LIVINGSTON COUNTY SOILS

SOIL REPORT 72

UNIVERSITY OF ILLINOIS
AGRICULTURAL EXPERIMENT STATION

COVER PICTURE

The picture on the cover of this report shows how a small part of Livingston county appears from the air. Many will recognize the southeastern part of the city of Pontiac in the northwest corner of the picture and Vermilion river winding through the upper half of the picture. State Route 116 can be seen entering Pontiac from the east and the Wabash railroad tracks entering from the southeast.

The peculiar shaped area in the central part of the picture is a former channel of Vermilion river. Its outer portion is still somewhat ponded and swampy. The lightest shadings adjacent to Vermilion river are timbered soils, mostly Vance silt loam, Type 158. The darkest shadings are mostly Drummer clay loam, Type 152, one of the most extensive and also one of the most productive soils in Livingston county. The somewhat lighter-colored soil lying along the Wabash railroad near the south part of the picture is Harpster clay loam, Type 67.

Differences in elevation in the area shown in this picture are not more than 25 feet. A large part of Livingston is made up of nearly level land of this nature.

(Picture supplied by
Agricultural Adjustment Administration,
U. S. Department of Agriculture)

Livingston county lies in northeast central Illinois. Pontiac, the county seat, is about 74 miles northwest of Champaign-Urbana and 106 miles northeast of Springfield, the capital of the state.

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The photographs on pages 3 and 34 were supplied by W. F. Purnell.

Urbana, Illinois — August, 1949

LIVINGSTON COUNTY SOILS

By Herman L. Wascher, R. S. Smith, and R. T. Odell

THIS SOIL REPORT has been written primarily for the farmers of Livingston county. The soil map, included in seven sections at the back of this booklet, shows the soils that occur in the county. In the text suggestions are made for the use, conservation, and management of each kind of soil.

Livingston county is mainly agricultural. There are no large cities in it. Pontiac, the county seat, is the largest town, with a population of about 9,600. About 80 percent of the total area of the county, or 537,000 acres, is planted to the major crops grown in this general region, including sweet clover and alfalfa.

This report attempts to answer four major questions for the farmers and landowners of Livingston county: *What soil types do I have on my farm? What treatment does each soil type need? What crops are adapted to each soil type? What yields may be expected on each soil type?*

A typical farm scene in Livingston county. The sweet-clover pasture in the foreground is on Bryce clay loam to clay. The higher areas in the background and where the farm buildings stand consist of Swygert silt loam. Fig. 1

HOW TO KNOW YOUR SOILS AND PLAN THEIR MANAGEMENT

First Examine the Soil Map

Colors are guide to general soil conditions. On the soil map for Livingston county five different colors are used to indicate the dark soils — shades of blue, blue-green, green, gray, and red. The *blue* shades show the dark soils developed from silty wind-blown (loessial) material; the *bluish-green* and *green* shades, those derived from permeable glacial till and water-borne (alluvial) sediments; the *gray* shades, those with subsoils that are slowly permeable to water and underlain with glacial till that water penetrates only slowly; the *red* shades, those with very slowly permeable subsoils underlain with glacial till that water hardly penetrates.

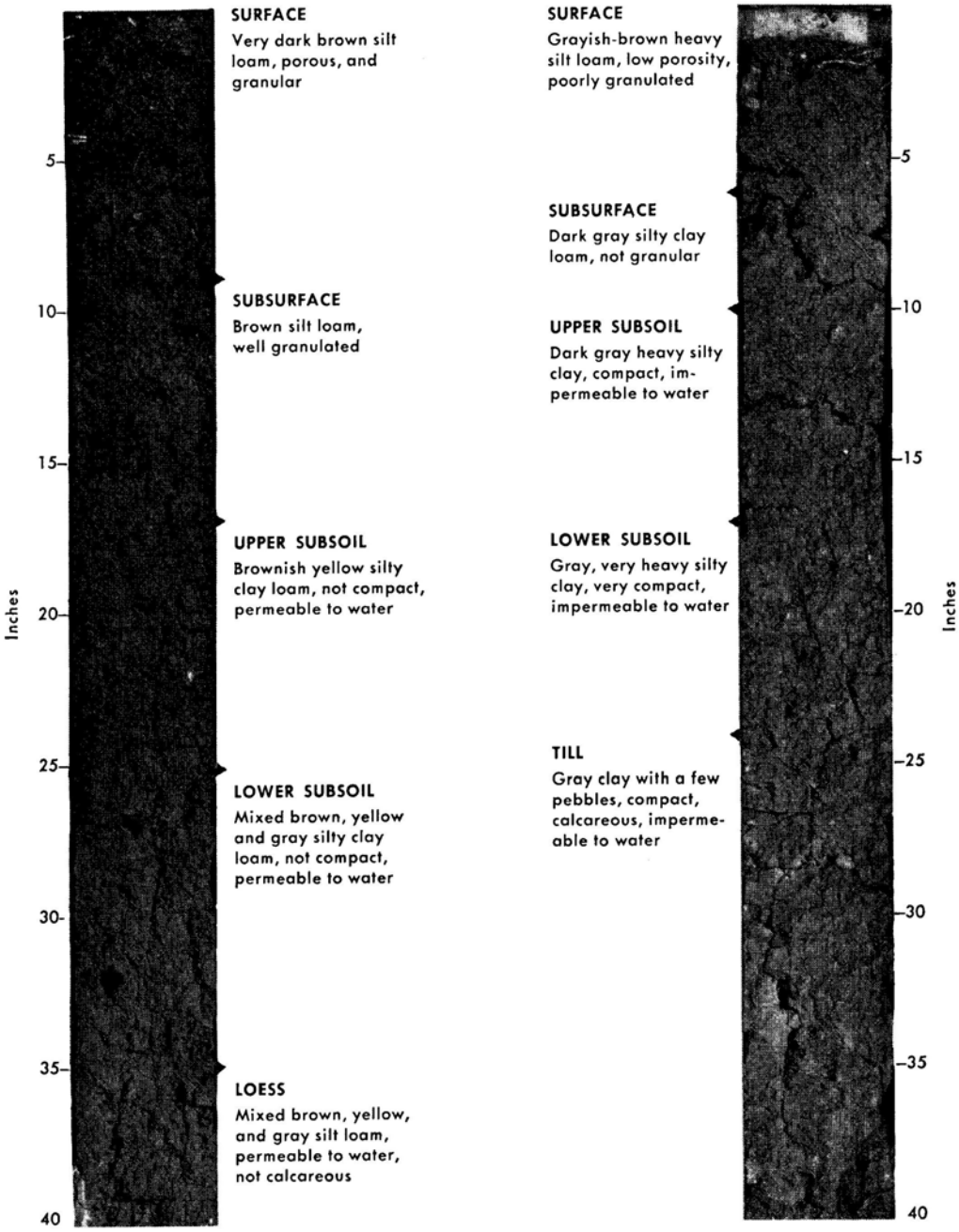
For the light-colored timberland soils shades of yellow are used. The subsoil horizons, or layers, of these timberland types vary greatly in their permeability to water, the range being all the way from very rapid to very slow.

Note names of soil types. The first step in using this report is to turn to the soil map and note the names of the soil types in the area in which you are interested. The map, consisting of seven sheets, shows the location and boundaries of the various soil types in the county. The area of each type is shown not only by a distinguishing color, as explained above, but also by a number usually placed in each area. Where an area is too small to accommodate the soil number, the number is placed adjacent to the area and connected with it by a line.

Study your soil types. After finding out what soil types occur on your farm, turn to the soil-type descriptions (pages 15 to 48) and read what is said about each of the soils you have. Some of the soils in Livingston county are difficult to manage and medium to low in productivity; others are easily handled and high in productivity and will retain their high-producing capacity if the well-known good farming practices, including the use of limestone, fertilizers, and organic matter, are followed. The *use and management* discussion for each soil type and Table 4, page 14, bring out these differences in soils and suggest possible solutions for many problems.

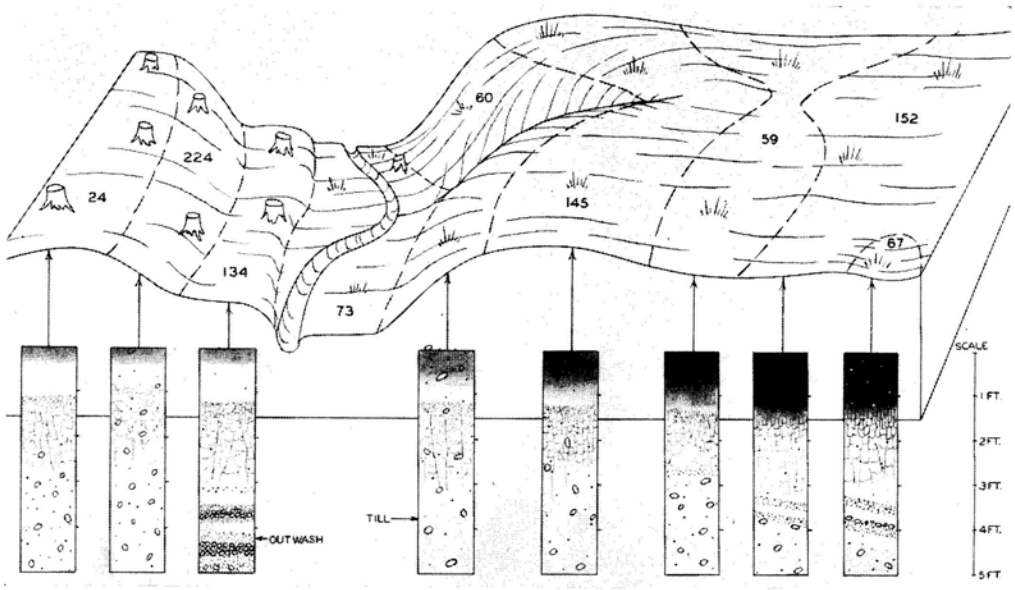
Entire soil profile is important. Soil types are differentiated on the basis of the character of the soil to a depth of 40 inches or more, *not the surface alone.* The surface layer of one type is frequently little or no different from that of another, and yet the two types may differ widely in agricultural value because of differences in the subsurface or subsoil. It is of utmost importance, therefore, in studying descriptions of soil types, to get a clear mental picture of *all* the outstanding features of each type, including the various layers to be seen as you dig down into the soil for 40 inches or more.

The appearance of Muscatine silt loam and Clarence silt loam to a depth of 40 inches is shown in Fig. 2. The surface soil of Muscatine is about 9 inches thick, very dark brown, and well granulated. The subsurface horizon, to a depth of about 17 inches, is brown, well granulated, and permeable to water and to roots. The upper subsoil, extending to a depth of about 25 inches, is a little heavier than the lower subsoil, but both are permeable to water and roots. At about 35 inches the material is less-weathered parent material and shows less structural development. *The high quality of this soil is due as much to the*



CONTRAST IN STRUCTURE OF TWO SOILS

Muscatine silt loam (left) is high in organic matter and very productive. Note deep, dark-colored surface layer, absence of shrinkage cracks, and granular structure. Clarence silt loam (right) is only moderately productive. Note shallow, grayish surface layer, shrinkage cracks indicating high clay content, and compact structure. Because of its permeable subsoil Muscatine has only slight tendency to erode. Clarence erodes easily and is drouthy. Fig. 2



24	224	134	.. Type No. ..	60	145	59	152	67
Miami silt loam	Strawn silt loam	Camden silt loam	.. Type name ..	LaRose silt loam	Saybrook silt loam	Lisbon silt loam	Drummer clay loam	Harpster clay loam
1½–3½	7–15	1½–3½	...Slope, %...	7–15	1½–3½	½–1½	0–1	0–1

EFFECT OF TOPOGRAPHY AND NATIVE VEGETATION ON SOIL

The upper part of the above diagram shows how three timber soils (left) and five prairie soils (right) in Livingston county are located with reference to topography, or lay of the land. Also shown is the way the native vegetation that once covered these soils has influenced the thickness of the dark surface layer (tree stumps indicate areas where timber once grew, and the clumps of grass where grasses grew).

The diagram in the foreground shows the general structure of the different soil layers of each type. All these soils except Camden, No. 134, are underlain by calcareous (limey) glacial till at depths of less than 4 feet, and this till is permeable to water. A few types like Nos. 60 and 224 often contain, even in the surface layer, free lime in the form of pebbles. Camden, as well as some of the other more important types, is underlain by stratified materials laid down by water in remote times. A few types, represented above by Drummer, No. 152, and Harpster, No. 67, are underlain by a combination of permeable till and water-worked materials.

The light-colored, timber soils in Livingston county are all of minor importance. Strawn, No. 224, occupies such a small area that it is not shown on the soil map.

The prairie soils differ markedly in the amount of organic matter they contain (organic matter is represented by the dark shading), and they differ in other features also. All these differences trace back to topography. Harpster, No. 67, is so limey as to be alkaline. The high amount of lime in this soil is due to the great number of snail shells that accumulated throughout the profile when coarse marsh grasses grew here. Fig. 3

nature of the deeper horizons as to the nature of the surface.

