

[1]The alfalfa was reseeded in the spring of 1929 with a nurse crop of oats. One crop of hay (mixed oats and alfalfa) was removed.

TABLE 25.—KEWANEE FIELD
Rotation: Corn, oats, clover, wheat

Serial plot No.	Soil treatment	Series 100 Clover	Series 200 Oats	Series 300 Corn	Series 400 Wheat
1	0	(2.47)	58.8	57.3	26.2
2	M	(3.36)	75.3	72.6	28.3
3	ML	(4.25)	74.5	84.5	35.3
4	MLrP	(4.36)	69.7	82.7	35.1
5	0	(3.58)	68.6	58.1	25.0
6	R	(1.54)	61.3	72.4	24.8
7	RL	(1.72)	66.9	87.9	25.5
8	RLrP	(1.72)	70.9	86.0	32.6
9	RLrPK	(1.60)	73.3	94.7	40.1
10	0	(2.88)	49.8	58.4	28.2

TABLE 26.—KEWANEE FIELD
Rotation: Corn, oats, clover, wheat

Serial plot No.	Soil treatment	Series 500 Clover	Series 600 Oats	Series 700 Corn	Series 800 Wheat
1	RrP	(2.41)	62.8	79.0	33.8
2	RsP	(2.22)	66.1	76.1	34.9
3	RLrP	(2.65)	76.3	98.2	35.3
4	RLsP	(2.42)	74.7	90.7	38.8

TABLE 27.—LAMOILLE FIELD
Rotation: Corn, corn, oats, wheat

Serial plot No.	Soil treatment	Series 100	Series 200		Series 300	Series 400
		Wheat	Oats	Stubble hay (hubam)	Second-year corn	First-year corn
1	0	24.2	83.8	(1.60)	35.2	39.8
2	M	33.5	85.3	(1.71)	60.2	58.8
3	ML	33.9	80.2	(1.69)	60.6	61.2
4	MLrP	33.8	78.1	(1.67)	60.5	66.5
5	0	27.9	78.1	(.90)	50.3	62.4
6	R	30.0	81.7	(.97)	57.6	56.5
7	RL	34.5	83.3	(1.36)	63.1	60.4
8	RLrP	37.3	84.4	(1.36)	62.3	60.7
9	RLrPK	38.8	80.8	(1.75)	66.4	64.6
10	0	26.2	71.4	(.60)	44.0	41.1

TABLE 28.—LEBANON FIELD
Rotation: Corn, soybeans, wheat, wheat

Serial plot No.	Soil treatment	Series 100		Series 200	Series 300	Series 400	
		Wheat[1]	Stubble hay (hubam)	Soybeans	Corn	Wheat[1]	Stubble hay (sw. cl.)
1	0	4.2	(.42)	5.6	35.5	3.3	....
2	M	1.8	(.16)	14.3	58.3	4.6	....
3	ML	3.8	(1.55)	18.1	51.0	15.7	....
4	MLrP	2.7	(1.44)	18.2	53.6	14.8	....
5	0	2.7	(.54)	10.5	31.4	6.0	....
6	R	2.5	(.62)	10.6	53.2	3.8	(0)
7	RL	2.1	(1.70)	20.5	71.6	8.3	(1.06)
8	RLrP	2.4	(1.36)	19.8	74.9	9.1	(1.29)
9	RLrPK	3.3	(1.55)	26.5	71.8	8.9	(1.50)
10	0	2.2	(.42)	16.5	49.0	5.0	....

[1]Wheat practically ruined by Hessian fly.

TABLE 29.—LEBANON FIELD: SPECIAL FERTILIZER STUDIES ON SERIES 300[1]

Rotation: Corn, wheat, wheat, soybeans

Serial plot No.	Basic treatment	Section A Corn	Section B Corn	Section C Corn	Section D Corn
1	0	35.5	32.0	33.7	36.2
2	M	58.3	53.4	48.2	49.5
3	ML	51.0	48.3	47.3	56.6
4	MLrP	53.6	51.0	50.2	46.2
5	0	31.4	25.6	30.2	37.2
6	R	53.2	50.1	70.6	56.8
7	RL	71.6	71.9	61.6	54.8
8	RLrP	74.9	69.6	62.4	65.9
9	RLrPK	71.8	79.7	72.3	72.9
10	0	49.0	47.9	45.0	46.5

[1]In order to study the relative values of finely processed rock phosphate, superphosphate, and mixed fertilizer when used in addition to the different basal soil treatments applied since 1910, these series of plots in 1929 were divided into four sections extending across all plots. The treatments for the different sections are as follows, the added fertilizers being hill-dropped for corn:

Section A, basal treatment only.

Section B, basal treatment plus rock phosphate at the rate of 250 pounds an acre.

Section C, basal treatment plus superphosphate at the rate of 150 pounds an acre.

Section D, basal treatment plus a 2-12-6 fertilizer at the rate of 250 pounds an acre.

TABLE 30.—LEBANON FIELD

Rotation: Corn, oats, wheat

Serial plot No.	Soil treatment	Series 500 Oats	Series 600		Series 700 Corn
			Wheat[1]	Stubble hay (sw. cl.)	
1-W	Le	28.1	1.8	(0)	45.4
1-E	LesP	31.6	2.3	(0)	44.8
2-W	LeM	35.3	4.0	(0)	49.4
2-E	LeMsP	42.2	5.0	(0)	48.0
3-W	LeML	38.1	10.5	(1.70)	54.0
3-E	LeMLsP	51.6	12.2	(1.72)	58.8
4-W	LeMLrP	43.1	15.5	(2.01)	57.2
4-E	LeMLrP	45.6	18.3	(1.84)	61.0

[1]Wheat practically ruined by Hessian fly.

TABLE 31.—LEBANON FIELD
Rotation: Wheat, potatoes

Serial plot No.	Soil treatment	Series 800 Potatoes	Series 900 Wheat[1]
1	LeM	61.3	8.8
2	LesP	80.3	8.3
3	LerP	73.3	6.3
4	LesPK	58.0	6.0
5	LerPK	51.3	5.7
6	Le, straw	83.0	3.7
7	LesP, straw	128.0	7.2
8	LerP, straw	129.0	6.8
9	Le, treble superphosphate	59.0	5.8
10	Le, potassium phosphate	49.3	6.3

Note.—In 1925 Series 800 and 900 were laid out on land which had received 8,000 pounds of limestone, 2,000 pounds of rock phosphate, and 15 tons of manure an acre in 1911. The land grew alfalfa almost continuously from 1911 to 1925. A rotation of wheat (sweet-clover catch crop) and potatoes is followed. Fertilizers are applied as indicated above. The phosphates are supplied annually, rock phosphate 400 pounds, superphosphate 200 pounds, treble superphosphate 100 pounds and potassium phosphate 200 pounds an acre. Kainit 200 pounds an acre is applied for each potato crop. Two tons of manure an acre is applied for potatoes. Straw is applied as a mulch when the potatoes are coming thru the ground.

[1]Wheat practically ruined by Hessian fly.

(*See opposite page for Table 32*)

TABLE 33.—MINONK FIELD
Rotation: Corn, corn, oats, wheat

Serial plot No.	Soil treatment	Series 100 Wheat		Series 200		Series 300 Second-year corn		Series 400 First-year corn	
		North half[1]	South half	Oats	Stubble hay (hubam)	North half[2]	South half	North half[2]	South half
1	0	33.3	28.7	69.4	(1.16)	33.8	47.4	52.8	48.4
2	M	37.3	28.3	65.6	(1.81)	56.7	55.7	64.0	58.4
3	ML	33.3	26.7	53.4	(1.66)	61.8	52.4	71.8	69.8
4	MLrP	33.3	22.7	54.5	(1.43)	46.6	49.7	72.4	65.2
5	0	30.3	23.3	60.9	(1.12)	48.0	42.3	48.0	47.8
6	R	35.0	30.0	63.6	(1.12)	41.7	45.6	54.8	58.4
7	RL	29.7	26.3	72.8	(1.03)	53.7	53.2	68.4	67.8
8	RLrP	31.0	30.0	71.7	(1.21)	56.4	57.1	64.0	71.4
9	RLrPK	30.0	29.0	70.0	(1.39)	55.7	58.4	68.8	69.8
10	0	24.0	19.7	69.7	(.24)	41.6	40.7	58.6	48.6

[1]On March 8, 200 pounds of sodium nitrate per acre was applied to the north halves of all plots as a top dressing for the wheat. This application was repeated on May 11. [2]The north halves of all plots of Series 400 received nitrogen fertilizers as follows: ammonium sulfate, 75 pounds per acre hill-dropped at planting time; 125 pounds sodium nitrate as a side dressing when the corn was about 12 inches high. The yields of corn on Series 300-N show the residual effects of this nitrate fertilization in 1928.

TABLE 32.—McNABB FIELD
Rotation: Corn, oats, wheat, clover

Serial plot No.	Soil treatment	Series 100 Oats	Series 200 Corn	Series 300 Clover	Series 400 Wheat
1	R	80.0	73.8	(2.43)	27.8
2	RrP	86.9	83.0	(2.61)	30.5
3	0	93.1	69.6	(3.96)	29.7
4	MrP	95.6	74.6	(4.12)	33.7
5	M	86.3	77.2	(4.27)	37.7

TABLE 34.—MT. MORRIS FIELD
Rotation: Corn, oats, clover, wheat

Serial plot No.	Soil treatment	Series 100[1]	Series 200 Oats	Series 300 Corn	Series 400 Wheat
1	0	....	46.9	54.4	27.0
2	M	....	55.6	64.9	32.0
3	ML	....	67.5	81.6	39.5
4	MLrP	....	64.7	72.6	38.7
5	0	....	44.2	46.1	26.8
6	R	....	45.5	56.5	28.2
7	RL	....	58.4	67.3	39.6
8	RLrP	....	60.0	73.8	39.8
9	RLrPK	....	61.6	75.5	43.3
10	0	....	43.6	47.5	19.7

[1]This series was summer fallowed in an attempt to destroy an infestation of quack grass.