The Clarence profile is very different from the Muscatine. The surface soil is only 6 inches thick and shows a distinctly grayish cast. It is heavier and more difficult to work than the Muscatine surface. The subsurface of Clarence is only about 4 inches thick and is heavy and dark gray instead of brown. The upper subsoil begins at about 10 inches and is dark gray, heavy, compact, and very slowly permeable to water. The lower subsoil is gray, heavy, compact, and very slowly permeable to water. At about 24 inches glacial till is encountered. This till is slightly weathered, heavy, plastic, and calcareous (limey). It extends to an undetermined depth and is practically impermeable to water. *The removal of the upper portion of this soil by erosion permanently destroys it for profitable crop production.*

Variations occur within each type. It is likewise important to understand that a given soil includes a range in properties. The boundaries between soil types vary in sharpness. Between most soils there is a zone that includes some of the properties of each type. Also, within a given type there are often distinct areas of other types too small to be shown on the soil map. Sometimes types are so intermingled that it is impossible to show them separately. These variations, the shading of one soil type into another, small areas that cannot be shown on the map, and the intermingling of soil types, make it necessary for every landowner and operator to study his soils carefully in addition to studying the soil map.

Compare Your Yields With Test Yields

Use five-year averages. High crop yields year after year are the result of good soil and good management. Low yields may be caused by a poor soil, or by trying to grow crops that are not adapted to the soil, or by faulty management.

Table 1 on page 8 shows what yields can reasonably be expected from Livingston county soils, as an average, over a period of years under good soil management.[1] If you find that your average yields for five years or longer are much below those shown in Table 1 for your soil types, it will pay you to examine your management practices to see where changes should be made. At least five years is necessary for a valid comparison because of the wide seasonal variations that occur in rainfall, temperature, wind, and insect and disease injury.

Still higher yields are possible. On most soils crop yields can be advanced beyond those shown in Table 1 by applying nitrogen, soluble phosphates, or potash, or perhaps even the minor elements. Soluble phosphates drilled with wheat and certain other small grains will increase yields in many seasons. There is also evidence that mixed fertilizers applied at corn-planting time often will increase corn yields, especially on very productive soils. Thus while yields below those shown in Table 1 probably indicate faulty management, higher yields are not out of the question.

[1] Anyone interested in land as an investment should realize that crop yields alone are not necessarily a true index to land values, for the operating costs necessary to get good yields vary from one soil type to another. In general, the poorer the soils the more difficult and more costly it is to apply good management practices. On some soils that produce only medium or low yields, good management is rarely found except where the owner himself operates the farm.

Table 1. — LIVINGSTON COUNTY SOILS

Average Yields of Crops to Be Expected Over a Period of Years Under Good Management

Good management is defined on pages 9 to 12. Figures in **bold face** are based upon long-time records kept by farmers in cooperation with the Department of Agricultural Economics; the others are estimated yields. *These yields were obtained without the use of soluble fertilizers.*

Type No.	Type name	Hybrid corn	Soy-beans	Oats	Winter wheat	Alfalfa	Bluegrass pasture[a]
		bu.	*bu.*	*bu.*	*bu.*	*tons*	*days*
23	Blount silt loam	48(E)[b]	21(E)	39	22	2.3	70
24	Miami silt loam	55(E)	23(E)	43	24	2.5	80
25	Hennepin gravelly loam, eroded	N	N	N	N	N	30
36	Tama silt loam	**66**(E)	**25**(E)	**48**	**25**	**2.8**	90
40	Dodgeville silt loam	49	20	40	22	2.1	70
41	Muscatine silt loam	**73**	**27**	**54**	**26**	**3.0**	100
45	Denny silt loam	49	22	38	20	N	50
59	Lisbon silt loam	**72**	**28**	**52**	**26**	**2.8**	100
60	LaRose silt loam	N	N	42	22	2.2	60
67	Harpster clay loam	V	V	V	V	N	V
68	Sable silty clay	**71**	**29**	**50**	**25**	**2.3**	100
73	Huntsville loam, bottom	D	D	D	D	N	D
80	Alexis silt loam, terrace	61(E)	23(E)	45	23	2.5	80
81	Littleton silt loam, terrace	69	26	50	25	2.8	90
91	Elliott silt loam, plastic till phase	**55**	**22**	**42**	**22**	**2.5**	70
103	Muck	V	V	N	N	N	V
134	Camden silt loam, terrace	54(E)	22(E)	40	23	2.3	70
144	Alvin sandy loam	41	16	32	18	1.7	40
145	Saybrook silt loam	**70**	**26**	**54**	**26**	**2.9**	90
146	Elliott silt loam	**62**	**24**	**48**	**24**	**2.7**	80
147	Clarence silt loam	**47**	**20**	**37**	**20**	**2.3**	60
148	Proctor silt loam	**62**	**24**	**48**	**24**	**2.6**	80
149	Brenton silt loam	**71**	**27**	**53**	**26**	**2.9**	100
150	Onarga sandy loam	49	20	37	20	2.0	60
152	Drummer clay loam	**70**	**28**	**49**	**25**	**2.3**	100
154	Flanagan silt loam	**71**	**27**	**53**	**26**	**3.0**	100
156	Ridgeville sandy loam	**59**	**23**	45	24	2.4	70
157	Rankin sandy loam	50	20	39	21	2.1	60
158	Vance silt loam	56	23	43	24	2.4	80
159	Pilot silt loam	48	20	37	21	2.1	60
206	Thorp silt loam	**56**	24	**41**	22	1.7	80
223	Varna silt loam	N	N	N	N	1.9	40
228	Eylar silt loam	38(E)	18(E)	33	19	2.0	50
229	Monee silt loam	35	18	28	17	N	40
230	Clarence clay loam to silty clay loam	**51**	**23**	**36**	**19**	**1.7**	70
231	Clarence silt loam, rolling phase	N	N	N	N	1.6	30
232	Elliott clay loam to silty clay loam	**64**	**27**	**45**	**23**	**2.1**	80
235	Elliott clay loam to silty clay loam, plastic till phase	**58**	**25**	**41**	**21**	**1.9**	80
238	Drummer clay	V	V	V	V	N	V

[a] Estimated number of days that one acre, without soil treatment, will carry one cow.

[b] Letters have the following meanings: D = Soil fertile but yields are variable, depending upon frequency of overflow. E = Crop should not be grown unless erosion control measures are used. N = Crop not adapted. V = Variability of soil as mapped makes yield estimate impossible.

In future years new crop varieties, new cultural and fertilizer practices, and new plant diseases or insect pests may change yield levels. The yields in Table 1 must therefore be regarded as mainly of current interest. Revised tables can be obtained from time to time by writing to the DEPARTMENT OF AGRONOMY, AGRICULTURAL EXPERIMENT STATION, URBANA, ILLINOIS.

Know What Good Soil Management Involves

Good drainage must be provided. There are soils in Livingston county that cannot be effectively underdrained, and a poorly drained soil cannot be consistently productive. The problem is to recognize these soils and to provide a surface drainage system to carry off excess water. These same soils tend to be drouthy because the same soil conditions that prevent tile from providing adequate drainage also limit root penetration. Crops growing on them are sensitive to seasonal conditions and are likely to show the lack of moisture during rainless periods sooner than do crops on more permeable soils.

The soil map and Fig. 14 (page 52) show those areas in Livingston county where it is hard to get enough underdrainage; and the *use and management* paragraphs for each soil type (pages 15 to 48) point out possible ways to lessen the harmful effects of poor underdrainage.

Tests must be made for acidity, phosphate, and potash. The removing of crops from the land year after year and the dissolving and leaching action of rain finally cause soils to become acid and deficient in available plant nutrients. Satisfactory yields cannot be produced on such soils. As a means of detecting these deficiencies and indicating how much limestone, phosphate, or potash should be applied in order to correct them, soil tests are an invaluable aid. It often happens that parts of a field need no limestone or fertilizer, while other parts of the same field are acid or low in phosphate or potash. It is a poor practice to apply to the whole field the average amounts needed, for some parts of the field will then get something not needed, other parts will not get enough, and the results will be disappointing.

Organic matter and nitrogen need special attention. The maintenance of an adequate supply of decaying organic matter and of nitrogen in the soil is essential. Nitrogen in large amounts is necessary for vigorous and maximum crop growth (see Table 2). Unlike phosphorus and potash, nitrogen is not a constituent of the soil minerals. It comes in large part from leguminous organic matter; it is therefore important to have a good supply of organic matter high in nitrogen in the soil. Nitrogen may also be purchased as a commercial fertilizer, and if judiciously applied in this form during periods of high grain prices may bring a profit.

Besides supplying nitrogen, decaying organic matter tends to keep the soil in good physical condition. Heavy-textured clay loam soils (such as Types 152, 230, 232, and 235) are loosened up, made more "mellow" and easier to till. Light-textured sandy soils (such as Types 144, 150, and 157) are bound together better, are moved less by wind action, and retain more moisture.

A good rotation must be selected. A good rotation not only provides nitrogen and fresh organic matter but also makes it possible to maintain good physical condition in the deeper portions of the soil as well as in the surface 6 inches. These deeper parts of the soil must be kept porous enough so that water can pass down into and through them. Deep-rooting legumes help to produce and maintain this porous condition. Too often the physical condition of a soil is judged by the surface soil alone. The deeper, hidden parts of the soil are just as important as the surface in determining physical condition and sometimes more important.

Not only is it important to adopt a good rotation, it is also important to

Table 2. — COMPOSITION OF SEVEN FARM CROPS

As Grown for the Most Part on Soil Experiment Fields Located on Dark Soils in Central and Northern Illinois

Crop		Nitrogen	Phosphorus	Potassium	Calcium	Magnesium
		lb.	*lb.*	*lb.*	*lb.*	*lb.*
Corn	Grain, 100 bushels	97	13	25	5	9
	Stalks, 4,480 pounds	38	4	67	24	18
	Cobs, 1,120 pounds	5	Trace	9	1	1
	Total	140	17	101	30	28
Oats	Grain, 50 bushels	31	4	13	2	3
	Straw, 1,700 pounds	7	1	47	6	3
	Total	38	5	60	8	6
Wheat	Grain, 25 bushels	22	4	9	1	3
	Straw, 2,000 pounds	10	1	16	4	2
	Total	32	5	25	5	5
Soybeans	Grain, 25 bushels	95	5	28	4	4
	Straw, 2,840 pounds	31	1	15	46	26
	Total	126	6	43	50	30
Alfalfa	2,000 pounds	58	4	39	36	9
Red clover	2,000 pounds	55	3	40	38	9
Soybeans	2,000 pounds	52	3	18	28	18

Analyses by H. J. Snider.

return to the soil all crop residues and part of the top growth of the legumes. If all top growth is taken off or grazed close, much of the value of the rotation will be lost.

Another problem to be considered when selecting a rotation is the tendency of most soils to develop a "plow-sole," or compacted layer, just beneath the surface layer. This compact layer retards underdrainage and may limit the development of a good root system. Deep-rooting legumes, such as sweet clover and alfalfa, are the best remedy now known to lessen or prevent this unfavorable condition.

The four-field cropping system outlined in the next column shows a type of rotation that has many advantages for corn-belt farms. It is essentially a four-year rotation — three years are devoted to cash and feed grains and one year to a deep-rooting perennial legume. Its special advantage is that the alfalfa stays down two years, thus a farmer gets crops during two years with one seeding. It also provides a green-manure catch crop to be plowed down for corn. However, on soils which should be fall-plowed (such as Types 152, 230, 232, and 235) the sweet-clover catch crop will be hard to kill.

	Field 1	Field 2	Field 3	Field 4
1950	Corn	Corn	Oats (sw. clover)	Alfalfa-brome
1951	Corn	Oats	Corn	Alfalfa-brome
1952	Oats (sw. clover)	Alfalfa-brome	Corn	Corn
1953	Corn	Alfalfa-brome	Oats	Corn
1954	Corn	Corn	Alfalfa-brome	Oats (sw. clover)
1955	Oats	Corn	Alfalfa-brome	Corn
1956	Alfalfa-brome	Oats (sw. clover)	Corn	Corn
1957	Alfalfa-brome	Corn	Corn	Oats

In this system soil-improving-and-conserving legumes are on one-fourth of the land one year and half the land the next year, or on an average of more than one-third (37½ percent) of the land yearly. The legumes come at times in the rotation when the nitrogen supply in the soil is lowest. The corn crops follow deep-rooting legumes and thus benefit from the nitrogen they supply.

A four-field cropping system of this kind can be fitted into various situations without sacrificing its main features. It can be adjusted to differences in soil productivity or the tendency of a soil to erode, to different types of farming, to the production of new crops, to changing crop prices, or to hazards of weather, insects, diseases, and weeds. Crop choices and split cropping on one or more fields give the flexibility that is needed for meeting these problems.[1]

Following are seven other four-field rotations that can be used instead of the corn-corn-oats-alfalfa rotation chosen for illustration. They show further how flexible a four-field rotation is.

Other Four-Field Rotations

1.....	Corn	Corn	Oats	Sod
2.....	Corn	Soybeans	Oats	Sod
3.....	Corn	Soybeans	Wheat	Sod
4.....	Corn	Corn-soybeans	Oats	Sod
5.....	Corn	Oats-soybeans	Wheat	Sod
6.....	Corn	Soybeans	Oats-wheat	Sod
7.....	Corn	Corn-soybeans	Oats-wheat	Sod

(Sod here = mixed legumes and grasses.)

In Rotations 4 to 7 the fields have been split some years to permit two different crops to be grown.

[1] The subject of crop rotations is discussed in more detail in the U. S. Department of Agriculture Yearbook for 1938, pages 406-430, the Yearbook for 1943-1947, pages 527-536, and in the Yearbook for 1948, pages 191-202.