TABLE 35.—MT. MORRIS FIELD
Rotation: Corn, barley, mixed hay, alfalfa

Serial plot No.	Soil treatment	Series 500 Alfalfa	Series 600 Alfalfa	Series 700 Barley	Series 800 Corn
1	0	(0)	(2.48)	35.0	57.2
2	M	(0)	(2.87)	41.9	61.4
3	ML	(4.60)	(4.49)	74.2	65.4
4	MLrP	(4.73)	(4.87)	68.1	62.4

TABLE 36.—NEWTON FIELD
Rotation: Corn, oats, wheat, mixed hay

Serial plot No.	Soil treatment	Series 100 Oats	Series 200 Corn	Series 300 Mixed hay	Series 400	
					Wheat	Stubble hay (mixed)
1	0	10.6	2.7	(.32)	2.7	(0)
2	M	25.9	23.8	(.35)	10.0	(0)
3	ML	26.6	55.8	(2.31)	25.8	(.88)
4	MLrP	34.4	59.0	(2.96)	28.8	(.91)
5	0	26.6	6.6	(.28)	6.7	(0)
6	R	23.1	13.2	(.28)	7.5	(0)
7	RL	25.6	38.8	(1.36)	21.5	(.36)
8	RLrP	29.1	45.4	(1.75)	24.5	(.36)
9	RLrPK	18.1	48.0	(2.65)	29.0	(.72)
10	0	15.9	3.6	(.64)	6.0	(0)

TABLE 37.—NEWTON FIELD
Rotation: Wheat, soybeans, redtop

Serial plot No.	Soil treatment	Series 1100-N Redtop		Series 1100-S Soybeans	Series 1200 Wheat
		Seed	Hay		
1	LeLrP	3.71	(.46)	(1.43)	17.2
2	LeL	2.86	(.32)	(1.56)	14.3
3	LeLrP	2.79	(.37)	(1.52)	13.5
4	LeL	2.64	(.42)	(1.44)	12.7
5	LeLrP	4.07	(.46)	(1.30)	12.7

Note.—Prior to 1923 these series were used in plant-breeding projects and all plots had received uniform soil treatment. From 1923 to 1926 wheat, soybeans, and timothy were grown. In 1927 the rotation was changed to wheat (sweet clover), soybeans, and redtop, the redtop to occupy a given series for three years while wheat and soybeans are grown alternately on the other two series. The plan of fertilization is as follows: Limestone in sufficient amounts to grow sweet clover. Rock phosphate: Plot 1 received an application sufficient to bring the phosphorus content of the surface soil up to 2,000 pounds per acre by analysis. Plot 3 will receive phosphate at the annual acre rate of 200 pounds (400 pounds applied for wheat and 600 pounds for redtop). Plot 5 to receive phosphate at the annual acre rate of 400 pounds (800 pounds for wheat and 1,200 pounds for redtop).

TABLE 38.—NEWTON FIELD: LIME EXPERIMENT
Rotation: Corn, wheat, sweet-clover—redtop mixture

Serial plot No.	Soil treatment	Limestone fineness (meshes per inch)	High-calcium lime				Dolomitic lime			
			Series 500	Series 700	Series 900		Series 600	Series 800	Series 1000	
			Wheat	Corn	Sweet clover[1]	Redtop[1]	Wheat	Corn	Sweet clover[1]	Redtop[1]
1	RrPK	.....	6.2	26.6	0	4.07	6.7	27.0	0	5.36
2	RrPKL	4 down....	12.0	48.8	1.90	6.50	14.5	42.2	.65	6.50
3	RrPKL	4 to 10....	12.8	50.2	1.67	6.43	23.5	40.4	1.22	9.29
4	RrPKL	10 down...	12.7	42.0	1.28	6.71	23.8	36.6	.65	8.64
5	RrPKL	50 down...	15.0	40.2	.72	6.00	19.7	32.8	1.00	7.79
6	RrPKL	Burnt.....	13.5	34.6	.87	7.29	16.3	34.8	.72	7.21
7	RrPK	.....	7.8	24.8	.07	2.21	10.8	26.0	.18	3.57
8	RrPKL	4 down....	14 0	45.8	.50	10.50	20.2	47.0	.37	8.79
9	RrPKL	4 to 10....	14.2	44.0	.88	9.79	20.7	46.0	.68	14.79
10	RrPKL	10 down...	15.5	43.2	.93	7.64	19.3	44.0	.85	12.93
11	RrPKL	50 down...	14.2	40.6	1.40	9.57	19.2	42.2	1.10	17.07
12	RrPKL	Burnt.....	14.0	41.6	2.17	5.57	18.5	40.4	1.10	11.29
13	RrPK	.....	7.0	23.2	.13	4.93	11.3	22.4	.23	3.43
14	RrPKL	4 down....	14.8	39.6	1.80	4.29	19.0	44.6	1.20	7.79
15	RrPKL	4 to 10....	15.3	48.0	1.68	6.86	17.2	50.2	1.35	19.79
16	RrPKL	10 down...	16.3	42.8	1.03	2.86	17.5	51.6	1.28	6.50
17	RrPKL	50 down...	17.3	46.6	.90	4.07	19.3	54.6	2.28	8.50
18	RrPKL	Burnt.....	16.0	35.2	.17	4.14	17.8	50.4	1.90	7.14
19	RrPK	.....	7.0	21.0	0	6.71	10.8	24.0	.32	4.43

Note.—Lime materials have been applied in amounts equivalent to pure calcium carbonate as follows: to Plots 2 to 6, 500 pounds an acre a year; to Plots 8 to 12, 1,000 pounds; to Plots 14 to 18, 2,000 pounds. The total amounts applied since 1913 are 3,000 pounds, 6,000 pounds and 12,000 pounds respectively. No more will be applied until there appears to be need for it.

[1]Sweet clover and redtop were grown and harvested together and the seed separated.

TABLE 39.—OBLONG FIELD
Rotation: Wheat, corn, oats, mixed hay

Serial plot No.	Soil treatment	Series 100 Mixed hay	Series 200 Oats	Series 300 Corn	Series 400 Wheat
		SOUTH HALF			
1	0	(.70)	19.1	16.2	9.5
2	M	(1.17)	17.8	46.2	12.2
3	ML	(2.60)	31.9	58.0	26.8
4	MLrP	(2.55)	30.6	62.6	27.2
5	0	(.70)	33.8	19.2	13.0
6	R	(.83)	27.8	29.6	13.3
7	RL	(2.03)	35.8	22.4	21.3
8	RLrP	(2.20)	34.4	32.0	23.2
9	RLrPK	(2.22)	32.2	60.6	23.7
10	0	(.42)	26.3	18.6	10.7
		NORTH HALF			
1	RLsP	(.94)	14.7	17.2	20.7
2	MLrP	(2.11)	22.8	36.6	28.8
3	MLbP	(2.55)	27.8	65.6	29.7
4	MLrP	(2.49)	31.6	60.8	30.5
5	RL, underacidulated P	(1.14)	33.1	26.2	24.7
6	RLrP	(1.51)	24.4	31.2	26.2
7	RLbP	(2.36)	29.4	38.8	25.5
8	RLrP	(2.12)	33.8	36.0	22.2
9	RLrPK	(2.23)	28.1	55.8	28.5
10	RL, potassium P	(1.47)	16.6	43.0	20.5

Note.—In 1925 these series were divided into north and south halves for the purpose of studying the relative values of different phosphorus carriers. The plots on the south halves of all series, as well as Plots 4, 8, and 9 on the north halves, continue under the original soil treatment.

On the north halves the new soil treatment is as follows: An initial application of 4,000 pounds of limestone an acre to Plots 1, 2, 5, 6, and 10; subsequent applications to be governed by the clover requirements. Rock phosphate to Plots 2 and 6: 1,000 pounds an acre ahead of wheat and 600 pounds ahead of corn. Bone meal to Plots 3 and 7: 500 pounds an acre ahead of wheat and 300 pounds ahead of corn. Superphosphate to Plot 1, underacidulated phosphate to Plot 5, and potassium phosphate to Plot 10; all in the same amounts and applied for the same crops as the bone meal. Residues to be turned under on Plots 1, 5, and 10 as on the original residues plots.

(*See opposite page for Table 40*)

TABLE 41.—OBLONG FIELD: LIME-LEGUME STUDIES[1]

Kind of lime material	1/4-inch mesh	1/4- to 1/10-inch mesh	1/10-inch mesh	1/50-inch mesh	Burnt lime
	Red clover	Red clover	Red clover	Red clover	Red clover
High calcium	(1.42)	(1.33)	(1.11)	(1.04)	(.95)
Dolomitic	(1.05)	(1.18)	(1.34)	(1.35)	(1.64)

[1]This experiment is similar to the Newton lime experiment except that the lime is applied at a uniform rate (9,000 pounds calcium carbonate equivalent per acre) and no materials except lime are applied. Each yield is the average of duplicate plots.