Application of limestone and fertilizers. As pointed out before, soil tests will show whether limestone is needed and how much and whether available phosphorus and potash are too low for best yields. If the soil is acid, this unfavorable condition is easily corrected by applying limestone. If available potash is deficient, it can be supplied by the application of a potash fertilizer.

If, however, phosphate is deficient, it is not so clear what is the best way to correct this condition. Both rock phosphate and superphosphate are widely used. Rock phosphate costs less per ton; but anyone using phosphate fertilizers is more interested in the returns on his investment and in applying enough phosphate to maintain and in some cases to increase the phosphate supply in his soil than he is in cost per ton.

The best information on this problem indicates that in Livingston county there are soils that will respond well to rock phosphate and others that probably will not (see Tables 5 and 7, pages 21 and 33). What the response of these same soils would be to superphosphate is not known, as there is not yet enough evidence to justify conclusions. The soils that may be expected to respond satisfactorily to rock phosphate are Types 23, 24, 60, 91, 145, 146, 147, 223, and 231. Types 23, 91, 147, 223, and 231 would not be expected to give as good response as Type 146 (see pages 31 to 34). Except for Type 41 (see pages 19 to 22) and the nine types mentioned above, there is little experimental information to show whether the soils in this county would respond to rock phosphate. It will be noted that the response of Type 41 is irregular, and the results do not give much encouragement for the use of rock phosphate.

On any of these soils it seems to be good practice to apply superphosphate

for wheat and a mixed fertilizer, such as 3-12-12, for corn even though rock phosphate has been used. The role and importance of phosphate are explained in Illinois Bulletin 484, "The Problem of Phosphate Fertilizers."[1]

Protection against erosion. Suggestions for controlling erosion are made on pages 15 to 48 in the paragraphs on *use and management* whenever a type needs such protection.

Even on moderately sloping land, the long-time effects of soil erosion must be given serious consideration. This is particularly true in those portions of Livingston county that are underlain by slowly permeable glacial till. In those regions a thin blanket of silty material overlies the till. The retention of this blanket of good soil-forming material is highly important. Its complete removal by erosion permanently destroys the producing capacity of the soils in the Clarence and the Swygert areas and seriously reduces the producing capacity of the soils in the Saybrook and Elliott areas.

On types with gentle slopes the right rotations properly handled will cut erosion to a minimum unless so much soil has already been lost that a vigorous vegetative growth cannot be secured. Full use should be made of grass waterways, winter cover crops, contour cultivation, and other erosion-control practices. There are some areas that should be kept in permanent pasture or used for meadow. Badly eroded areas in the heavy till regions have not yet been successfully used for timber.

Detailed directions for controlling erosion will be found in Farmers' Bulletin 1795, "Conserving Corn Belt Soils," published by the U. S. Department of Agriculture, Washington, D. C., and in Illinois Circular 513, "Save the Soil with Contour Farming and Terracing."

Good tillage practices. Soils that are to produce maximum crop yields must be kept in good physical condition. This is hard to do on any soil that is cultivated frequently — it is especially hard to do on many soils in Livingston county.

Four extensive soil types (Nos. 152, 230, 232, and 235), totaling more than half the area of Livingston county, have heavy-textured surfaces which are sticky when wet. If plowed when too moist, these soils dry hard and cloddy and may also develop a compacted layer, or "plow-sole." Because they tend to dry more slowly than associated silt-loam and sandy-loam soils, and they occur mostly in nearly level areas, these soils are best suited to fall plowing. When fall-plowed, they tend to granulate during the winter, and so they dry more rapidly in the spring and are less cloddy and more easily tilled.

Three other extensive soil types (Nos. 91, 146, and 147) may be seriously injured by erosion resulting from improper tillage. Erosion is especially destructive on these soils because it brings the unfavorable glacial till nearer to the surface. These soils should therefore be plowed on the contour and only in the spring. This precaution is especially necessary in areas with slopes of more than 2 or 3 percent. This practice may delay planting somewhat in the spring, but the choice seems to be either this or eventual complete destruction of these soils.

Illinois Circular 604, "Shall We Fall-Plow or Spring-Plow in Northeastern Illinois," discusses this problem at greater length.

[1] All Illinois publications listed in this report are available at the date of the issuance of this report. When they go out of print, they are likely to be replaced by others of a similar nature. The newer publications will then be sent.

Table 3. — LIVINGSTON COUNTY SOILS: Areas of the Different Types

Type No.	Type name	Area in square miles	Area in acres	Percent of total area
23	Blount silt loam	3.98	2 550	.38
24	Miami silt loam	.25	160	.02
25	Hennepin gravelly loam, eroded	3.46	2 210	.34
36	Tama silt loam	.48	310	.05
40	Dodgeville silt loam	1.07	680	.10
41	Muscatine silt loam	13.75	8 800	1.33
45	Denny silt loam	.02	10	Trace
59	Lisbon silt loam	12.25	7 840	1.18
60	LaRose silt loam	.32	210	.03
67	Harpster clay loam	2.25	1 440	.22
68	Sable silty clay	15.23	9 750	1.47
73	Huntsville loam, bottom	15.13	9 680	1.46
80	Alexis silt loam, terrace	.73	470	.07
81	Littleton silt loam, terrace	.61	390	.06
91	Elliott silt loam, plastic till phase	102.78	65 780	9.95
103	Muck	.74	470	.07
134	Camden silt loam, terrace	.34	220	.03
144	Alvin sandy loam	.09	60	.01
145	Saybrook silt loam	31.57	20 200	3.05
146	Elliott silt loam	121.78	77 940	11.79
147	Clarence silt loam	36.88	23 600	3.57
148	Proctor silt loam	13.27	8 490	1.28
149	Brenton silt loam	36.20	23 170	3.50
150	Onarga sandy loam	.68	440	.07
152	Drummer clay loam	165.49	105 910	16.02
154	Flanagan silt loam	11.01	7 050	1.06
156	Ridgeville sandy loam	2.65	1 700	.26
157	Rankin sandy loam	.84	540	.08
158	Vance silt loam	12.99	8 310	1.26
159	Pilot silt loam	.29	190	.03
206	Thorp silt loam	2.35	1 500	.23
223	Varna silt loam	8.17	5 230	.79
228	Eylar silt loam	1.71	1 090	.17
229	Monee silt loam	.69	440	.07
230	Clarence clay loam to silty clay loam	17.23	11 030	1.67
231	Clarence silt loam, rolling phase	.94	600	.10
232	Elliott clay loam to silty clay loam	212.38	135 920	20.56
235	Elliott clay loam to silty clay loam, plastic till phase	179.05	114 590	17.33
238	Drummer clay	2.26	1 450	.22
M.D.	Mine dump	.08	50	.01
G.P.	Gravel pit	.12	80	.01
C.W.	Clay Works	.10	60	.01
S.M.	Surface mines and quarries	.17	110	.02
	River and ponds	.73	470	.07
	Total	1 033.11	661 190	100.00

Table 4. — LIVINGSTON COUNTY SOILS: Summary of Characteristics and Properties

Type No.	Type name	See page[a]	Topography[b]	Permeability of subsoil[c]	Organic matter	Tendency to erode[d]	Resistance to drouth
23	Blount silt loam	15	Very gently to moderately sloping	Slow	Low	Moderate to great	Fair to poor
24	Miami silt loam	16	Gently to moderately sloping	Moderate	Low	Moderate	Fair
25	Hennepin gravelly loam, eroded	17	Strongly sloping to steep	Moderate	Low	Very great	Poor
36	Tama silt loam	18	Moderately sloping	Moderate	Medium high	Moderate	Good
40	Dodgeville silt loam	18	Nearly level to moderately sloping	Moderate	Medium to high	Variable	Variable
41	Muscatine silt loam	19	Very gently to gently sloping	Moderate	High	Slight	Very good
45	Denny silt loam	22	Nearly level	Slow	Medium	None	Fair
59	Lisbon silt loam	23	Very gently sloping	Moderate	High	Slight	Very good
60	LaRose silt loam	23	Strongly sloping	Moderate	Medium	Great	Fair
67	Harpster clay loam	24	Nearly level	Moderate	High	None	Good
68	Sable silty clay	25	Nearly level	Moderate	High	None	Very good
73	Huntsville loam, bottom	26	Nearly level	Moderate	High	Variable	Good
80	Alexis silt loam, terrace	26	Gently to moderately sloping	Moderate	Medium	Moderate	Good to fair
81	Littleton silt loam, terrace	27	Very gently sloping	Moderate	High	Slight	Good
91	Elliott silt loam, plastic till phase	27	Gently to moderately sloping	Very slow	Medium	Moderate to great	Fair
103	Muck	29	Depressional to sloping	.....	Very high	None	Fair
134	Camden silt loam, terrace	29	Gently to moderately sloping	Moderate	Low	Moderate	Fair
144	Alvin sandy loam	30	Gently sloping	Moderately rapid	Low	Moderate	Poor
145	Saybrook silt loam	30	Gently to moderately sloping	Moderate	Medium high	Slight to moderate	Good
146	Elliott silt loam	31	Gently to moderately sloping	Slow	Medium	Moderate to great	Good to fair
147	Clarence silt loam	34	Very gently to moderately sloping	Very slow	Medium	Great	Poor
148	Proctor silt loam	36	Very gently to moderately sloping	Moderate to moderately rapid	Medium	Slight to moderate	Fair
149	Brenton silt loam	37	Nearly level to very gently sloping	Moderate	High	Slight	Very good
150	Onarga sandy loam	37	Gently to moderately sloping	Moderately rapid	Medium low	Slight to moderate	Fair
152	Drummer clay loam	37	Nearly level	Moderate	High	None	Very good
154	Flanagan silt loam	38	Very gently to gently sloping	Moderate	High	Slight	Very good
156	Ridgeville sandy loam	39	Nearly level to very gently sloping	Moderately rapid	Medium	Slight	Fair to good
157	Rankin sandy loam	39	Gently to moderately sloping	Moderately rapid	Medium low	Moderate	Poor to fair
158	Vance silt loam	40	Very gently to moderately sloping	Moderate	Low	Slight to moderate	Fair
159	Pilot silt loam	40	Gently to moderately sloping	Moderately rapid	Medium	Slight to moderate	Poor
206	Thorp silt loam	41	Nearly level	Slow	Medium	None	Fair
223	Varna silt loam	41	Strongly sloping	Slow	Medium	Great	Poor
228	Eylar silt loam	42	Nearly level to strongly sloping	Very slow	Low	Moderate to great	Poor
229	Monee silt loam	43	Nearly level	Very slow	Medium low	None	Poor
230	Clarence clay loam to silty clay loam	44	Nearly level	Very slow	High	None	Fair
231	Clarence silt loam, rolling phase	45	Moderately to strongly sloping	Very slow	Low to medium	Very great	Poor
232	Elliott clay loam to silty clay loam	46	Nearly level	Slow	High	None	Fair
235	Elliott clay loam to silty clay loam, plastic till phase	46	Nearly level to gently sloping	Very slow	High	None to slight	Fair
238	Drummer clay	48	Depressional	Slow	High	None	Fair

[a] For description of soil type turn to page indicated.
[b] Topography is expressed by the following terms based upon the respective slopes: *depressional*, sloping inward; *nearly level*, less than 0.5 percent slope; *very gently sloping*, 0.5 to 1.5 percent; *gently sloping*, 1.5 to 3.5 percent; *moderately sloping*, 3.5 to 7 percent; *strongly sloping*, 7 to 15 percent; *steep*, greater than 15 percent.
[c] Of the terms used to express permeability, *moderate* indicates the most desirable condition.
[d] Tendency to erode is the susceptibility of the soil type to erosion when cultivated.

SUMMARY OF CHARACTERISTICS OF LIVINGSTON COUNTY SOILS

A summary of the agriculturally more significant characteristics of the soil types shown on the soil map is given in Table 4. The information in this table is necessarily general and should not be taken to mean that every farm or field of a given soil type exhibits exactly the same characteristics as here indicated: As already pointed out, productivity varies within areas of the same type because of differences in past management. These differences cannot always be detected by the soil surveyor but they are known to the farmer operating the land. By supplementing the *use and management* suggestions with his special knowledge, an operator should be able to plan a good soil and crop-management program for each of the soils on his farm.

The column in Table 4 headed "Tendency to erode" does not indicate the harmfulness of erosion on the various soils. Soils with good parent materials which are deep, such as Muscatine, are less injured by erosion than are soils with poor parent materials near the surface, such as Clarence. Muscatine is injured by erosion, but the removal of the surface horizon does not destroy it. The removal of the surface soil from Clarence and the other slowly permeable till soils seriously and permanently reduces their agricultural value.

SOIL TYPES OF LIVINGSTON COUNTY, THEIR USE AND MANAGEMENT

Blount silt loam (23)

Blount silt loam is a light-colored soil found in Livingston county along the Vermilion river and its tributaries. Here it is a rather unimportant type, occupying a total area of only 4 square miles. It developed on gentle to moderate slopes which were once covered by mixed hardwood forests and from a thin layer of loess, a wind-blown silt, deposited over compact calcareous (limey) glacial till. This is the same kind of parent material as that from which Elliott silt loam also developed.

Soil profile. In cultivated fields the plow layer of Blount is a yellowish-gray silt loam. It is low in organic matter and nitrogen and is medium acid. This layer tends to pack and crust easily during rains. In undisturbed forest areas the upper 2 or 3 inches of soil is dark brownish gray because of the accumulation of leafmold. The subsurface is a grayish-yellow silt loam. The subsoil, which starts at a depth of 14 to 16 inches, is a yellowish-brown compact and medium-plastic silty clay loam. Just beneath the subsoil there usually lies a compact limey glacial till. Sometimes the upper few inches of this till contains no lime.