TABLE 40.—OBLONG FIELD: SPECIAL LEGUME STUDIES
Rotation: Corn, oats, wheat, legumes

Serial plot No.	Soil treatment	Series 700 Corn	Series 800 Legumes[1]	Series 900 Wheat	Series 1000 Oats
1	White biennial sweet clover	41.5	....	28.0	31.9
2	Red clover	39.7	....	30.3	29.4
3	Alsike clover	46.2	....	27.0	36.2
4	Native vegetation	43.7	....	17.3	30.6
5	White biennial sweet clover	41.9	....	26.3	16.9
6	Red clover	48.0	....	24.7	21.3
7	Alsike clover	42.6	....	26.0	25.0
8	Native vegetation	39.2	....	19.0	19.4

Note.—From 1912 to 1920 these series were operated as single plots and grew a rotation of potatoes, corn, soybeans, and alfalfa with regular applications of manure, limestone, rock phosphate, and kainit. In 1921 the rotation was changed to corn, oats, legumes, and wheat. Since that time no fertilizing materials have been used except sweet clover as a green-manure crop.

In 1926 the series were divided into 8 plots each and since that time a rotation of corn, oats, wheat, and legumes has been grown. Legumes are seeded as designated in the above table and occupy the ground as a regular crop. Where practical, the sweet clover is removed as a hay crop in the fall of the first year and clipped or harvested as seed during the second year. Only one crop of red and alsike clover is removed, the fall growth being plowed down. The native vegetation on Plots 4 and 8 is plowed under.

[1]Legumes not harvested.

TABLE 42.—ODIN FIELD
Rotation: Corn, oats, wheat, soybeans

Serial plot No.	Soil treatment	Series 100 Soybeans	Series 200 Corn	Series 300 Oats	Series 400 Wheat
1	0	3.6	4.0	3.9	4.2
2	R	2.8	6.6	4.4	3.9
3	RL	4.7	8.5	14.2	12.6
4	RLbP	4.5	9.5	12.8	13.2
5	RLbPK	6.2	31.2	14.5	17.4
6	0	2.4	5.4	5.8	3.8
7	R	4.8	8.8	5.2	5.9
8	RL	10.3	15.1	19.7	10.9
9	RLbP	9.7	19.2	18.8	10.8
10	RLbPK	14.8	32.1	21.1	13.3

TABLE 43.—ODIN FIELD
Rotation: Wheat, corn

Serial plot No.	Soil treatment	Light lime		Heavy lime	
		Series 500 Wheat	Series 600 Corn	Series 700 Wheat	Series 800 Corn
1	LeLbPK	16.8	13.4	18.3	14.6
2	LeLK	11.3	9.6	18.0	15.8
3	LeLsPK	13.0	13.6	13.0	10.6
4	LeLrPK	15.5	11.2	13.3	8.8
5	LeLK	12.5	9.2	17.8	10.6
6	LeL, slag P, K	18.3	13.2	13.8	6.4

TABLE 44.—ODIN FIELD
Sweet-clover rotation experiment

Rotation	Soil treatment	Corn	Soybeans	Wheat	Sweet clover
3-year rotation[1]	RLbP	4.3	5.0	18.3	....
4-year rotation[2]	RLbP	15.5	15.0	22.8	2.75

[1]Corn, soybeans, wheat (sweet-clover catch crop). [2]Corn, soybeans, wheat, sweet clover.

TABLE 45.—OQUAWKA FIELD
Rotation: Wheat, corn, soybeans, rye, mixed hay, alfalfa

Serial plot No.	Soil treatment	Series 100 Wheat	Series 200 Alfalfa	Series 300 Clover-alfalfa	Series 400 Rye	Series 500 Soybeans	Series 600 Corn
1	0	9.3	(1.98)	(0)	11.4	5.2	10.0
2	M	16.7	(4.46)	(0)	15.9	8.3	22.0
3	ML	19.7	(4.84)	(5.06)	16.8	11.7	45.0
4	MLrP	30.0	(4.94)	(5.26)	18.8	12.2	54.2
5	0	13.8	(4.27)	(0)	13.6	5.2	9.4
6	R	14.0	(4.35)	(0)	14.7	6.9	10.2
7	RL	22.7	(4.59)	(2.96)	15.4	11.3	48.6
8	RLrP	20.0	(4.67)	(3.01)	15.6	11.8	52.4
9	RLrPK	20.3	(4.77)	(3.14)	16.1	13.3	62.4
10	0	7.5	(2.64)	(0)	10.3	8.7	5.0

TABLE 46.—PALESTINE FIELD
Rotation: Wheat, corn, oats, mixed hay, alfalfa

Serial plot No.	Soil treatment	Series 100 Wheat	Series 200 Mixed hay	Series 300 Stubble hay[1]	Series 400 Corn	Series 500 Alfalfa
1	LeL	10.7	(3.76)	(1.67)	55.0	(3.25)
2	LeLM	14.3	(3.76)	(2.21)	54.2	(3.24)
3	LeLMsP	16.3	(3.59)	(2.60)	48.0	(3.65)
4	LeLMrP	17.3	(3.99)	(2.12)	53.4	(3.70)
5	LeL	14.3	(3.41)	(.97)	51.2	(3.38)
6	LeL, KCl	14.5	(4.21)	(1.63)	53.0	(3.65)
7	LeLsP, KCl	16.8	(3.88)	(2.30)	58.4	(3.76)
8	LeLrP, KCl	16.2	(3.51)	(1.97)	51.8	(3.90)
9	LeLrP, kainit	15.3	(3.90)	(2.40)	45.0	(4.32)
10	0	1.7	(1.67)	(.80)	48.0	(3.51)

Note.—In 1928 the rotation was changed to wheat (standard mixture catch crop), corn (hairy vetch seeded at last cultivation), oats, red-clover-alfalfa mixture, and alfalfa. KCl is applied at the rate of 250 pounds an acre for the corn crop; kainit, 500 pounds an acre for wheat and 500 pounds for corn; superphosphate, 300 pounds an acre for wheat, 300 pounds for oats, and 150 pounds for corn; rock phosphate, 600 pounds an acre for wheat, 600 pounds for oats, and 300 pounds for corn. Limestone has been applied in sufficient amounts to grow clovers and subsequent applications will be governed by the requirement of the legume crops. Plots 2, 3, 4 will receive manure in amounts equivalent to the crops removed from Plot 2 of all series, applied for corn.

[1]Oats were seeded on Series 300 but the clover and alfalfa of the standard mixture seeding smothered the oats and the crop was harvested as hay.

TABLE 47.—PALESTINE FIELD
Rotation: Wheat, corn, alfalfa

Serial plot No.	Soil treatment	Series 600 Alfalfa	Series 700 Wheat	Series 800 Corn
1	LeLsP	(3.97)	11.7	31.2
2	LeLrP	(3.12)	9.1	37.1
3	LeL	(3.09)	5.3	31.1
4	LeL, flowers of sulfur	(2.40)	4.8	39.0
5	LeLrP, flowers of sulfur	(2.70)	1.6	29.8
6	LeL	(2.38)	11.7	32.9
7	LeL, gypsum	(2.46)	3.2	34.7
8	LeLrP, gypsum	(3.10)	5.9	34.3

Note.—These series were laid out in the fall of 1925. A rotation of wheat (sweet clover), corn, and alfalfa is grown, wheat and corn alternating on two series for three years, while alfalfa occupies the third series for the same period. The following plan of soil treatment was adopted: An initial application of 6,000 pounds of limestone an acre, future applications to be governed by the crop needs. Rock phosphate, 600 pounds an acre for wheat, 300 pounds for corn, and 600 pounds for the second crop of alfalfa. Superphosphate, 300 pounds an acre for wheat, 150 pounds for corn, and 300 pounds for the second crop of alfalfa. Flowers of sulfur, 50 pounds an acre for wheat and 50 pounds for the second crop of alfalfa. Gypsum, 300 pounds an acre for wheat and 300 pounds for the second crop of alfalfa.

TABLE 48.—PALESTINE FIELD: SERIES 900
Corn-vetch experiment

Plot No.	Soil treatment	Corn	Plot No.	Soil treatment	Corn
1	Le	31.2	5	LerP (400)	38.7
2	LesP (100)	33.7	6	LeL	38.4
3	LerP (200)	33.3	7	LeLsP (100)	37.4
4	LesP (200)	36.6	8	LeLsP (200)	41.2

Note.—This experiment was planned to study the effects of vetch green manure on the following corn crop. Temporarily a single crop system is planned. Corn with a catch crop of hairy vetch will be grown. The vetch will be seeded in the corn late in August and the growth plowed under the following spring.

An initial application of 6,000 pounds of limestone an acre was made on Plots 6, 7, 8. The figures in parentheses represent the annual acre applications of the phosphates.