Often erosion has exposed the subsoil. In a few severely eroded spots even the subsoil has been worn away, exposing the compact till lying under it.

Use and management. Blount silt loam is not a highly productive soil. A few fairly good grain crops may be produced when the forest cover is first removed, but crop yields decline rapidly unless plenty of organic matter is provided by growing legumes and turning them under.

As the subsoil and underlying glacial till are compact and moderately plastic, underdrainage is slow. Tile are not effective, and the soil tends to be wet until somewhat late in the spring. Because moisture moves slowly into this soil, surface runoff is rapid and the steeper slopes are subject to severe erosion. For this reason plowing should not be done in the fall, particularly on areas that slope more than 2 percent.

Every effort should be made to prevent erosion since the productive capacity of Blount silt loam is seriously and permanently reduced if the surface and subsurface layers are removed. The use of cover crops, contour tillage wherever practicable, and the maintenance of grass waterways, together with soil treatment to improve the vegetation, are recommended practices.

A well-planned soil-improvement and maintenance program for this soil requires regular additions of fresh organic matter. A crop rotation should be adopted in which a legume is grown and plowed under as green manure every three years, even though a considerable amount of animal manure is available. As suggested in Illinois Circular 559, sweet clover is perhaps the best legume for this purpose. Before trying to grow sweet clover, however, the soil should be tested for acidity and limestone applied as needed. Tests for available phosphorus and potash should also be made, since soils that are short in these nutrients cannot support vigorous vegetation.

This soil makes reasonably good permanent pasture. Limestone and a phosphate fertilizer should be applied, however, in order to secure a better growth of pasture grasses. Overgrazing should be avoided, especially on the steeper slopes. Some of the steeper slopes that are eroded should be returned to timber.

Miami silt loam (24)

Miami silt loam is a light-colored soil. It is derived from a thin layer of loess, a wind-blown silt, on calcareous (limey) glacial till which water penetrates freely. It has developed on gently sloping to moderately sloping land under hardwood forest vegetation. Miami is not an important soil in Livingston county, occupying a total area of only about a quarter of a square mile.

Soil profile. In cultivated fields the surface layer of this soil is a yellowish-gray silt loam, low in organic matter and nitrogen, and medium acid. In undisturbed forest areas, the upper 2- or 3-inch layer is a dark brownish gray due to an accumulation of leafmold. In some severely eroded spots the surface horizon is entirely gone. The subsurface is a grayish-yellow to brownish-yellow silt loam. The subsoil, which begins at a depth of 12 to 16 inches, is a mixed grayish - yellow and brownish - yellow medium-plastic silty clay loam.

A few pebbles are sometimes scattered throughout the profile, and occasionally some layers are somewhat sandy. Calcareous till, permeable to water, lies below a depth of 30 to 35 inches. This till is sometimes capped by a few inches of pebbly till from which the lime has leached. The glacial till underlying Miami is similar to that underlying Saybrook silt loam, which is discussed on pages 30 and 31.

Use and management. The subsoil and underlying glacial till of Miami silt loam are more permeable to water than corresponding layers of Blount silt loam. Its underdrainage is therefore better, and

tile draw satisfactorily. Also, the eroded areas of Miami are more productive than similarly eroded areas of Blount. With proper management, moderate yields of crops may be expected.

Either rock phosphate or superphosphate will return good crop increases on this soil, according to results from the Antioch experiment field in Lake county, which is located on Miami silt loam. Of these two phosphates, superphosphate has returned more for each dollar invested than has rock phosphate. The returns for potash used in rather large amounts are less favorable. When used with superphosphate, potash has given a very small profit; with rock phosphate it has shown a loss.

Miami silt loam is a very good soil for permanent pasture, and much of it is used for this purpose. A mixture of legumes and grasses will usually produce more feed than grasses alone; but to assure a satisfactory growth of such a mixture, tests should be made for acidity and available phosphorus, and limestone and a phosphate fertilizer applied as needed.

Hennepin gravelly loam, eroded (25)

Hennepin gravelly loam in Livingston county occurs chiefly northwest of Pontiac, bordering the bottomlands along Vermilion river and its tributaries. It varies in slope, degree of erosion, and character of the glacial till from which it was formed. Most of this type occurs on areas that slope more than 15 percent. A few badly eroded areas with slopes of less than 15 percent are, however, included. The glacial till from which this type was formed includes all the kinds discussed on page 50.

Soil profile. In some of the uncleared forest areas where erosion has not been active, this type has a thin soil profile. This profile generally includes a top layer of dark, decaying leafmold 1 or 2 inches thick, then 4 to 6 inches of yellowish-brown silt loam, and then 6 to 10 inches of grayish silty clay or yellowish pebbly clay loam. Where the glacial till is plastic and very slowly permeable to water, the soil horizons are thin and gray; where the till is pebbly and moderately permeable, they are thicker and more yellowish in color.

In the prairie areas where Hennepin gravelly loam occurs in association with Varna silt loam and Clarence silt loam, rolling phase, erosion has left little of the original layers of soil. In such areas the gray plastic subsoil and the calcareous (limey) till are usually exposed.

Use and management. Hennepin gravelly loam should not be cultivated. Many slopes are too steep for the use of ordinary farm machinery and if plowed are quickly damaged by erosion. Eroded areas where the tough plastic subsoil or glacial till is exposed are very hard to plow and are not productive.

Hennepin areas should be kept in permanent grass or trees. Areas with slopes of 15 to 30 percent will often produce fair grass and clovers, though a satisfactory stand is hard to establish and maintain. Areas sloping more than 30 percent should be kept in timber.

On cleared areas that have been severely injured by erosion, the important problem is to get a suitable cover of vegetation started as rapidly as possible. One of the best trees for this purpose is black locust. Other possibilities are jack pine and Virginia pine. On areas to be used for pasture a grass-legume mixture should be seeded. If the heavy till is exposed, it is not now known what trees or grasses, if any, will

be able to take hold without the aid of expensive treatment and care. Illinois Circular 567, "Forest Planting on Illinois Farms," gives additional information about reforestation.

Tama silt loam (36)

Tama silt loam is a moderately dark soil found in the northwestern part of Livingston county on slopes ranging in steepness from 3½ to 7 percent. It has developed under prairie vegetation from silty wind-borne material 5 to 7 feet thick.

Soil profile. The surface is a brown silt loam 5 to 7 inches thick, medium high in organic matter and nitrogen, and medium acid. The subsurface is a light-brown to yellowish-brown silt loam. The subsoil, which begins at a depth of 12 to 15 inches, is a yellowish-brown silty clay loam moderately permeable to water. Below about 30 or 32 inches the material is a brownish-yellow friable silt loam.

Use and management. Although Tama silt loam absorbs water readily, there often is enough runoff to cause harmful erosion on unprotected slopes. A well-planned cropping system, including the use of cover crops, is very effective in reducing erosion if a vigorous growth of cover is obtained. This soil is well adapted to terracing, but terraces and terrace outlets must be properly built and kept up if they are not to do more harm than good. By concentrating the runoff water they can do heavy damage unless proper care is taken in their construction and maintenance.

This type should not be plowed in the fall because plowing at this time may result in serious erosion in winter and early spring. The soil dries rapidly, however, and is one of the first to be ready for spring plowing.

Although Tama is not an outstanding corn soil, in the sense that some of the darker and heavier soils such as Sable and Drummer are, yet it will produce very good crops of corn if well farmed. A rotation should be adopted that includes corn only once in four years. In a grain system a leguminous green-manure crop should be included in the rotation. Soybeans should not be grown unless the field is farmed on the contour or terraces are used. Rolling the cornstalks down at a right angle to the slope helps to retard erosion.

Limestone is usually necessary in order to get good stands of sweet clover and alfalfa, and some phosphate or potash may be needed for best crop yields. The extent to which these materials are needed should be determined by tests. If a good rotation is used, rock phosphate should return a small profit in a grain system of farming, according to limited data from the Mt. Morris experiment field in Ogle county. But if manure is available and is applied, rock phosphate probably will not increase yields enough to pay for its cost. Potash causes only a small increase in yield, according to the Mt. Morris tests. There are no experiments that show what response, if any, could be expected from superphosphate.

Dodgeville silt loam (40)

As mapped in Livingston county, Dodgeville silt loam is not a single type but a complex of types. The one feature that is common to all areas is the pres-

ence of limestone bedrock less than 4 feet beneath the surface. On top of the limestone are loess (a wind-blown silt) and glacial till or glacial outwash, the sediment deposited by glacial waters. Most of the areas where this type is found are gently sloping.

Soil profile. The following description applies to about 75 percent of Dodgeville as mapped in Livingston county.

The surface soil is a brown silt loam medium in organic matter and medium acid. The subsurface is a yellowish-brown silt loam. The subsoil, which begins at a depth of 14 to 16 inches, is moderately plastic silty clay loam, yellowish gray in color, with gray spots and streaks. Some sandy or pebbly material usually occurs in the lower part of the subsoil. Beneath the subsoil there is silty, sandy, or pebbly material resting on the bedrock at 3 to 4 feet.

The most important variations in this soil type are depth to bedrock, texture of the surface, and alkaline spots. In places the bedrock is only 2 feet or less beneath the surface, and the texture varies from sandy loam to clay loam. A few spots of sandy loam and also a few spots of clay loam occur about a mile northwest of Pontiac. About two miles southeast of Pontiac there are a few areas of clay loam similar to Drummer and a few which are alkaline and identical in the surface layer to Harpster. These and other variations are not shown on the map because the areas are so small.

Use and management. What may be best to do with a field of Dodgeville silt loam depends on three conditions: (**1**) The depth to bedrock — this is most important, for if the distance is less than 30 inches, a drouthy condition is likely to result. On such areas only early maturing crops should be grown or the land should be used for hay and pasture. (**2**) The presence of small alkaline spots that need a high potash fertilizer. (**3**) Need for erosion control on areas having a slope of more than about 2 percent.

With good farming this soil should produce well except where the bedrock is near the surface. Good farming includes the use of limestone and fertilizers in amounts indicated by soil tests, and the growing of legumes to supply fresh organic matter.

Muscatine silt loam (41)

Muscatine silt loam is an important but not an extensive soil type in Livingston county. It occupies a total of 8,800 acres and occurs only in the northwest corner of the county. It is a dark soil that has developed on slopes ranging in steepness from ½ to 3½ percent. It has formed under prairie vegetation from loess, a wind-blown silt, more than 5 feet thick (see Fig. 2).

Soil profile. The surface soil is a brown to dark-brown heavy silt loam 7 to 10 inches thick. It is high in organic matter and nitrogen and slightly acid. (Under a system of poor farming the organic matter and nitrogen are rapidly depleted and the acidity increased.) The subsurface is a brown to dull yellowish-brown heavy silt loam. The subsoil, which begins at a depth of 14 to 18 inches, is a mixed yellowish-brown, grayish-brown, and gray, moderately plastic silty clay loam. Below 35 to 40 inches the material is a mixed gray and yellow friable silt loam that is usually calcareous (limey).

Use and management. Muscatine silt loam is a productive soil. Control of erosion is a minor problem because the slopes are gentle, the whole profile is readily permeable to water, and plants

grow well. Roots can penetrate deep into the soil, which also holds water well. These two conditions help in making this a productive soil and probably in limiting its response to fertilizers. It is important to keep all layers permeable to water by growing deep-rooting legumes regularly; otherwise a compact layer gradually develops beneath the surface soil. Such a layer would interfere with underdrainage and root penetration. The practice of growing deep-rooting legumes also provides a supply of fresh organic matter and nitrogen.

Soil tests should be made, and if the soil is found to be acid, enough limestone should be added to correct the acidity. Further evidence from field experiments is needed to show how this soil responds to phosphate and potash fertilizers. The Kewanee and Dixon experiment fields, in Henry and Lee counties, on soil similar to the Muscatine in Livingston county, give some such information. Rock phosphate has been used on both of these fields in both the residues[1] and manure systems, and potash has been used in the residues system.

Results from rock phosphate. On the Kewanee field a total of 8,400 pounds of rock phosphate to the acre was applied to the phosphate plots in Series 200, 300, and 400, and 8,000 pounds on Series 100 during the 31 years from 1916 through 1946. The last application was made in the fall of 1933. On the Dixon field, a total of 8,000 pounds an acre was applied to the phosphate plots in all series, the last application having been made in 1924.

[1] In the residues system the residues of the crops produced on the land, with the exception of oat and wheat straw, plus sweet clover seeded in the wheat and plowed in the spring for corn, are returned to the land. In the manure system animal manure is applied to the manure plots for corn in amounts equal to the weight of the crops produced in the previous rotation.

Table 5 shows certain results from these fields. At Kewanee there has been an average net return for rock phosphate of $1.88 an acre a year in the residues system and an average net loss of 45 cents an acre a year in the manure system. At Dixon there has been a net return of 70 cents an acre a year in the residues system and a net loss of 51 cents an acre a year in the manure system.

It is not known whether lighter applications of rock phosphate will result in crop increases similar to those gained with the heavier applications, and therefore return greater profits than are indicated in Table 5. Information is also lacking on what yield response and profit superphosphate would give. Experiments have been started which may give this information.

From the Kewanee and Dixon fields we can draw three conclusions concerning the value of rock phosphate on Muscatine:

1. In a grain system of farming, if a good rotation is followed, rock phosphate, even if used in the amounts applied on these two fields, will return a moderate profit.