TABLE 49.—RALEIGH FIELD
Rotation: Wheat, corn, oats, mixed hay

Serial plot No.	Soil treatment	Series 100 Mixed hay	Series 200 Oats	Series 300 Corn	Series 400 Wheat[1]
		WEST HALF			
1	0	(.49)	11.6	9.2	1.5
2	M	(.88)	15.9	32.2	3.0
3	ML	(1.64)	32.5	41.6	3.3
4	MLrP	(1.02)	30.6	47.4	3.0
5	0	(.85)	11.6	10.2	1.8
6	R	(.95)	11.3	14.6	2.7
7	RL	(1.18)	19.4	24.6	3.8
8	RLrP	(1.58)	21.6	28.4	2.3
9	RLrPK	(1.76)	21.9	45.0	2.8
10	0	(.40)	14.1	18.6	1.7
		EAST HALF			
1	RL	(.70)	12.5	15.0	2.3
2	MrP	(.88)	11.3	31.0	.3
3	MLbP	(1.68)	29.1	44.8	2.3
4	MLrP	(2.31)	31.3	45.0	1.8
5	RsP	(.45)	8.4	9.8	1.0
6	RrP	(.85)	10.3	14.8	.5
7	RLsP	(2.21)	26.9	20.8	1.0
8	RLrP	(1.67)	22.5	28.6	2.2
9	RLrPK, gypsum	(1.86)	21.6	49.6	3.0
10	RLrP	(1.47)	23.4	23.2	3.2

Note.—In 1924 the plots on these series were divided into west and east halves and additional investigations were begun. The plots on the west halves of all series continue under the original soil treatment, but the plots on the east halves receive the treatment indicated above. *(Note is concluded on opposite page)*

TABLE 50.—SPARTA FIELD
Rotation: Corn, soybeans, oats, wheat

Serial plot No.	Soil treatment	Series 100 Oats	Series 200 Soybeans	Series 300 Corn	Series 400 Wheat
1	0	14.7	7.5	17.6	.7
2	M	23.1	9.5	21.6	1.8
3	ML	34.4	22.8	39.2	13.3
4	MLrP	36.3	22.5	40.8	14.0
5	0	11.9	3.5	9.0	2.8
6	R	12.2	5.0	19.0	3.7
7	RL	27.5	18.7	33.4	12.2
8	RLrP	26.3	19.3	31.6	12.5
9	RLrPK	26.6	20.2	57.6	10.5
10	0	18.1	3.0	13.4	1.0

TABLE 51.—SPARTA FIELD
Rotation: Wheat, corn, cowpeas, timothy

Serial plot No.	Soil treatment	Series 500 Cowpeas	Series 600 Timothy	Series 700 Wheat	Series 800 Corn
1	Le	(.70)	(1.07)	5.7	21.6
2	LeM	(.80)	(1.25)	7.7	24.4
3	LeML	(1.12)	(2.41)	12.7	52.8
4	LeMLrP	(1.32)	(2.46)	14.2	61.6
5	LeMLrPK	(1.44)	(2.18)	14.0	67.0
6	Le	(1.14)	(1.11)	5.2	24.6

(*Note to Table 49, concluded*)

No more rock phosphate will be applied to the phosphate plots on the west halves for an indefinite period, these plots having received a total of 8,500 pounds an acre. The same holds true for the east half of Plot 9 of all series.

On the east halves the phosphatic fertilizers and gypsum are applied twice in the rotation, one-half the rotation quota ahead of wheat and one-half ahead of corn at the following annual acre rates: rock phosphate 500 pounds, superphosphate 200 pounds, bone meal 200 pounds, gypsum 200 pounds.

The minimum amount of limestone necessary to the successful growth of clovers will be applied to Plots 1-E and 10-E of all series, 4,000 pounds an acre having been applied in 1924 and 2,000 pounds in 1927.

[1]Wheat damaged by hail.

TABLE 52.—SPARTA FIELD: MISCELLANEOUS STUDIES

Soil treatment	Plot A Corn	Plot B Wheat	Plot C Alfalfa	Plot D Corn	Plot E Wheat	Plot F Wheat
MLrPK	54.5	9.5	(1.70)	49.4	....	....
MrPK	30.4	4.5	(0)	53.0	....	....
LeLN	....	....	....	....	....	13.2
LeL	....	....	....	....	13.6	10.3

TABLE 53.—SPRINGVALLEY FIELD
Rotation: Wheat, corn, oats, clover

Serial plot No.	Soil treatment	Series 100 Clover	Series 200 Oats	Series 300 Corn	Series 400 Spring wheat
1	0	(3.60)	27.5	44.0	25.8
2	M	(3.79)	40.0	56.4	30.8
3	ML	(4.12)	43.4	59.6	32.2
4	MLrP	(4.17)	50.9	62.0	31.3
5	0	(3.13)	36.3	44.6	25.3
6	R	(2.10)	40.0	52.4	27.0
7	RL	(2.34)	45.9	57.0	26.7
8	RLrP	(2.02)	46.6	41.4	27.0
9	RLrPK	(2.39)	45.0	67.6	30.2
10	0	(2.00)	30.9	48.6	27.2

TABLE 54.—SPRINGVALLEY FIELD
Rotation: Corn, corn, oats, alfalfa

Serial plot No.	Soil treatment	Series 500 Alfalfa	Series 600 First-year corn	Series 700 Second-year corn	Series 800 Oats
1	0	(2.96)	48.4	30.2	54.4
2	RM	(3.56)	47.6	54.4	70.9
3	RML	(4.33)	53.0	52.0	77.5
4	RMLrP	(3.47)	55.2	52.8	74.4

TABLE 55.—TOLEDO FIELD
Rotation: Wheat, corn, oats, mixed hay

Serial plot No.	Soil treatment	Series 100 Mixed hay	Series 200 Oats	Series 300 Corn	Series 400 Wheat
	SOUTH HALF				
1	0	(1.15)	16.6	7.0	10.3
2	M	(1.68)	23.1	15.4	10.7
3	ML	(2.70)	37.8	37.0	24.0
4	MLrP	(2.45)	33.1	34.4	21.5
5	0	(.62)	19.4	6.6	11.7
6	R	(.92)	17.2	15.4	13.8
7	RL	(1.78)	52.8	11.2	22.7
8	RLrP	(1.88)	32.8	6.6	21.8
9	RLrPK	(2.65)	36.6	41.0	26.7
10	0	(.58)	22.5	6.0	5.2
	NORTH HALF				
1	RL	(1.92)	35.0	14.8	20.5
2	MrP	(2.30)	23.4	15.2	20.3
3	MLbP	(2.88)	33.8	38.0	25.5
4	MLrP	(2.68)	40.9	39.8	24.7
5	RsP	(.92)	20.9	8.6	13.8
6	RrP	(1.60)	20.9	12.6	17.2
7	RLsP	(2.38)	23.4	7.6	17.7
8	RLrP	(2.40)	34.4	8.2	20.7
9	RLrPK, gypsum	(3.02)	35.0	37.2	33.3
10	RLrP	(1.20)	36.6	16.0	16.2

Note.—In 1924 the plots on these series were divided into north and south halves and additional studies were begun. The plots on the south halves of the series continue under the original soil treatment but the plots on the north halves receive the soil treatment designated above. No more rock phosphate will be applied to the phosphate plots on the south halves for an indefinite period, these plots having received a total of 8,000 pounds. The same holds true of the north half of Plot 9 of all series. Both halves of Plots 2, 3, and 4 will receive the sweet-clover catch crop in the same manner as the residue plots.

On the north halves the phosphatic fertilizers and gypsum are applied twice in the rotation, one-half of the rotation quota ahead of corn and one-half ahead of wheat at the following annual acre rates: rock phosphate 500 pounds, superphosphate 200 pounds, bone meal 200 pounds, gypsum 200 pounds.

The minimum amount of limestone necessary to the successful growth of clovers will be applied to Plots 1-N and 10-N, 4,000 pounds having been applied in 1924.

TABLE 56.—UNIONVILLE FIELD
Rotation: Wheat, cowpeas, mixed hay

Serial plot No.	Soil treatment	Series 500 Cowpeas		Series 700	Series 800
		Seed	Hay	Wheat	Mixed hay
1	0	7.3	(.88)	5.1	(.54)
2	MLrP	15.2	(2.46)	23.0	(2.50)
3	RLrP	12.8	(1.75)	20.8	(2.39)
4	RLrP, kainit	15.8	(1.92)	22.7	(1.81)
5	RLrP, shale	12.6	(1.50)	20.9	(1.84)
6	RLrP, common salt	13.3	(1.68)	20.9	(1.40)
7	RLrP, Omaha K	13.6	(1.79)	18.7	(1.95)
8	0	9.3	(.84)	9.3	(1.11)

TABLE 57.—UNIONVILLE FIELD
Rotation: Corn, soybeans, oats, wheat

Serial plot No.	Soil treatment	Series 100 Oats	Series 200 Soybeans	Series 300 Corn	Series 400 Wheat
		WEST HALF			
1	0	9.1	2.7	2.4	4.3
2	M	3.1	5.0	6.7	7.2
3	ML	31.6	15.5	18.8	13.2
4	MLrP	33.8	16.2	16.4	13.2
5	0	8.1	3.3	2.8	3.7
6	R	26.6	3.0	6.3	3.3
7	RL	45.0	11.2	27.2	12.3
8	RLrP	49.1	12.0	33.3	12.8
9	RLrPK	44.1	15.2	47.2	21.5
10	0	6.6	3.2	2.2	6.3
		EAST HALF			
1	L	3.4	6.8	6.8	4.3
2	MLrP	6.3	7.7	11.2	9.3
3	ML, KCl	26.9	15.7	11.8	14.3
4	MLrP, KCl	26.9	14.8	11.8	16.7
5	LsP	5.6	4.8	7.2	10.3
6	L, $NaNO_3$	15.3	6.8	11.4	7.7
7	RLsP, KCl	36.9	13.7	31.8	18.0
8	RLrP, KCl	31.6	14.5	37.0	19.5
9	RLrP, kainit	35.6	17.2	40.0	19.3
10	LsP, $NaNO_3$	6.3	10.2	6.7	16.5

Note.—In 1925 these series were divided into west and east halves and new investigations were begun. All plots on the west halves and Plot 9 on the east halves of all series will continue under the original soil treatment; but the plots on the east halves, with the exception of Plot 9, receive the treatment indicated above. No more rock phosphate will be applied to any of the original phosphate plots for an indefinite period, these plots having received a total of 8,000 pounds an acre.

(*Note is concluded on opposite page*)

TABLE 58.—URBANA, MORROW PLOTS: ROTATION EXPERIMENT

Section of plot	Soil treatment	Plot 3 (Continuous corn) Corn	Plot 4 (Corn and oats rotation) Corn	Plot 5 (Corn, oats, and clover rotation) Oats
NW	0	16.4	20.4	50.7
SW	MLrP	32.4	67.2	75.8
NE	0	18.8	26.8	60.4
SE	MLbP	39.6	63.2	74.8

TABLE 59.—URBANA, DAVENPORT PLOTS
Rotation: Corn, oats, clover, wheat, alfalfa

Serial plot No.	Soil treatment	Series 100 Corn	Series 200 Clover	Series 300 Wheat	Series 400 Alfalfa	Series 500 Oats
		WEST HALF				
1	0	66.0	(2.45)	21.6	(1.72)	54.0
2	R	71.2	(2.74)	20.8	(1.26)	49.8
3	M	71.6	(3.50)	30.5	(1.29)	49.7
4	RL	68.0	(2.97)	29.8	(2.49)	47.5
5	ML	65.2	(3.42)	36.5	(2.91)	52.0
6	RLrP	75.2	(4.04)	44.1	(3.84)	62.9
7	MLrP	66.0	(4.25)	47.5	(4.40)	64.2
8	RLrPK	70.4	(4.05)	44.3	(4.80)	61.9
9	MLrPK	69.2	(4.27)	41.7	(5.39)	67.2
10	M[z]LrP[z]	68.4	(3.89)	41.9	(5.10)	41.3
		EAST HALF				
1	0	58.4	(2.79)	([1])	(1.77)	53.2
2	R	57.6	(3.00)	([1])	(1.61)	50.1
3	M	73.6	(3.83)	([1])	(1.94)	54.3
4	RL	67.6	(2.99)	([1])	(2.50)	45.4
5	ML	68.8	(3.65)	([1])	(2.90)	71.5
6	RLbP	70.0	(3.84)	45.1	(4.39)	61.0
7	MLbP	72.8	(4.42)	46.0	(4.86)	67.2
8	RLbPK	79.2	(4.18)	44.4	(5.04)	66.6
9	MLbPK	64.0	(4.13)	46.5	(5.53)	71.4
10	M[z]LbP[z]	74.0	(3.92)	42.7	(5.35)	55.1

[1]These plots were used in special fertilizer tests, see Table 60.

(*Note to Table 56, concluded*)

The soil treatment on the east halves is as follows: Limestone to Plots 1, 2, 5, 6, 10 at the rate of 4,000 pounds an acre; subsequent applications to be governed by the requirement of the legume crops. Rock phosphate to Plot 2; 500 pounds an acre for wheat, and 500 pounds for corn. Superphosphate, 250 pounds for wheat, and 250 pounds for corn. KCl, 150 pounds for wheat and 150 pounds for corn. $NaNO_3$, 100 pounds an acre as a top dressing for wheat and 100 pounds as a side dressing for corn. No more residues to Plot 6.

In 1929 the rotation was changed to corn, soybeans, oats, and wheat. Hubam clover will be seeded in the oats on all plots and sweet clover on the residues plots as green manure.

TABLE 60.—URBANA, DAVENPORT PLOTS: SPECIAL FERTILIZER EXPERIMENT

Plot No.	Section A		Section B		Section C	
	Soil treatment	Wheat	Soil treatment	Wheat	Soil treatment	Wheat
301	0	21.6	sP	22.2	sP, $NaNO_3$	22.7
302	R	20.8	RsP	24.8	RsP, $NaNO_3$	26.0
303	M	30.5	MsP	31.5	MsP, $NaNO_3$	36.4
304	RL	29.8	RLsP	34.5	RLsP, $NaNO_3$	37.9
305	ML	36.5	MLsP	36.1	MLsP, $NaNO_3$	38.7

Note.—In the spring of 1929 Plots 1, 2, 3, 4, and 5 of Series 300 were divided into three sections. *Section A* remained under the original soil treatment. On April 17 superphosphate (16 percent) was applied at the rate of 320 pounds an acre across all plots in *Section B*. At the same time all plots in *Section C* received superphosphate at the rate of 320 pounds an acre and sodium nitrate at the rate of 125 pounds.

TABLE 61.—WEST SALEM FIELD
Rotation: Corn, oats, wheat, mixed hay, wheat

Serial plot No.	Soil treatment	Series 100 Wheat	Series 200 Mixed hay	Series 300 Wheat	Series 400[2] Oats	Series 500[2] Corn
1	0	4.2	(.77)	6.0	32.3	7.9
2	ML[1]	17.6	(1.17)	11.0	43.6	36.3
3	ML	21.0	(1.30)	18.1	60.9	42.6
4	MLrP	28.2	(2.02)	21.2	63.1	47.6
5	L[1]	11.3	(.20)	7.4	35.3	14.8
6	RL[1]	13.6	(.44)	8.7	43.0	24.6
7	RL	15.2	(.93)	15.7	54.5	25.3
8	RLrP	19.1	(1.65)	17.3	70.5	28.7
9	RLrPK	25.8	(1.91)	20.1	61.6	52.2
10	0	3.2	(.52)	1.3	....	....

[1]Initial application of limestone only. [2]Series 400 and 500 contain only 9 plots each.

TABLE 62.—WEST SALEM FIELD: MINOR ROTATIONS

Soil treatment	Wheat, sweet clover, and mixed hay			Corn, wheat, and mixed hay		
	Plot A Mixed hay	Plot B Wheat	Plot C Sweet clover	Plot D Mixed hay	Plot E Wheat	Plot F Corn
MLrPK	(1.84)	23.5	2.45	(1.16)	18.7	30.4
MrPK	(.56)	6.8	0	(.40)	8.2	25.4

WHAT IN GENERAL DOES A STUDY OF THESE FIELDS INDICATE?

From the summaries on the following pages, the reader can get a clearer conception of the influence of soil treatments upon the Illinois soil experiment fields than can be obtained by a study of each field independently or of each year independently. A very condensed form is used. The crop yields for a rotation have been averaged and converted into money values. These money values in turn have been reduced to an annual acre basis. For a four-year rotation this procedure condenses 16 different crop yields into one figure. Such figures make it possible to see at a glance the relative effect of any particular treatment for the rotation period.

The crop prices on which these figures are based are the average December 1 prices on Illinois farms as reported by the government for the period covered. For the more common crops the prices for the four-year period ending in 1929 were as follows: corn, 67 cents; wheat, $1.17; oats, 39 cents a bushel; and mixed hay, $12.90 a ton.

Where deductions were made for the cost of the treatment applied, crop residues were figured as costing 75 cents an acre annually, and the manure, limestone, rock phosphate, and kainit 75 cents, $3, $15, and $25 a ton respectively. Under average conditions these prices should cover the cost of application as well as purchase.

With these explanations, attention is directed to the facts brought out in the following tables and text.

Fields Vary Markedly in Level of Productiveness

Marked variation in the present level of productivity among the soils represented by these thirty fields is revealed by the figures from the untreated plots, shown in Table 63. The annual acre-value of the crops grown during the last rotation ranged from $4.19 at Sparta to $41.07 at McNabb, a difference of nearly 900 percent. The returns from the other fields are distributed more or less regularly between these two extremes. If these values are correlated with the soil groups on page 325, some interesting relationships become apparent. The dark-colored soils, for instance, are on the average from three to four times as productive as the light-colored soils. Among the dark-colored soils those having heavy, noncalcareous subsoils are the most productive and those with impervious, noncalcareous subsoils the least productive. The sandy soils occupy an intermediate position, and the old, very poorly drained gray soils with impervious, noncalcareous subsoils occupy the lowest position.

TABLE 63.—UNTREATED LAND: VALUE OF ALL CROPS GROWN ON THE UNTREATED PLOTS ON EACH FIELD

(Values represent average annual acre returns for rotation periods ending in 1929)

Rank	Field	Value
1	McNabb	$41.07
2	Aledo	31.90
3	LaMoille	30.63
4	Minonk	28.64
5	Bloomington	28.16
6	Springvalley	27.83
7	Kewanee	27.56
8	Urbana	27.32
9	Hartsburg	25.92
10	Dixon	23.94
11	Carthage	20.81
12	Clayton	20.77
13	Mt. Morris	19.62
14	Antioch	19.49
15	Carlinville	19.40
16	Palestine	19.10
17	Joliet	17.36
18	Lebanon	16.51
19	Oquawka	14.78
20	Oblong	9.95
21	Toledo	7.19
22	Enfield	6.38
23	Raleigh	5.53
24	Unionville	5.51
25	Newton	5.48
26	Odin	5.17
27	West Salem	4.87
28	Ewing	4.61
29	Elizabethtown	4.51
30	Sparta	4.19

Limestone Results Indicate Value of Soil-Testing Program

On most soil experiment fields 4 tons of limestone an acre was applied when the field was established, in addition to either manure or crop residues. Subsequent applications were made at the rate of 2 tons an acre each four years thereafter until 1923, when all applications were discontinued. The total amount applied to the respective fields ranges from 4 to 10 tons an acre depending upon the age of the field. On most fields a total of 8½ tons an acre has been applied, which is at the rate of about 900 pounds a year.