2. In a manure system wheat is the only crop likely to show a consistent increase for rock phosphate. Crop increases for the whole rotation on both of the fields were so small that the use of rock phosphate did not prove profitable.

3. Since wheat is responsive to phosphate and requires a higher level of readily available phosphorus than other crops, it often needs special phosphate fertilization.

Results from potash. Table 6 shows the results that have been secured with potash on the Kewanee and Dixon fields. Rather heavy applications of potash

Table 5. — LIVINGSTON COUNTY SOILS: Rock Phosphate Experiments on the Kewanee and Dixon Experiment Fields

(Located mainly on Muscatine silt loam)

Series No.	Average annual yields per acre								Value of increases[a] for rock phosphate	
	CORN		OATS		CLOVER		WHEAT		Net acre returns, entire period, without interest[b]	Net annual acre returns with interest[c]
	R or M LrP	Increase for rP	R or M LrP	Increase for rP	R or M LrP	Increase for rP	R or M LrP	Increase for rP		
KEWANEE FIELD 1916-1946										
Residues system	*bu.*	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100	79.4	4.6	66.5	4.9	1.52	.22	42.3	3.8	$55.00	$3.18
200	72.0	−.4	52.9	1.5	1.89	.30	33.9	4.2	−3.86	−.20
300	60.6	4.6	61.9	8.1	1.73	.47	34.6	6.2	91.52	5.45
400	79.1	1.1	63.5	4.0	1.93	−.08	34.5	4.1	8.90	−.91
Average[d]	71.7	2.5**	61.2	4.6**	1.77	.23**	36.3	4.6**	.....	1.88
Manure system										
100	86.8	.7	72.5	1.0	2.68	−.03	39.7	3.0	−27.38	−2.22
200	76.9	1.6	68.2	−3.8	2.23	.13	34.8	3.1	−17.97	−2.86
300	85.1	1.4	59.5	3.0	2.55	.34	37.8	6.5	64.64	2.93
400	82.8	1.1	68.6	1.2	2.63	.18	35.4	3.8	21.59	.36
Average[d]	82.9	1.2*	67.2	.4	2.52	.16*	36.9	4.1**	.....	−.45
DIXON FIELD 1912-1947										
Residues system	*bu.*	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100	70.1	−.1	74.7	2.5	1.54	.23	37.3	3.1	$23.63	$ .59
200	67.9	5.0	69.4	4.9	1.85	.31	30.6	3.5	81.85	3.78
300	65.2	.9	57.4	.1	.86	.08	37.4	4.0	22.84	.36
400	71.3	−1.8	53.0	.6	1.18	.12	33.4	2.1	−3.52	−1.92
Average[d]	68.6	1.0	63.6	2.0*	1.36	.18**	34.7	3.2**	.....	.70
Manure system[e]										
100	76.5	.1	77.9	2.9	1.81	.04	37.9	1.1	−18.27	−.86
200	71.4	2.1	74.2	3.0	2.41	−.01	30.8	2.5	14.28	1.09
400	82.1	.8	59.8	−.8	1.97	.13	35.9	.7	−16.93	−1.78
Average[d]	76.7	1.0	70.6	1.7	2.06	.05	34.9	1.4**	.....	−.51

KEY TO SOIL-TREATMENT SYMBOLS: R = residues, M = manure, L = limestone, rP = rock phosphate.

[a] Crop prices are from Illinois Cooperative Crop Reporting Service; rock phosphate is included at cost.

[b] Returns from yield increases less cost of rock phosphate.

[c] Returns from yield increases less cost of rock phosphate plus or minus interest at 4 percent earned or paid out on capital invested in rock phosphate.

[d] Tests of significance were applied only to *average* crop-yield increases. * Odds are more than 19 to 1 that the increase is not due to chance. ** Odds are more than 99 to 1 that the increase is not due to chance.

[e] Series 300 omitted because of soil variability.

fertilizer have been made on both fields. On the Kewanee field 3,200 pounds of kainit to the acre was applied prior to 1931 on Series 100 and 400 and 3,400 pounds on Series 200 and 300. Muriate of potash has been used instead of kainit since 1931, a total of 1,300 pounds an acre on all series to and including 1946. At Dixon 4,000 pounds of kainit was applied prior to 1931 on Series 100 and 400 and 4,400 pounds on Series 200 and 300. Muriate of potash has been used since 1931, a total of 1,000 pounds an acre on all series to and including 1947.

On the Kewanee field the effect of potash has been so small on all crops that there is little chance that even lighter applications would have paid for their cost, assuming that the response would have been similar.

The consistently favorable response of corn to potash on the Dixon field suggests that the use of potash for corn is profitable. Wheat and clover also respond to potash, but the yield increases are small and would pay for only a little potash.

The best suggestion that can be made at this time regarding the potash fertilization of Muscatine is to test for potash and, if there is not enough in the soil, to apply the amount indicated by the test.

Table 6. — LIVINGSTON COUNTY SOILS: Potash Experiments on the Kewanee and Dixon Experiment Fields

(Located mainly on Muscatine silt loam)

Residues system, Series No.	Average annual yields per acre								Value of increases for potash[a]	
	CORN		OATS		CLOVER		WHEAT		Net returns, entire period, without interest[b]	Net annual acre returns with interest[c]
	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K		
KEWANEE FIELD 1916-1946										
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100	78.8	1.0	66.0	−.8	1.52	0	42.3	.1	$−64.62	$−3.70
200	71.7	.2	53.0	.1	1.96	.07	34.2	.8	−50.96	−1.65
300	75.4	2.3	61.9	0	1.79	.06	34.8	−.4	−72.04	−3.27
400	77.8	−.6	60.7	−1.9	1.50	.05	34.7	.3	−72.51	−3.41
Average[d]	75.9	.7	60.4	.6	1.69	.05	36.5	.2	−65.03	−3.01
DIXON FIELD 1912-1947										
100	76.7	6.6	71.5	−2.8	1.69	.15	37.1	−.2	−13.85	−2.42
200	73.1	5.5	69.2	−.2	2.09	0	32.5	1.9	−9.15	−1.21
300	72.1	5.8	60.8	3.8	1.65	.27	38.1	.7	15.75	.07
400	78.0	6.7	51.1	−1.9	1.69	.11	35.9	2.5	11.00	.32
Average[d]	74.9	6.1**	63.1	−.3	1.78	.13**	35.9	1.2**	.94	−.81

KEY TO SOIL-TREATMENT SYMBOLS: R = residues, L = limestone, rP = rock phosphate, K = potassium.

[a] Crop prices are from Illinois Cooperative Crop Reporting Service; potash is included at cost.

[b] Returns from yield increases less cost of potash.

[c] Returns from yield increases less cost of potash plus or minus interest at 4 percent earned or paid out on the capital invested in potash.

[d] Tests of significance were applied only to *average* crop yield increases.

** Odds are more than 99 to 1 that the yield increase is not due to chance.

Denny silt loam (45)

Denny silt loam is a medium-dark soil found in some of the small depressions in association with Muscatine silt loam. It occupies a total of only about 15 acres as mapped in Livingston county. Some areas — those that are less than half an acre in size — could not be shown on the soil map.

Soil profile. The surface layer is a grayish-brown silt loam 7 to 9 inches thick, medium in organic matter and nitrogen, and medium to strongly acid. The subsurface is a gray to dark-gray silt loam. The subsoil, which begins at a depth of 16 or 18 inches, is a mottled gray to dull yellowish-gray plastic silty clay. Beneath the subsoil the material is a mixed gray and yellow silt loam similar to that under Muscatine except that free carbonates (lime) are much deeper in Denny silt loam.

Use and management. Denny silt loam is poorly drained, acid, and relatively low in nitrogen and available phosphorus. The impervious nature of the subsoil limits the effectiveness of tile, hence the response to treatment is often disappointing. Surface drainage is advisable but is sometimes difficult to establish because of the low-lying position of many Denny spots. If tile are used, open inlets may be necessary in order to correct the "wet-spot" condition that often prevails. If the amount of limestone, manure, and other fertilizers applied to Muscatine is doubled on the Denny spots, and good drainage is established, crop yields should be satisfactory.

Lisbon silt loam (59)

Lisbon silt loam is a dark soil formed from thin loess or silty wash on permeable calcareous glacial till. It developed under a heavy tall-grass prairie vegetation on very gently sloping land. It is intermediate between Saybrook silt loam and Drummer clay loam and as mapped it includes a small amount of each of these types. Also the separation between Lisbon and Brenton silt loam is not always distinct, especially in the region around Fairbury.

Soil profile. The surface of this type is a brown to dark-brown heavy silt loam 7 to 10 inches thick. It is high in organic matter and nitrogen and slightly acid. The subsurface is a brown to dark grayish-brown silt loam. The subsoil, which begins at a depth of 15 or 16 inches, is a mottled yellowish-brown to brownish-gray medium-plastic silty clay loam. A few inches of silty or sandy material often lies immediately beneath the subsoil; and calcareous glacial till, permeable to water, generally occurs at a depth of 35 or 40 inches.

Use and management. Lisbon silt loam is a productive soil, easy to cultivate and not subject to erosion except where water from adjacent higher land flows across it. Surface drainage is fairly good on most areas, and tile draw well. This soil, like all soils that are somewhat heavy, tends to form a compacted layer, or plow sole, just beneath the surface soil unless deep-rooting legumes are grown. Such a layer will retard underdrainage and discourage root penetration.

Although Lisbon is a rich soil, intensive farming will reduce its content of plant nutrients. Tests should therefore be made to determine whether a field has become acid and whether it contains enough available phosphate and potash. It is believed that crops will respond to rock phosphate where tests show the soil to be low in phosphate, though no experiment-field tests have been made on this type. The response will probably be less than on Elliott silt loam (see pages 31 to 34) but somewhat better than on Muscatine silt loam (see pages 19 to 22). Where wheat is grown, it probably will be worth while to apply superphosphate. If both phosphate and potash are low, a fertilizer such as 3-12-12, applied for corn, is suggested, or rock phosphate may be applied for the legume and potash for the corn crop.

LaRose silt loam (60)

LaRose silt loam is a medium-dark soil developed under prairie vegetation from thin loess, a wind-blown silt, on calcareous (limey) till, through which water penetrates readily. It is found on strongly rolling land where the slopes range in steepness from 6 to 15 percent. It occurs in association with Saybrook silt loam except for one area 1¾ miles south of Blackstone.

Soil profile. The surface of this type is a brown to light-brown silt loam, medium in organic matter, and medium acid. It averages about 5 to 6 inches thick except where erosion has recently been active. The subsurface is a yellowish-brown silt loam. The subsoil, which usually begins at a depth of 12 to 15 inches, is a yellowish-brown and slightly plastic silty clay loam. A few pebbles are commonly scattered over the surface and throughout the profile, increasing in abundance with

depth. Beneath the subsoil is calcareous glacial till that is permeable to water.

Use and management. Surface runoff is rapid on LaRose because of the steepness of the slopes, and control of erosion is a major problem. The removal of the overlying silty material by erosion does not completely destroy this soil but it permanently and very noticeably lowers its value. Areas which have lost most or all of their silty cover should be left in permanent pasture and meadow and treated in such a way as to maintain vigorous vegetation. Areas that still have enough silty cover to produce fairly good cultivated crops should be so handled that soil losses will be kept to a minimum. It is impossible, however, to prevent all erosion, particularly when clean-cultivated crops are grown. Contour tillage, grass waterways, and often terraces, help and should be used wherever needed. Soil tests should also be made, and any shortages of plant food corrected. Such correction is necessary in order to obtain vigorous growth of hay and pasture or moderate yields of cultivated crops.

Harpster clay loam (67)

Harpster clay loam is a dark, heavy-textured soil which occurs in association with a number of other types, mainly Sable silty clay and Drummer clay loam. It is generally formed from either wind-blown or water-deposited sediment or both. These materials may in some places be rather thin, and glacial till may occur within 40 inches of the surface. The large accumulation of organic matter in Harpster is due to the heavy growth of coarse marsh grass that once covered it. Its alkaline condition is due to the great accumulation of disinte-

In growing corn on Harpster clay loam a potash fertilizer is necessary. Small grains are not adapted to this soil because of lodging in seasons favorable to a heavy growth of straw. Note the cloddy condition of the soil in the foreground. **Fig. 4**

grated shells of fresh-water snails that lived on these grasses. This alkaline condition is the outstanding feature of this soil.

Soil profile. The surface of this type is a black to grayish-black clay loam or silty clay loam varying from 5 to 12 inches in thickness. It is high in organic matter and is alkaline. Its grayish cast is due partly to the many shell fragments present. The subsurface and subsoil do not vary much in appearance from that of the clay loam or silty clay loam with which it is associated except that shell fragments and lime concretions are often scattered throughout both these layers as well as in the surface layer.

Use and management. On Harpster clay loam an outlet for surface drainage is usually lacking, and tile have to be used. Tile draw satisfactorily if an outlet with enough fall can be obtained. This soil is not adapted to small grains, as they tend to lodge in seasons which are favorable to a heavy growth of straw. Harpster is a good corn soil if good drainage has been established, but corn usually requires some readily available potash and possibly also phosphate for best results. Potash may be supplied in the form of straw, coarse manure, cobs, muriate of potash, or mixed fertilizers. Any phosphate deficiency should be corrected by superphosphate or a mixed fertilizer — rock phosphate is not effective on this soil.