The annual acre-value of the limestone used on the soil experiment fields, as revealed in Table 64, ranges from minus 49 cents to $17.94 in the livestock system and from minus 18 cents to $11.94 in the grain system, indicating the great need for limestone on some soils, the uselessness of it on others, and the need, therefore, of a soil-testing program on the part of every farmer.

TABLE 64.—LIMESTONE: VALUE OF CROP INCREASES RESULTING FROM LIMESTONE WHEN USED IN ADDITION TO MANURE OR CROP RESIDUES
(Values represent average annual acre returns for rotation periods ending in 1929)

Livestock systems			Grain systems		
Rank	Fields	Values	Rank	Fields	Values
1	Ewing	$17.94	1	Ewing	$11.94
2	Enfield	14.03	2	Lebanon	11.55
3	Newton	12.68	3	Enfield	11.09
4	Toledo	11.57	4	Aledo	10.19
5	Oquawka	10.78	5	Clayton	10.17
6	Elizabethtown	9.75	6	Mt. Morris	10.12
7	Raleigh	9.74	7	Oquawka	9.74
8	Oblong	9.73	8	Toledo	9.61
9	Mt. Morris	9.17	9	Sparta	9.11
10	Sparta	9.10	10	Newton	8.70
11	Carlinville	8.62	11	Elizabethtown	8.20
12	Urbana	8.54	12	Urbana	7.62
13	Lebanon	8.06	13	Carlinville	7.60
14	Unionville	7.55	14	Carthage	7.60
15	Clayton	6.63	15	Unionville	7.40
16	West Salem[1]	5.36	16	West Salem[1]	7.19
17	Hartsburg	5.05	17	Odin	7.11
18	Joliet	4.82	18	Raleigh	6.79
19	Kewanee	4.17	19	Dixon	5.54
20	Carthage	4.00	20	Oblong	5.44
21	Aledo	3.60	21	LaMoille	5.09
22	Dixon	3.12	22	Kewanee	4.30
23	Springvalley	1.68	23	Bloomington	4.11
24	LaMoille	1.02	24	Joliet	3.70
25	Minonk	−.49	25	Antioch	1.28
			26	Springvalley	1.13
			27	Hartsburg	.77
			28	Minonk	−.18

[1]Some limestone was applied to check plots by mistake in 1912.

Most Soils Respond to Farm Manure

In livestock systems of farming the amount of manure that can be produced and returned to the soil depends upon the productiveness of the soil. If manure is composed of 75 percent moisture and 25 percent dry matter, and it is assumed that one-third of the produce grown is sold and two-thirds is fed, and that one-fifth of the manure is lost before it can be returned to the land, then for every pound of produce grown, one pound of manure can be returned to the soil. When manure was applied to the respective experiment fields on this basis the amounts returned, where no supplementary treatments were used, ranged from less than three-quarters ton at Enfield to about 3¾ tons at LaMoille. With supplementary treatments consisting of either limestone, or limestone and phosphate, the amount of manure returned to the soil on each field was increased, but the extremes in range of the amounts applied was not greatly different than when no supplementary treatments were used.

The application of manure in the manner described increased crop yields on all fields. Rather marked variations occurred, however, in the size of the increases on the respective fields. The value of the crop increases for the manure where it was used alone varied from $2.02 an acre annually at Unionville, on a yellow soil with a noncalcareous subsoil, to $9.93 at Oquawka, which is located on a semimature sand soil. In a similar manner the ton-value of the manure ranged from 94 cents at McNabb on a young, dark soil with an open, noncalcareous subsoil, to $8.28 at Oquawka. These data reveal a tendency for the smaller applications to give higher ton-values, but a comparison of these values with the acre-values indicates that some soils are more highly responsive to manure than are others, and that this difference in responsiveness exists both in the highly productive and in the less productive soils.

TABLE 65.—MANURE: AMOUNTS APPLIED TO SOIL IN THREE SYSTEMS OF LIVESTOCK FARMING AND RETURNS FROM IT WHERE USED ALONE
(For rotation periods ending in 1929)

Rank	Fields	Amounts applied annually per acre			Value when used alone	
		Alone	With limestone	With limestone and phosphate	Ton value	Annual acre value
		tons	*tons*	*tons*		
1	Oquawka	1.10	1.90	1.89	$8.28	$9.93
2	Clayton	2.41	3.00	3.04	4.08	9.83
3	Kewanee	2.94	3.11	3.19	3.07	9.04
4	Dixon	2.76	3.02	3.12	3.03	8.37
5	Aledo	3.47	3.89	3.87	2.33	8.10
6	LaMoille	3.73	3.77	3.75	2.14	7.99
7	Carthage	2.53	2.98	3.14	3.01	7.62
8	Springvalley	2.78	2.97	3.20	2.72	7.57
9	Mt. Morris	2.75	3.33	3.26	2.64	7.26
10	West Salem	1.10[1]	1.30	1.40	6.58[1]	7.24[1]
11	Lebanon	1.90	2.20	2.10	3.55	6.75
12	Carlinville	2.31	2.92	2.93	2.92	6.75
13	Minonk	3.59	3.45	3.49	1.53	5.51
14	Oblong	1.12	2.16	2.26	4.71	5.28
15	Joliet	2.44	2.76	3.12	2.09	5.09
16	Urbana	2.62	3.30	3.67	1.91	5.00
17	Raleigh	.98	2.00	2.19	4.80	4.71
18	Newton	.89	1.90	2.00	5.22	4.65
19	Hartsburg	3.27	3.50	3.61	1.34	4.38
20	Ewing	.79	2.14	2.38	5.19	4.10
21	Elizabethtown	.77	1.46	1.82	5.17	3.98
22	Enfield	.73	1.85	2.00	4.88	3.57
23	Toledo	1.00	2.20	2.10	3.03	3.03
24	Palestine	1.50	1.50	1.50	1.88	2.92
25	McNabb	2.99	....	....	.94	2.80
26	Sparta	.75	1.60	1.60	2.73	2.05
27	Unionville	.82	1.24	1.28	2.46	2.02

[1]Some limestone applied thru mistake.

Soil Improvement Value of Crop Residues

On farms where little or no livestock is fed there usually is produced more or less crop-residue material that may be used for soil-improvement purposes. Cropping systems are easily devised in which the amount of such material available for soil-improvement purposes can be greatly increased. The value of such material, as utilized on the Illinois soil experiment fields, is shown by the data in Table 66. This material has consisted chiefly of cornstalks, green-manure sweet clover, second-crop red clover and soybean chaff, grown upon the land and plowed down in the absence of other soil treatments. In the early years the grain straws were also returned.

The results in the last column indicate that this system of soil improvement may be rather effective on some soils and less effective on others. The best results were obtained on those fields where sweet clover will grow without the application of limestone, such as those representing the young soils in the group of dark soils with heavy, noncalcareous subsoils. The poorest results were obtained on the dark soils that will not grow sweet clover but which will grow fairly good red clover without supplementary treatments, such as the dark soils with noncalcareous subsoils represented by the Urbana and Kewanee fields. In the latter group the red clover grows as well on the check plots as on the residues plots. The only difference between these plots is that on one, two crops of hay are removed and on the other the second crop is plowed down. This fact makes it difficult to measure the effects of crop residues on those fields where red clover is a prominent legume. On those fields where legumes will not grow without limestone, the value of the crop residues is probably due chiefly to the cornstalks plowed down. In this system of soil improvement the legume green manure is probably an essential factor. On many experiment fields where limestone is not applied, this influence is entirely suppressed.

TABLE 66.—CROP RESIDUES: CROP YIELDS AND VALUE OF INCREASES RESULTING FROM PLOWING DOWN CROP RESIDUES IN ABSENCE OF OTHER SOIL TREATMENT PRACTICES

(Figures represent average annual acre yields and average annual acre returns for rotation periods ending in 1929)

Rank[1]	Fields	Grain yields		Value of crop increases	
		Corn	Wheat	Grain crops only	All crops
		bu.	*bu.*		
1	Minonk	12.5	3.9	$5.52	$7.73
2	Hartsburg	16.0	4.0	6.30	7.07
3	LaMoille	6.3	4.0	3.72	5.05
4	Aledo	6.1	3.1	3.12	3.13
5	Oquawka	1.5	1.5	1.47	3.13
6	Palestine[2]	2.1	3.0	2.46	3.12
7	Lebanon	13.7	− .1	2.98	2.83
8	West Salem[2]	6.2	3.1	3.20	2.68
9	Springvalley	9.0	4.0	4.10	2.15
10	Carthage	12.0	4.6	5.28	2.01
11	Clayton	10.0	5.0	4.31	1.91
12	Antioch	3.5	3.0	3.16	1.86
13	Oblong	6.7	4.0	2.94	1.82
14	Odin	2.7	1.8	2.01	1.73
15	Raleigh	3.2	1.3	.84	1.73
16	Dixon	4.3	3.6	2.34	1.68
17	Sparta	6.0	.7	2.42	1.58
18	Toledo	4.6	1.0	1.62	1.57
19	Elizabethtown	5.1	.7	1.69	1.56
20	Newton	1.7	1.8	1.14	1.27
21	Mt. Morris	10.0	1.4	3.12	1.25
22	Joliet	2.9	1.6	1.36	1.09
23	Enfield	2.7	.5	.77	.62
24	Unionville	2.5	− .4	.60	.62
25	Urbana	3.1	−1.6	.30	.47
26	Carlinville	.7	1.4	.61	.32
27	Ewing	1.4	− .4	.14	.14
28	Bloomington	12.2	9.8	5.39	− .29
29	Kewanee	5.4	1.5	1.43	−1.44

[1]The rank is based on the value of the crop increases shown in the last column.
[2]Includes a little limestone.

Phosphates Highly Important on Some Soils

On most experiment fields one ton of rock phosphate an acre was applied every four years until a total of 4 tons was reached, after which no further applications were made. The bone phosphate was applied at the annual rate of 200 pounds an acre until a total of 4,800 pounds was reached. Thus, distributed over all the years of the experiment, rock phosphate has been applied at the annual acre-rate of about 440 pounds and bone phosphate at the rate of 160 pounds.

In general better results for phosphate were obtained in the grain system than in the livestock system, probably because the manure functioned to some extent as a source of phosphorus. The poor results on some fields in both systems of farming indicate the desirability of testing the soil for phosphates, as described in Bulletin 337, when making plans to apply this plant-food element to Illinois fields.

TABLE 67.—PHOSPHATE: VALUE OF CROP INCREASES RESULTING FROM PHOSPHATE WHEN USED IN ADDITION TO LIMESTONE AND MANURE OR LIMESTONE AND CROP RESIDUES

(Values represent average annual acre returns for rotation periods ending in 1929)

Livestock systems			Grain systems		
Rank	Fields	Values	Rank	Fields	Values
1	Urbana	$ 9.72	1	Bloomington	$14.98
2	Joliet	6.34	2	Urbana	11.74
3	Elizabethtown	5.16	3	Antioch	10.56[1]
4	West Salem	3.22	4	Joliet	10.14
5	Carthage	3.01	5	Elizabethtown	8.16
6	Newton	2.89	6	West Salem	4.62
7	Kewanee	2.63	7	Kewanee	4.10
8	Enfield	2.56	8	Oblong	3.44
9	Springvalley	2.20	9	Raleigh	3.33
10	Raleigh	1.73	10	McNabb	2.88
11	Oblong	1.39	11	Newton	2.85
12	Palestine	1.39	12	Minonk	2.77
13	Clayton	1.36	13	Mt. Morris	2.44
14	Carlinville	1.24	14	Palestine	2.20
15	Dixon	1.10	15	Carlinville	2.00
16	Ewing	.81	16	Hartsburg	1.98
17	Aledo	.77	17	Carthage	1.88
18	Oquawka	.61	18	Lebanon	1.70
19	Sparta	.39	19	Clayton	1.62
20	McNabb	.31	20	Ewing	1.48
21	Unionville	.09	21	Unionville	1.48
22	Lebanon	− .30	22	Enfield	1.21
23	Hartsburg	− .44	23	Dixon	1.18
24	Minonk	− .57	24	LaMoille	1.14
25	LaMoille	− .60	25	Oquawka	.78
26	Mt. Morris	−1.06	26	Aledo	.70
27	Toledo	−1.26	27	Odin	.20[1]
			28	Toledo	− .33
			29	Sparta	− .71
			30	Springvalley	−1.18

[1]Bone phosphate. All other rock phosphate.

Carriers of Phosphorus Being Studied

Five experiment fields were modified in 1924 so as to give information concerning the relative value and behavior of several carriers of phosphorus under various conditions. The results recorded in Table 68 indicate that rock phosphate was more effective than superphosphate when both were applied in the absence of limestone, and that there was but little difference between the two carriers when applied in the presence of limestone.

The poorest results with rock phosphate were obtained where heavy applications of limestone were made, and in general the best results where light applications of limestone were made. Some relationship between soil acidity, or response to limestone, and the effectiveness of rock phosphate is suggested.

No large responses for phosphates have occurred on any of these five fields, probably because the soils are not deficient in available phosphorus or else because some other constituent such as potassium is more deficient than phosphorus.

TABLE 68.—PHOSPHATE: VALUE OF CROP INCREASES RESULTING FROM VARIOUS CARRIERS OF PHOSPHORUS WHEN USED WITH LIMESTONE AND WITHOUT LIMESTONE[1]

(Values represent average annual acre returns for rotation periods ending in 1929)

Phosphate treatment	Basal treatment	Hartsburg (response to limestone slight)	Dixon (response to limestone fair)	Aledo (response to limestone medium)	Raleigh (response to limestone high)	Toledo (response to limestone very high)
Rock phosphate						
No limestone..	M	$3.17	$1.27	$1.56	$1.34	$3.71
No limestone..	R	2.16	4.31	1.94	3.13	2.39
Light limestone[2].....	RL	−1.00	4.82	4.96	3.12	2.57
Heavy limestone[2].....	RL	1.98	1.18	.70	2.24	− .33
No limestone						
Rock phosphate	R	2.16	4.31	1.94	3.13	2.39
Superphosphate	R	− .54	.95	− .08	.70	− .36
Heavy limestone[2]						
Rock phosphate	RL	1.98	1.18	.70	2.24	− .33
Superphosphate	RL	1.75	1.26	− .04	2.48	.40
Bone phosphate	RL	.44	1.27	.86	1.38	1.21

[1]These experiments were established in 1924. The phosphate applications were all new at that time with the exception of the rock phosphate where applied with the heavy applications of limestone. This phosphate was first applied when the fields were established.

[2]The heavy applications of limestone range from 8 to 10 tons an acre in total since the establishment of the field and the light applications from 2 to 4 tons an acre. The detailed description of these experiments will be found in the table and footnotes for each individual field.

Less-Productive Soils Give Best Response to Potash

The potash used in these experiments was applied at the annual acre-rate of 200 pounds of kainit or 100 pounds of potassium sulfate or potassium chlorid, ahead of corn and wheat.

The more-productive soils have given little or no response to potash, the less-productive soils, the best responses. At Hartsburg, where the soil is dark, with a heavy, calcareous subsoil, potash was applied at a loss. At Ewing, where the soil is gray and has an impervious noncalcareous subsoil, the net return was $10.53 an acre annually. The sandy fields at Palestine and Oquawka are not very responsive.

That the favorable results for potash on some fields may have been influenced in part by the accompanying treatments is suggested by these data. The sweet-clover and limestone treatments especially seem to have increased the effectiveness of the potash.

TABLE 69.—POTASH: VALUE OF CROP INCREASES RESULTING FROM POTASH[1] WHEN USED IN ADDITION TO CROP RESIDUES, LIMESTONE, AND PHOSPHATE
(Values represent average annual acre returns for rotation periods ending in 1929)

Rank	Fields	Values
1	Ewing	$10.53
2	Toledo	8.43
3	Enfield	7.72
4	Newton	6.22
5	Carthage	5.98
6	Springvalley	5.17
7	Oblong	4.94
8	Clayton	4.86
9	West Salem	4.63
10	Raleigh	4.55
11	Sparta	4.52
12	Unionville	4.06
13	Joliet	4.03
14	Carlinville	3.79
15	Urbana	3.29[2]
16	Odin	3.25[2]
17	Kewanee	3.01
18	Lebanon	2.93
19	Aledo	2.53
20	Mt. Morris	2.43
21	Elizabethtown	2.37
22	Palestine	2.29[3]
23	Dixon	1.54
24	Bloomington	.68[2]
25	Oquawka	.48
26	Antioch	.22[2]
27	LaMoille	.00
28	Minonk	— .61
29	Hartsburg	— .77

[1]Chiefly kainit. [2]Potassium sulfate. [3]Potassium chlorid.

Net Value of Increases Greatest on Less-Productive Soils

In general the less-productive soils have given the greatest net response to soil treatment, and the more-productive soils the least. Some of the more-productive soils have given little or no net response for any system of soil treatment tried. On the young dark soil at McNabb, for instance, in the grain system of farming the check plot gave the highest net returns and in the livestock system manure without other fertilizer returned a net increase of only 56 cents.

On a large number of fields the livestock system has given a larger net response than the grain system.

From the farmer's point of view the net value of the crop increases is not of as great interest as the total value of the crop with the cost of treatment deducted (see Table 71 and discussion).