Sable silty clay (68)

Sable silty clay is a dark soil developed under swampy prairie vegetation from loess, a wind-blown silt, more than 5 feet thick. It is found on nearly level to slightly depressed areas and occurs in northwestern Livingston county in association with Muscatine silt loam.

Soil profile. The surface of this type is very dark brown to black and varies from a silty clay loam to silty clay. It is 8 to 12 inches thick, high in organic matter and nitrogen, and nearly neutral in reaction, being neither acid nor alkaline. The subsurface is a dark grayish-brown to grayish-black silty clay loam. The subsoil is a mottled dark-gray to brownish-gray moderately plastic silty clay loam to silty clay. Below 28 to 30 inches the material is a mixed-gray and brownish-yellow friable silt loam which is usually limey at 36 to 38 inches. This silty material is the same as that underlying Muscatine.

Use and management. Surface drainage, or runoff, is slow on Sable silty clay, but underdrainage is moderate. Tile draw satisfactorily. The only difficulty in tiling is in getting a good outlet. In a few places where the bordering soils are on eroding slopes a small amount of silt has been deposited over this type.

Whenever possible, this soil should be plowed in the fall. This practice improves the tilth, and tillage can then start earlier in the spring. Fall plowing should not, however, be extended to the sloping portions of the associated silt loam soils.

Sable is a very productive soil and when well drained and well farmed may be considered a natural corn soil. Small grains tend to grow rank and may lodge. Limestone is not often needed to secure a good growth of red clover; but because of intensive farming during recent years some limestone may be necessary in order to get a good growth of sweet clover or alfalfa. The soil should be tested for acidity, and limestone applied if needed. Additions, at regular intervals, of fresh organic matter in the form of barnyard

manure, crop residues, and legumes plowed under will keep this soil highly productive for a long time and will also help to preserve good tilth.

Keeping this soil in good tilth is very important as it, like other heavy soils, becomes harder to work and more difficult to underdrain unless well farmed. Deep-rooting legumes should be grown, and the soil plowed only when it is dry enough not to pack badly. Otherwise a compact layer tends to develop beneath the surface, and interferes with underdrainage.

Huntsville loam, bottom (73)

Huntsville loam is a dark soil derived from sediments laid down by streams. It occurs along most of the larger water courses in Livingston county. Along a few of the major streams, the flood plain has no distinct boundary, and flood waters spread over wide stretches of nearly level land. This flood plain is occupied mostly by heavy clay loams so nearly like the upland clay loams that no satisfactory separation could be made in mapping them. This condition is best illustrated along the North Fork of Vermilion river eastward from its junction with the South Fork to the Ford county line, where Drummer clay loam occupies the broad flood plain.

Soil profile. Huntsville shows no development into definite layers, or horizons. The surface varies in thickness as well as in color and texture. It usually is brown to dark brown or black, and it grades from a sandy loam to a silt loam or silty clay loam. It is high in organic matter and nitrogen and is not usually acid. The material beneath the surface is rather variable in color and in texture. No well-defined subsurface or subsoil horizons can be distinguished.

Use and management. Many of the bottoms in this county are narrow and not well suited to cultivation. These should be kept in permanent pasture or timber. Where danger of flooding is not too great, the wider areas may be planted to annual grain crops, such as corn, oats, or soybeans. Wheat may sometimes be grown satisfactorily but the overflow hazard is greater for this crop than for those mentioned above.

No soil treatment is recommended for Huntsville loam.

Alexis silt loam, terrace (80)

Alexis silt loam occurs on the well-drained, moderately dark terrace areas along Vermilion river. It is not an important type in Livingston county, occupying a total area of less than a square mile.

Soil profile. The surface is a light-brown silt loam 4 to 7 inches thick. The subsurface is a yellowish-brown friable silt loam. The subsoil, beginning at a depth of 10 to 15 inches, is a yellowish-brown moderately plastic silty clay loam. Below 40 to 50 inches there usually are layers of silt, sand, and gravel.

Use and management. Many areas of Alexis silt loam are small and narrow and not well adapted to large-scale cropping. These areas, especially where bordered by Hennepin gravelly loam, might well be seeded to permanent grass. Under cultivation they should produce satisfactory yields when properly treated. Treatment similar to that for Tama silt loam (page 18) is suggested.

Littleton silt loam, terrace (81)

Littleton silt loam is a dark soil that has developed under moderate drainage. It occurs in rather small areas along Vermilion river and some of its tributaries.

Soil profile. The surface of this type is a brown to dark-brown silt loam 7 to 10 inches thick. It is moderately high in organic matter and nitrogen and medium to slightly acid. The subsurface is a dark brownish-yellow silt loam. The subsoil, which begins at a depth of 14 to 16 inches, is a yellowish-brown to brownish-gray moderately plastic silty clay loam. Layers of silt and sand occur below 40 inches, with sometimes a layer of gravel below 60 inches.

Use and management. Littleton silt loam is similar in makeup to Muscatine silt loam. Recommendations made for the treatment and management of Muscatine apply also to Littleton (see pages 19 to 21).

Elliott silt loam, plastic till phase (91)[1]

Elliott silt loam, plastic till phase, is a dark soil formed from thin silty loessial (wind-blown) material on compact, plastic, calcareous (limey) glacial till. This soil developed under prairie vegetation on gently sloping to moderately sloping areas. It occupies all told about 100 square miles in Livingston county.

Soil profile. The surface of this type is a brown to dark-brown heavy silt loam. Where not eroded it is 6 to 8 inches thick. It is medium in organic matter and nitrogen and medium to slightly acid. The subsurface is a yellowish-brown heavy silt loam to silty clay loam. The subsoil, which begins at a depth of 12 to 15 inches, is a mottled brownish-gray plastic silty clay loam to silty clay. Heavy plastic calcareous (limey) till lies beneath the subsoil and extends to an unmeasured depth.

Use and management. The surface drainage of this soil type is moderate to rapid, but underdrainage is very slow. During heavy rains this slow underdrainage causes excessive runoff, which may in turn cause severe erosion. Areas where the heavy, plastic subsoil and underlying till are exposed are extremely difficult to cultivate and are unproductive for many crops. It is therefore important to reduce to the minimum the loss of surface soil by erosion. Each field must be studied to determine the best management for it in order to get best results.

Well-planned and well-maintained grass waterways are important measures for controlling erosion. Along with these waterways must, if possible, go contour tillage on all areas that slope more than 1½ to 2 percent. A good way to control erosion in cornfields is to roll down the stalks at right angles to the slope in the fall after harvest. This will hold back the runoff during the fall, winter, and early spring.

The value of terracing is questionable on this soil unless the terrace ridges are inspected following dry periods. Cracks are likely to form across the terrace ridges because the soil material is high in very fine particles which expand when wet and contract when dry. These cracks should be filled with soil material, otherwise they are likely to allow breakthroughs in the ridges during heavy rains.

[1] Subsequent to the preparation of the Livingston county soil map the name Elliott silt loam, plastic till phase, was changed to Swygert silt loam to silty clay loam.

Slow underdrainage on Elliott silt loam, plastic till phase, calls for special measures to retard the flow of excess surface runoff. Grass waterways are important, as also is contour cultivation on land that slopes more than 1½ to 2 feet in a hundred. Fig. 5

Crops should be so managed that a legume sod can be plowed under at least every fourth year. All crop residues should be turned under. If manure is available, it should be carefully preserved and applied where most needed.

Here is a field of Elliott silt loam, plastic till phase, being ruined by up-and-down cultivation and unsodded waterways. Fields like this rapidly lose their productive surface layer of silt loam, cultivation becomes difficult, and many crops cannot be grown. Fig. 6

Thorough soil tests should be made in order to have a good basis for the liming and fertilizing program. This soil type will most likely respond to fertilizers in the same way that Elliott silt loam does. Yields will be somewhat less than on Elliott (see Table 1, page 8), but the response to phosphate and potash should be similar. Joliet field results, page 33, are of interest to one farming this soil.

Muck (103)

Muck is of minor importance in Livingston county. It has developed mainly in poorly drained swampy flats or basinlike depressions where the water level is generally high. In one area about 4 miles northeast of Strawn some Muck is found on a slope. Here water seeping from the hillside keeps the soil permanently wet and in condition to support a rank growth of swamp plants.

Soil profile. There are no definite soil layers in this type. The surface material, which may vary in thickness from a few inches to several feet, is a mixture of organic matter with varying amounts of silt and clay particles. It is brown to black in color, neutral to alkaline in reaction, and commonly is low in available potash. Where the Muck material is less than 2 feet thick, the underlying mixture of clay or silt may be considered the subsoil. This underlying material is often calcareous (limey) and marl-like.

Use and management. On most areas of Muck, surface drainage is slow and some areas have no surface drainage. The soil profile is permeable to water, but underdrainage may be difficult to establish because of poor outlets.

Undrained areas are best used for permanent pasture; if they are well ponded they may be used as refuges for wild game. Drained areas may be used for corn or hay. In some sections of the state vegetables are grown on Muck, several kinds being well adapted to this soil. Small grains, soybeans, and clovers, however, tend to grow very rank and lodge badly. Potash fertilizer should be used on Muck; and some experiments indicate that a fertilizer containing both potash and superphosphate gives good results.

The marl-like silt underlying the Muck may be used for liming, but often its neutralizing value is low and then it does not pay to transport it very far.

Camden silt loam, terrace (134)

Camden silt loam is a light-colored timbered soil that has developed under moderate drainage. It occurs in small areas along Vermilion river and a few of its tributaries.

Soil profile. The surface of this type is a yellowish-gray silt loam 5 to 8 inches thick. It is low in organic matter and medium acid. In undisturbed forest areas the upper 2 or 3 inches is dark brownish gray because of leafmold that has accumulated. This leafmold rapidly disappears under cultivation. The subsurface is a yellowish-brown silt loam. The subsoil, which begins at a depth of 15 to 18 inches, is a yellowish-brown to yellowish-gray medium-plastic silty clay loam. At a depth of 40 to 60 inches the material is stratified silt, sand, and gravel.

Use and management. Some areas of Camden are so small, irregular, and inaccessible that they are not suited to cultivation. If these areas are cleared,

they are good for permanent pasture. This soil is similar to Vance silt loam, and the same suggestions for treatment and management can be used (page 40).

Alvin sandy loam (144)

Alvin sandy loam is a light-colored soil developed on gently rolling to very gently rolling land under hardwood forest vegetation. It is not important in Livingston county, occurring only as small areas in Vermilion river valley.

Soil profile. The surface of this type is brownish-yellow to yellow sandy loam or fine sandy loam. It is low in organic matter and nitrogen and medium to strongly acid. In undisturbed forested areas the upper 2 or 3 inches is grayish-brown. This color is due to a small accumulation of leafmold. The subsurface is a loose brownish-yellow sand or fine sand. In cultivated fields it is difficult to distinguish this sand from the surface soil. The subsoil, which begins at a depth of 16 to 20 inches, is a yellow to brownish-yellow slightly plastic sandy clay loam. The underlying material is commonly a mixture of sand and fine sand with or without thin layers of silts and gravels.

Use and management. Throughout the areas of Alvin sandy loam, both surface drainage and underdrainage are moderately rapid. The soil does not hold water well, and if the ground-water table goes below about 3 feet the soil will be drouthy for such crops as corn and soybeans. During some seasons wind erosion may prove a hazard to crops.

This type is not highly productive. Where the acidity of the soil has been corrected and barnyard manure added or legumes plowed down as green manure, very good increases in crop yields can be expected in favorable seasons. If wheat is grown, a mixed fertilizer high in phosphate is suggested, or superphosphate may be used alone. This soil is not likely to respond to rock phosphate. Corn is not a good crop because of the drouthy nature of the soil, but if it is grown it is well to use a high potash fertilizer.

(Anyone particularly interested in the management of sandy soils will find it worth while to consult the Iroquois county soil report for further suggestions.)

Saybrook silt loam (145)

Saybrook silt loam is a dark soil. It has developed under prairie vegetation from a thin blanket of loess, a wind-blown silt, on calcareous (limey) glacial till into which water penetrates readily. It is found on gently sloping to moderately sloping lands. In Livingston county it occupies about 31½ square miles.

This type grades into Lisbon silt loam on slopes of about 1 percent and into LaRose silt loam on slopes of about 7 percent, and sometimes it includes small areas of both these types. It usually occurs in regions underlain by permeable calcareous till. A few areas in Livingston county, however, were found in regions where the underlying material is heavy calcareous till. Areas of the latter kind are, for the most part, the result of thick accumulations of silty material thought to have been built up in what were once local water holes or in pools located within the glacier before it melted.

Soil profile. The surface of this type is a brown to dark-brown silt loam 6 to 8 inches thick. It is medium high in organic matter and nitrogen and medium acid. The subsurface is a light-brown to yellowish-brown silt loam. The subsoil, which begins at a depth of 14 to 16 inches, is a yellowish-brown silty clay loam that is moderately plastic. It often contains some sand and pebbles. Beneath the subsoil there are usually a few inches of leached silty or pebbly material. At a depth of 35 to 40 inches this material grades into friable calcareous till.

Use and management. Saybrook silt loam is a productive soil that is easy to work. On the more sloping portions of the type there is much erosion. The loss of the silty material that overlies the till reduces the productivity of this soil, but the effect is not so serious as similar loss on the heavy till types. Contour tillage, grass waterways, and a good rotation should, nevertheless, be used to reduce the amount of erosion. Saybrook is well adapted to terracing, and on some areas a well-designed and well-maintained terrace system is advisable.