TABLE 70.—NET VALUE OF INCREASES FROM MOST EFFECTIVE SYSTEMS OF SOIL TREATMENT ON EACH FIELD

(Figures represent value of increases per acre per year for rotation periods ending in 1929, after deducting cost of treatment)

Livestock systems				Grain systems			
Rank	Fields	Treatment	Values	Rank	Fields	Treatment	Values
1	Ewing	ML	$19.06	1	Ewing	RLrPK	$16.31
2	Oquawka	ML	17.71	2	Urbana	RLrP	13.47
3	Newton	ML	14.97	3	Enfield	RLrPK	12.56
4	Urbana	MLrP	14.90	4	Lebanon	RL	12.25
5	Enfield	ML	14.83	5	Elizabethtown	RLrP	12.22
6	Clayton	ML	12.86	6	Toledo	RLrPK	11.55
7	Mt. Morris	ML	12.58	7	Newton	RLrPK	11.41
8	Elizabethtown	MLrP	12.57	8	Aledo	RL	11.19
9	Oblong	ML	12.01	9	Clayton	RLrPK	10.63
10	Carlinville	ML	11.82	10	Joliet	RLrPK	10.58
11	Raleigh	ML	11.69	11	West Salem	RLrPK	9.77
12	Lebanon	ML	11.41	12	Carthage	RLrPK	9.69
13	Toledo	ML	11.25	13	Mt. Morris	RL	9.27
14	West Salem	ML	10.12	14	Antioch	RLbP	9.03
15	Kewanee	ML	9.53	15	Oquawka	RL	9.00
16	Joliet	MLrP	8.74	16	Sparta	RL	8.50
17	Sparta	ML	8.51	17	Odin	RL	8.16
18	Carthage	ML	8.01	18	Oblong	RLrPK	7.71
19	Dixon	ML	7.92	19	Minonk	R	6.98
20	Unionville	ML	7.26	20	Bloomington	RLbP	6.90
21	Aledo	ML	6.90	21	LaMoille	RL	6.83
22	Springvalley	ML	5.73	22	Raleigh	RLrPK	6.65
23	Hartsburg	ML	5.55	23	Unionville	RLrPK	6.36
24	LaMoille	M	5.19	24	Hartsburg	R	6.32
25	Minonk	M	2.82	25	Carlinville	RLrPK	5.93
26	Palestine	ML Le	1.67	26	Dixon	RL	5.20
27	McNabb	M	.56	27	Kewanee	RLrPK	1.62
				28	Springvalley	R	1.40
				29	Palestine	LeL KCl	1.32
				30	McNabb	0	0

Net Value of Total Yields the Important Consideration

Ranked by net value of total crops, these fields fall into quite different order than when arranged by net value of crop increases, the naturally more-productive fields coming in the higher ranks. Aledo and Urbana rank first, with values of $43.30 and $42.22 respectively, and Unionville last in both grain and livestock systems with values of $11.49 and $12.80. Aledo and Urbana are situated on young and semimature dark soils and Unionville on a mature yellow soil.

It is with these total yields that a farmer is seriously concerned. Some soils, it is obvious, will challenge the most skilful farmer.

Changes have been instituted on certain of these fields in an attempt to ascertain whether other crop rotations and other systems of soil treatment will give better responses than those tried.

TABLE 71.—NET VALUE OF TOTAL CROPS FROM MOST EFFECTIVE SYSTEMS OF SOIL TREATMENT ON EACH FIELD

(Figures represent total values per acre per year for rotation periods ending in 1929, after deducting cost of treatment)

Livestock systems				Grain systems			
Rank	Fields	Treatment	Values	Rank	Fields	Treatment	Values
1	Urbana	MLrP	$42.22	1	Aledo	RL	$43.30
2	McNabb	M	41.63	2	McNabb	0	41.07
3	Aledo	ML	38.80	3	Urbana	RLrP	40.79
4	Kewanee	ML	37.57	4	LaMoille	RL	38.31
5	LaMoille	M	36.46	5	Minonk	R	35.81
6	Mt. Morris	ML	33.41	6	Bloomington	RLbP	35.06
7	Minonk	M	32.79	7	Kewanee	RLrPK	32.02
8	Clayton	ML	32.31	8	Hartsburg	R	31.70
9	Dixon	ML	32.27	9	Clayton	RLrPK	31.69
10	Springvalley	ML	32.21	10	Springvalley	R	30.47
11	Hartsburg	ML	30.22	11	Dixon	RL	29.75
12	Carlinville	ML	30.03	12	Carthage	RLrPK	29.60
13	Oquawka	ML	29.99	13	Mt. Morris	RL	28.93
14	Carthage	ML	28.72	14	Lebanon	RL	28.77
15	Joliet	MLrP	25.98	15	Antioch	RLbP	28.52
16	Lebanon	ML	25.66	16	Joliet	RLrPK	27.65
17	Ewing	ML	22.64	17	Oquawka	RL	26.60
18	Oblong	ML	21.63	18	Carlinville	RLrPK	25.85
19	Palestine	ML Le	20.77	19	Ewing	RLrPK	20.80
20	Enfield	ML	20.12	20	Palestine	LeL KCl	20.42
21	Newton	ML	19.89	21	Enfield	RLrPK	18.57
22	Toledo	ML	19.47	22	Oblong	RLrPK	18.41
23	Elizabethtown	MLrP	17.08	23	Toledo	RLrPK	18.23
24	Raleigh	ML	16.26	24	Newton	RLrPK	17.02
25	West Salem	ML	14.99	25	Elizabethtown	RLrP	16.73
26	Sparta	ML	13.65	26	West Salem	RLrPK	14.64
27	Unionville	ML	12.80	27	Odin	RL	12.33
				28	Sparta	RL	12.23
				29	Raleigh	RLrPK	12.20
				30	Unionville	RLrPK	11.49

What Are the Most Valuable Systems of Treatment on the Illinois Experiment Fields?

Table 72 on the next page summarizes still further the data presented in Tables 70 and 71, the fields being ranked according to the net value of the crop increases from the treatments and according to the net value of the total yields whether in the grain or in the livestock system of farming.

An interesting fact about these data is that all systems of soil treatment employed are represented by one or more fields. On some fields the simplest systems have proved the most effective; on others the most complicated systems have given the best results. On the gray, yellow, sandy, hilly, and the less-productive dark soils, the livestock systems were generally of more value than the grain systems, while on some of the more-productive dark soils, such as those represented by the Aledo, LaMoille, and Minonk fields, the grain systems were the more effective.

The net annual acre-value of the crop increases resulting from the respective treatment systems ranged from $19.06 at Ewing to 56 cents at McNabb, a difference of more than 3,300 percent. In general the largest increases were obtained from the naturally less-productive fields, and the smallest increases from the more-productive fields. There are, however, some exceptions to this generalization, as is indicated by the results from the Odin, Sparta, and Unionville fields on the one hand, and the Aledo, Carlinville, Mt. Morris, and Urbana fields on the other. Apparently the ability of a soil to respond to systems of soil treatment is not always related to its present level of productiveness. Several factors acting separately or in combination may be mentioned that probably explain these differences. Previous to their use for experimental purposes, some of these fields doubtless had been more depleted than others of their plant-food materials by faulty farm practices; in some soils of the same general type, the minerals are in more available form or present in somewhat different proportions than in others, and on some soils weathering factors have played a more important part than on others.

The range in total crop values for the most effective treatments, after deducting the cost of the treatment, is not so great proportionately as the range in net increases discussed on the preceding page. This range is from $43.30 an acre at Aledo to $12.33 at Odin, a difference of about 250 percent. From the farmer's point of view, however, these figures are of more importance than the value of the

increases. It will be much more difficult for a farmer to meet his expenses and derive profit from $12.33 an acre than it will be from $43.30 an acre. Soils low in natural productivity and low in response to treatment will require the most careful management.

These results again emphasize the fact that no one system of soil improvement will give the best results on all soils. A study of the results from these fields, by rotation periods (data not presented here), reveals further that the most effective system for any particular field changes from time to time, tending to go from the simpler to the more complex. A clear lesson from these data is that farmers must be constantly on the alert if they are to make the most economic use of their soils.

(Table 72)

Summary of Crop Values From Most Effective Systems of Soil Treatment on the Illinois Soil Experiment Fields Considering Both Livestock and Grain Systems of Farming

(Values represent average annual acre-returns for rotation periods ending in 1929 after deducting cost of treatment)

Value of crop increases				Total value of crops			
Rank	Fields	Treatment	Values	Rank	Fields	Treatment	Values
1	Ewing	ML	$19.06	1	Aledo	RL	$43.30
2	Oquawka	ML	17.71	2	Urbana	MLrP	42.22
3	Newton	ML	14.97	3	McNabb	M	41.63
4	Enfield	MLrP	14.93	4	LaMoille	RL	38.31
5	Urbana	ML	14.90	5	Kewanee	ML	37.57
6	Clayton	ML	12.86	6	Minonk	R	35.83
7	Mt. Morris	ML	12.58	7	Bloomington	RLbP	35.06
8	Elizabethtown	MLrP	12.57	8	Mt. Morris	ML	33.41
9	Lebanon	RL	12.25	9	Clayton	ML	32.31
10	Oblong	ML	12.01	10	Dixon	ML	32.27
11	Toledo	RLrPK	11.55	11	Springvalley	ML	32.21
12	Carlinville	ML	11.82	12	Hartsburg	R	31.70
13	Raleigh	ML	11.69	13	Carlinville	ML	30.03
14	Aledo	RL	11.19	14	Oquawka	ML	29.99
15	Joliet	RLrPK	10.58	15	Carthage	RLrPK	29.60
16	West Salem	ML	10.12	16	Lebanon	RL	28.77
17	Carthage	RLrPK	9.69	17	Antioch	RLbP	28.52
18	Kewanee	ML	9.53	18	Joliet	RLrPK	27.65
19	Antioch	RLbP	9.03	19	Ewing	ML	22.64
20	Sparta	RL	8.50	20	Oblong	ML	21.63
21	Odin	RL	8.16	21	Palestine	ML Le	20.77
22	Dixon	ML	7.92	22	Enfield	ML	20.12
23	Unionville	ML	7.26	23	Newton	ML	19.87
24	Minonk	R	6.98	24	Toledo	ML	19.47
25	Bloomington	RLbP	6.90	25	Elizabethotwn	MLrP	17.08
26	LaMoille	RL	6.83	26	Raleigh	ML	16.26
27	Hartsburg	R	6.32	27	West Salem	ML	14.99
28	Springvalley	ML	5.73	28	Sparta	ML	13.65
29	Palestine	ML Le	1.67	29	Unionville	ML	12.81
30	McNabb	M	.56	30	Odin	RL	12.33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