Before beginning special measures for controlling erosion, the soil should be tested. Tests will show how much limestone and other soil-building materials to apply in order to insure vigorous plant growth.

There is no experiment field located on Saybrook but it is reasonable to suppose that, if the phosphate test shows a shortage of that element and if a good rotation is used, the soil will respond to rock phosphate. If manure is used, the response to rock phosphate will be less. No tests have been made that show what the response to superphosphate would be.

Saybrook is not likely to be low in potash. Each field should be tested, however, and if there is a shortage of available potash this must be applied in order to get maximum yields. If the soil is short of both phosphate and potash, these elements may be applied in a mixed fertilizer such as 0-12-12 or 0-20-10.

Saybrook should not be plowed in the fall, especially on areas that slope more than about 2 percent. Such areas should be protected as much as possible against erosion during the fall, winter, and spring by crop residues, manure, and cover crops.

Further information about the use of potash and phosphate will be found in connection with Elliott silt loam (see below). While Saybrook differs from Elliott in several ways, its response to fertilizers would likely be similar.

Elliott silt loam (146)

Elliott silt loam is an important soil in Livingston county. It is a dark soil and was formed under grass from thin loess, a wind-blown silt, on compact calcareous (limey) glacial till through which water penetrates only slowly. It occurs on gently sloping to moderately sloping areas. Surface drainage is moderate to rapid whereas underdrainage is moderately slow. The subsoil and underlying glacial till, in their plasticity and permeability to water, are intermediate between Saybrook silt loam and Elliott silt loam, plastic till phase.

Soil profile. The surface layer of Elliott is a medium-brown heavy silt loam 6 to 8 inches thick. It is medium in organic matter and slightly to medium acid. The subsurface is a brown to light-brown silt loam 6 to 8 inches thick. The subsoil,

which begins at a depth of 14 to 16 inches, is a brownish-yellow to yellowish-gray medium-plastic heavy silty clay loam. Often a few inches of silty or pebbly material lies beneath the subsoil, and below 35 to 40 inches there is compact calcareous glacial till.

Use and management. Good soil management for Elliott silt loam must provide for four things: (**1**) the control of erosion, (**2**) the correction of soil acidity, (**3**) the maintenance of enough nitrogen and organic matter for good crop growth, and (**4**) additions of phosphate and potash in amounts shown by the soil tests to be needed.

Except where areas slope more than about 3 percent, erosion can be controlled satisfactorily in general farming by using good farming methods. Such methods include the soil treatment necessary to obtain good crop growth, contour farming and grass waterways, and protection of slopes by leaving crop residues. Crop residues slow down the rate of runoff during fall, winter, and spring. More water can then penetrate into and be absorbed by the soil, thus helping to control erosion. Rolling down the cornstalks at right angles to the slope, if the picker has not already left them well flattened, is effective in controlling erosion. Areas that slope more than 3 percent also need longer crop rotations with more sod crops and winter cover crops. Fall plowing should be avoided on Elliott silt loam, but when it is necessary it should be done on the contour and the land left rough.

After limestone applications based on acidity tests have corrected soil acidity, a good rotation including legume catch crops and standover legumes should be adopted.

Strongly sloping areas of Elliott tend to erode, especially under cultivation. These areas are therefore better adapted to livestock farming than to grain farming.

Experience with the Joliet soil experiment field, which is located on Elliott silt loam and Elliott silt loam, plastic till phase, may be taken as a guide to the results that may be expected from these two soil types in Livingston county in the way of crop yields and their response to phosphate and potash. Table 7 gives the results from this field.

Applied at the rates of 8,000 to 8,500 pounds an acre (the last application having been made in 1933) rock phosphate on the Joliet field has given large and consistent increases in the yields of all crops grown in the residues system. Increases in corn, due to rock phosphate, have been larger during the past ten years than before. In the manure system crop increases have been smaller and less consistent than in the residues system.

From these results we can conclude that rock phosphate will return a good profit on Elliott silt loam, even when applied in large amounts. Whether smaller applications would be just as effective, and what results superphosphate would give, are questions still to be answered. Experiments have been started that it is hoped may give this information.

Applications of potash on the Joliet field have brought better yields of corn, wheat, clover, and alfalfa, but the increases have not been large enough on four of the six series to pay for the cost of the potash. The applications were, however, rather large. Before 1931 kainit was used in amounts totaling 3,600 to 4,200 pounds an acre. Potassium chloride has been used since 1932 and through 1946 in amounts ranging from 1,100 to 1,300 pounds an acre. It might be that smaller applications would give profitable returns. The only way to know

Table 7. — LIVINGSTON COUNTY SOILS: Phosphate and Potash Experiments on the Joliet Experiment Field, 1915-1946

(Located mainly on Elliott silt loam, and Elliott silt loam plastic till phase)

Series No.	Average annual yields per acre												Value of increase[a]	
	CORN		OATS		SOYBEANS		WHEAT		CLOVER		ALFALFA		Net acre returns, entire period without interest[b]	Net annual acre returns with interest[c]
	ROCK PHOSPHATE EXPERIMENTS—Residues system													
	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP		
	bu.	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*tons*	*tons*		
100	48.3	6.8	59.5	9.6	21.4	.1	31.0	9.0	.93	.48	2.81	1.37	$228.61	$13.67
200	48.5	6.7	55.2	4.6	19.4	1.9	29.2	12.1	1.65	.73	1.51	.71	204.20	11.90
300	46.9	9.9	58.6	7.1	19.7	2.4	29.7	8.0	1.41	.46	....	...	159.48	8.58
400	51.1	7.2	63.0	6.3	22.3	3.2	32.3	9.3	1.12	.43	....	...	135.79	6.80
500	50.6	8.0	62.4	9.6	17.1	.3	29.7	12.2	1.19	.56	....	...	153.96	8.47
600	52.9	5.5	65.9	5.3	25.8	.7	25.6	6.2	.83	.19	2.35	.54	101.35	5.68
Average[d]	49.7	7.4**	60.8	7.1**	21.0	1.4*	29.6	9.5**	1.19	.48**	2.22	.87**	.....	9.18
	ROCK PHOSPHATE EXPERIMENTS—Manure system													
	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP		
	bu.	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*tons*	*tons*		
100	57.8	.1	61.5	2.4	23.8	−1.8	32.9	4.4	2.13	.63	2.58	.64	$ 78.86	$4.61
200	52.3	1.9	63.2	2.6	20.4	− .2	26.8	8.0	1.56	.03	1.64	.78	109.57	6.81
300	50.2	.2	61.0	.5	31.4	2.2	30.2	2.2	2.25	.24	....	...	−2.38	−.93
400	59.5	4.7	71.2	7.8	27.1	1.5	31.7	5.2	2.21	.44	....	...	109.05	6.35
500	55.1	2.6	64.3	1.9	20.0	−3.7	30.5	7.9	1.81	.73	....	...	79.42	4.14
600	49.6	−.2	64.1	−.7	33.2	3.1	26.1	4.6	1.50	.25	2.86	.86	84.96	6.09
Average[d]	54.1	1.6	64.2	2.4**	26.0	.2	29.7	5.4**	1.91	.39**	2.36	.76**	.....	4.51
	POTASH EXPERIMENTS—Residues system													
	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K		
	bu.	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*tons*	*tons*		
100	55.0	6.7	58.5	−1.0	22.6	1.2	32.9	1.9	1.04	.11	2.77	−.04	$−5.84	$−1.90
200	57.8	9.3	68.2	1.6	23.5	4.1	34.6	5.4	1.80	.15	2.03	.51	120.37	6.30
300	53.6	6.7	59.4	.8	20.9	1.2	29.9	.2	1.64	.23	....	...	−1.90	−.51
400	56.2	5.1	63.8	.8	23.2	.9	34.9	2.6	1.25	.13	....	...	−1.93	−.22
500	55.0	4.4	66.8	4.4	15.5	−1.6	34.8	5.1	1.32	.13	....	...	13.79	1.91
600	51.8	−1.1	63.9	−2.0	25.6	− .2	25.7	.1	.68	.08	2.55	.20	−50.52	−2.31
Average[d]	54.9	5.2**	63.4	.8	21.9	.9	32.1	2.6**	1.40	.14**	2.45	.22**	.....	.38

KEY TO SOIL-TREATMENT SYMBOLS: R = residues, M = manure, L = limestone, rP = rock phosphate, K = potassium.

[a] Crop prices from Illinois Cooperative Crop Reporting Service; rock phosphate and potash are included at cost.

[b] Returns from yield increases less cost of fertilizer.

[c] Returns from yield increases less cost of fertilizer plus or minus interest at 4 percent earned or paid out on capital invested in fertilizer.

[d] Tests of significance were applied only to average crop-yield increases. * Odds are more than 19 to 1 that the increase is not due to chance. ** Odds are more than 99 to 1 that the increase is not due to chance.

what is best for a particular field is to test the soil, and if potash is deficient, to apply the amount which the test indicates is needed.

Clarence silt loam (147)

Clarence silt loam is a medium-dark soil formed from a thin blanket of loess, a wind-blown silt, on very compact and plastic calcareous (limey) glacial till. It has developed on gently sloping to moderately sloping land under prairie vegetation. In Livingston county it occurs mainly to the north of Vermilion river, on what is known as Cayuga ridge.

Soil profile. The surface layer of this soil where not severely eroded, is a brown to grayish-brown heavy silt loam 4 to 6 inches thick. It is medium in organic matter and medium to slightly acid. The subsurface is a yellowish-brown to brownish-gray heavy silt loam to silty clay loam. The subsoil, which begins at a depth of 10 to 14 inches, is a brownish-gray to yellowish-gray silty clay to clay, very compact and very plastic. Beneath the subsoil there occasionally is a layer, a few inches thick, of silty material, but more frequently the subsoil passes directly into very heavy calcareous till that extends to a depth of many feet.

Use and management. Clarence silt loam presents difficult problems in use and management. It erodes easily because the subsoil and underlying till take up water very slowly. Surface runoff is greater on Clarence than on soils through which water seeps more easily. Even under good management, this soil is capable of producing only moderate yields (see Table 1).

In the successful management of Clarence silt loam, besides using a good rotation, it is necessary to cut down erosion losses to the minimum, provide

All tilled crops on Clarence silt loam should be planted on the contour if the slope is more than 1½ to 2 feet in a hundred. Otherwise the thin layer of silt loam is carried away by excess surface runoff and fields are practically destroyed. Fig. 7

Upper picture shows an area of Clarence silt loam well along toward permanent destruction as a result of erosion. Only good management can save this soil from being completely washed away. The lower picture shows a slope permanently destroyed. Fig. 8

surface drainage to carry off surplus water, add limestone where needed, and keep the soil as fertile as possible and in the best possible tilth.

Erosion is best controlled by a well-established permanent grass-and-clover sod. Cultivated crops should be grown as infrequently as possible and always in a rotation which includes a sod crop at regular intervals. Corn should be planted on the contour leading into well-sodded waterways. A large concentration of water must be avoided throughout the cultivated area and the flow of water should be as slow as possible to avoid soil losses.

Clarence is not well adapted to terracing. During dry weather the terrace ridges often crack and, unless these cracks are filled in, runoff water will channel through them, causing further damage. Sod for terrace outlets and grass waterways is hard to start and keep up, especially where the subsoil and till are exposed.

Clarence takes up water slowly and dries out slowly. Tile are not effective and ponded areas should be surface-drained. Fall plowing is recommended on nearly level areas but should be avoided on areas that slope more than 1 or 2 percent. Illinois Circular 604, "Shall We Fall-plow or Spring-plow in Northeastern Illinois?" gives some information on where and where not to plow in the fall. There is no experiment field on Clarence silt loam, but it is reasonable to suppose that on areas not eroded or only slightly eroded, phosphate will give fair returns. The soil tests should be made and if they show that phosphate is deficient, rock phosphate or superphosphate should be applied. Crops are not so likely to give a good response to potash as to phosphate. The application of 0-12-12, however, or a similar fertilizer for corn, even though rock phosphate has been used, is considered good practice.

Correction of acidity is necessary on most fields of Clarence silt loam.

Proctor silt loam (148)

Proctor silt loam is a medium-dark soil derived from a thin blanket of loess, a wind-blown silt, and water-laid silty material on coarse sandy and pebbly outwash. It has developed on very gently sloping to moderately sloping land under prairie vegetation. It occurs in most of the glacial outwash areas in the county but is found most extensively southeast of Pontiac near Lodemia and McDowell. Some of this Proctor silt loam, particularly southeast of Pontiac, has a shallow profile similar to that of Pilot silt loam (see page 40). These areas may easily be mistaken for Pilot, but they are less drouthy and more productive than Pilot.

Soil profile. The surface of this type is a medium-brown to light-brown silt loam 6 to 8 inches thick. It is medium in organic matter and nitrogen and medium acid. A small amount of sand and a few pebbles may occur in the surface layer as well as throughout the profile. The subsurface is a yellowish-brown silt loam. The subsoil, which begins at a depth of 15 to 18 inches, is a yellowish-brown, slightly plastic, silty or sandy clay loam. At 30 to 40 inches the subsoil grades into layers of loose silt, sand, and gravel. In some areas calcareous (limey) glacial till lies at 45 to 50 inches.

Use and management. The only special problems in the use and management of Proctor silt loam are the tendencies of this soil: (1) to be drouthy where the underlying sand or gravel is less than about 35 inches beneath the surface, and (2) to erode on the stronger slopes. Neither of these problems is serious.

Fresh organic matter should be supplied, as Proctor is rather low in this important material. The soil should be tested for lime and available phosphate and potash, and any deficiencies corrected. It will then be possible to use a good rotation, including legumes, which supply nitrogen as well as organic matter.

The glacial outwash and river terrace formations often are underlain by sand and gravel of commercial value. These are promising areas for prospecting for these materials.

Brenton silt loam (149)

Brenton silt loam is a dark soil formed from silty outwash or from a thin blanket of loess, a wind-blown material, on silty or sandy outwash. It has developed on nearly level to very gently sloping land under prairie vegetation.

Soil profile. The surface is a brown to dark-brown heavy silt loam 8 to 10 inches thick, high in organic matter and nitrogen, and slightly acid. The subsurface is a brown or pale yellowish-brown silt loam. The subsoil begins at a depth of 16 to 18 inches. It is a moderately plastic silty clay loam and in color is a mottled yellowish brown to mixed yellowish brown and gray. Beneath the subsoil the material is stratified silt and sand to a depth of 45 inches or more. Part of this deep material may be calcareous (limey). Below about 45 inches there may be gravelly layers in the outwash or the material may be calcareous glacial till.

Use and management. Brenton silt loam is a productive soil. It is well supplied with organic matter, only slightly to moderately acid, and well supplied with the plant-food nutrients. Brenton has moderate to slow surface drainage and moderate underdrainage. The soil profile is permeable to water throughout, and tile draw satisfactorily. However, if the underlying glacial till is heavy and occurs at a depth of less than about 45 inches, there may be some difficulty with underdrainage. This soil type has characteristics intermediate between those of Proctor silt loam and Drummer clay loam. Soil tests should be made to detect any deficiencies. With good soil and crop management, this soil will remain productive indefinitely. There is no experiment field located on this soil type; therefore, no specific recommendations for fertilization can be made.

Onarga sandy loam (150)

Onarga sandy loam is derived from either water-laid or wind-blown sand and fine sand. It has developed on gently sloping to moderately sloping land under prairie vegetation. It occupies a total of only 440 acres in Livingston county.

Soil profile. The surface is a light-brown sandy loam to fine sandy loam 4 to 8 inches thick, medium low in organic matter and nitrogen, and medium to strongly acid. The subsurface is a yellowish-brown loamy sand. At 15 to 20 inches it grades into slightly plastic clayey sand or sandy clay loam. Below 30 to 35 inches the material is usually loose yellowish-brown sand and fine sand, though occasional layers of silt or gravel are sometimes present below a depth of 45 to 50 inches.

Use and management. Drainage is moderately rapid to rapid. Onarga tends to be drouthy, though the clayey subsoil prevents water from seeping away too fast. Wind erosion is active on this soil in some places. Although Onarga tends to be slightly more productive than Alvin sandy loam, the suggested treatment is the same (see page 30).

Drummer clay loam (152)

Drummer clay loam is a dark soil formed from mixed silt-and-clay outwash or lake-bed sediments. It has developed under marsh-grass vegetation on areas that are nearly level or somewhat depressed. It is one of the more

extensive types in Livingston county, occupying about 165 square miles.

Many areas of Drummer clay loam have a rather gravelly surface. The most noticeable gravelly areas lie to the north and west of Fairbury. Sometimes this soil type includes areas of Harpster too small to be shown on the map.

Soil profile. The surface layer of this type is a granular black clay loam to silty clay loam 8 to 10 inches thick, high in organic matter and nitrogen, and slightly acid to neutral. The subsurface is difficult to distinguish as a separate layer but is usually a very dark gray or grayish-black clay loam or silty clay loam. At a depth of 14 to 16 inches it grades into a mottled dark-gray or brownish - gray, medium - plastic clay loam to silty clay loam. Below a depth of 30 to 35 inches the material is usually calcareous (limey) and consists of stratified clay, silt, and sand, with perhaps some gravel below 40 to 50 inches.

Use and management. Drummer clay loam is a productive soil if well drained and well farmed. Fall plowing is advisable in order to avoid too much delay when the spring is late. Fresh organic matter should be provided, and deep-rooted legumes should be included in the rotation in order to keep the deeper parts of the profile porous.

Although Drummer will usually grow sweet clover without limestone, it should be tested for acidity as well as for phosphate and potash. With good farming, this soil will remain productive indefinitely. It erodes only when water from higher land runs across it.

The most difficult problem in the management of Drummer, after good drainage has been provided, is to keep the soil from losing its good physical condition. Too much cropping to corn and soybeans during recent years has speeded the general breakdown of the soil, causing slower underdrainage and greater difficulty in working down a good seedbed. Rebuilding good tilth is slow work, and the sooner good cropping practices are used, the less trouble there will be in the future.

Flanagan silt loam (154)

Flanagan silt loam is a dark soil formed from loess, a wind-blown silt, 40 to 60 inches thick on calcareous (limey) glacial till that water penetrates readily. It has developed on gently sloping land under grass vegetation and occurs only in the western part of the county.

Soil profile. The surface horizon, or layer, of this soil varies in color from brown to dark brown. It is a heavy silt loam 6 to 8 inches thick, high in organic matter and nitrogen, and medium to slightly acid. The subsurface is a light-brown to yellowish-brown silt loam. The subsoil, which begins at a depth of 15 or 16 inches, is a yellowish-brown moderately plastic silty clay loam. There are usually several inches of silty material beneath the subsoil, with calcareous till below 40 to 60 inches.

Use and management. Flanagan silt loam is a productive soil, easy to work, and has good natural surface drainage and underdrainage. Tiling is often advisable on the more level portions of this type. Erosion is a minor problem and may be controlled by good farming, including the use of a good rotation, contour tillage on the more sloping portions, and grass waterways. Soil tests should be made to find how much lime is needed and whether phosphate or potash is short.

There is no experiment field located on Flanagan soil, but it would most likely respond to fertilizers much as Muscatine does (see Tables 5 and 6, pages 21-22).

Ridgeville sandy loam (156)

Ridgeville sandy loam is a dark soil formed from sandy glacial outwash. It has developed on nearly level to gently sloping areas under grass vegetation.

Soil profile. The surface of this type is generally a brown to dark-brown sandy loam to fine sandy loam. It is 8 to 10 inches thick, medium in organic matter, and medium to slightly acid. The subsurface is a yellowish-brown to grayish-brown sandy loam to fine sandy loam. The subsoil, which begins at a depth of 16 to 20 inches, is a mottled brownish-gray to yellowish-gray medium-plastic sandy clay loam. Beneath the subsoil the material is usually loose stratified silt, sand, and gravel that may sometimes be slightly calcareous (limey) below 45 to 50 inches.

Use and management. Tile drainage may be necessary in a few areas of Ridgeville sandy loam to take care of low wet spots. When dredge ditches are constructed through sandy areas, however, there is always danger of lowering the water table and causing a drouthy condition. Tile alone do not lower the water table below the depth of the tile, but dredging to provide the necessary outlets sometimes has this unfortunate effect.

Soil tests should be made in order to know how much lime, phosphate, and potash are needed. There is no experiment field located on soil similar to Ridgeville. If, however, a suitable rotation is used crops should give good response to the treatments that tests indicate are needed. Nitrogen is deficient and should be provided for by growing legume crops frequently, after limestone is supplied. A short rotation should be used, since a large reserve of organic matter and nitrogen cannot be built up in a sandy soil. If phosphate and potash are deficient, a fertilizer such as 0-12-12 is suggested for the grain crops. Rock phosphate is likely to give disappointing results.

Rankin sandy loam (157)

Rankin sandy loam is formed from water-laid sandy material on compact and moderately plastic to plastic glacial till. It has developed on gently sloping to moderately sloping land under grass vegetation. It occurs as small areas in regions where the till is only slowly permeable to water, and mainly in association with Elliott silt loam and Elliott silt loam, plastic till phase. It is a minor type in Livingston county, occupying a total of less than a square mile.

Soil profile. The surface of this type is a brown to light-brown sandy loam 6 to 8 inches thick. It is medium to medium low in organic matter and nitrogen and medium to strongly acid. The subsurface is not a clearly defined horizon but is usually a yellowish-brown loose sandy loam to loamy sand which grades into the subsoil at a depth of 16 to 20 inches. The subsoil is, in general, a yellowish-brown slightly plastic clayey sand or sandy clay loam. Beneath the subsoil there is usually a few inches of coarse sand from which the lime has been leached; and below this sand lies compact calcareous (limey) glacial till.

Use and management. Rankin sandy loam is not a productive soil, but it is somewhat better than Alvin sandy loam (see page 8). It is less drouthy than Alvin although it does not hold water especially well. This soil should be tested to find how much lime is needed and whether phosphate and potash are deficient. In general it should be managed in the same way as Alvin sandy loam (see page 30).

Vance silt loam (158)

Vance silt loam is a light-colored soil formed from silty outwash, a water-laid deposit, or from a thin blanket of loess on top of silty or sandy outwash. It has developed on nearly level to gently sloping land under hardwood forest vegetation and is found mainly in the Vermilion river valley.

Soil profile. The surface of this type is a yellowish-gray silt loam 5 to 8 inches thick, low in organic matter and nitrogen, and medium acid. In undisturbed forest areas the upper 2 or 3 inches of soil is dark brownish gray due to an accumulation of leafmold. The subsurface is a light yellowish-brown friable silt loam 6 to 8 inches thick. The subsoil, which begins at a depth of 15 to 18 inches, is a yellowish-brown to mixed gray and yellow medium-plastic silty clay loam. Beneath the subsoil the material is stratified silt, sand, or gravel which is sometimes limey at 40 to 45 inches. Occasionally compact calcareous glacial till occurs at 45 to 60 inches.

Use and management. Vance silt loam underdrains satisfactorily. The nearly level areas need tiling. The sloping areas do not erode as severely as do comparable slopes of Blount silt loam (see page 16). Vance is deficient in organic matter and nitrogen and should be tested for acidity and for phosphate, and potash deficiencies. There is no experiment field located on soil similar to Vance and no very definite statement can be made about how to fertilize it. The acidity should be corrected and nitrogen and organic matter provided by a good rotation that includes legumes. If the tests show that phosphate is deficient, superphosphate will probably give better returns than rock phosphate. If both phosphate and potash are deficient, 0-12-12 or a similar fertilizer is the most likely to give satisfactory returns.

Pilot silt loam (159)

Pilot silt loam is a moderately dark soil formed from either a very thin loess (a wind-blown silt) or a silty water-deposited sediment on sandy and pebbly outwash. It has developed on gently sloping to moderately sloping land under grass vegetation. It is a very minor type in Livingston county.

Soil profile. The surface of this type is a grayish-brown to light-brown silt loam to sandy silt loam 6 to 8 inches thick, medium in organic matter and nitrogen, and medium acid. The subsurface varies from a grayish-brown to yellowish-brown silt loam or loam. The subsoil, which begins at a depth of 14 to 16 inches, is a yellowish-brown slightly plastic loam or sandy clay loam. Layers of loose sand and gravel occur below 25 to 30 inches and continue to an unmeasured depth.

Use and management. Pilot silt loam responds fairly well to fertilizer treatment during seasons when moisture con-

ditions are good. It occurs in small areas and usually must be given the same treatment as the field in which it occurs. It is drouthy, and crops on this type suffer more during long rainless periods than those on soils with a higher water-holding capacity.

A deep-rooted crop, such as alfalfa, is more resistant to drouth than are the shallow-rooted crops, and often produces good yields after the roots are well established. Enough limestone to correct acidity is needed, however, before young alfalfa plants will live. Winter wheat, oats, and rye often yield well, as they usually escape the dry weather. Heavy applications of manure, besides furnishing plant nutrients, tend to slightly increase the water-holding capacity of this soil. The underlying sand and gravel may have commercial value in some areas.

Thorp silt loam (206)

Thorp silt loam is a medium-dark soil formed from silty outwash. This type has developed under weedy prairie vegetation on areas that range from nearly level to slightly depressed. It occurs in small patches, chiefly along Vermilion river and its North Fork.

Soil profile. The surface soil is a brown to grayish-brown silt loam 6 to 8 inches thick, medium in organic matter and nitrogen, and medium acid. The subsurface is a brownish-gray silt loam often mottled with rusty brown. The subsoil begins at a depth of 15 to 18 inches. In color it is a brownish gray to gray mottled with yellowish brown, and in texture it is plastic clay loam to sandy clay. Below 35 to 40 inches the material is usually coarse stratified sand and gravel.

Use and management. In many respects Thorp silt loam is similar to Denny silt loam (see page 22), but it generally covers larger areas than Denny. Tile do not draw freely in Thorp, and open ditches often have to be depended on to carry off surplus water. As soon as there is satisfactory drainage, enough limestone should be applied to correct acidity. Then it will be possible to grow sweet clover, which tends to loosen the soil and improve underdrainage. When the clover is turned under it will also supply fresh organic matter and add more nitrogen to the soil. Heavy applications of manure will also supply nitrogen and organic matter and will contribute small amounts of phosphate and potash.

This soil is not highly productive because of its rather unfavorable physical condition. Under good management, however, small grains, soybeans, and clovers are likely to produce satisfactory yields, and in favorable seasons corn usually does well. Alfalfa is a doubtful crop on this soil.

Varna silt loam (223)

Varna silt loam is a medium-dark soil formed from thin loess, a wind-blown silt, on compact calcareous (limey) till that is slowly permeable to water. It has developed on strongly sloping land under prairie vegetation and usually is associated with Elliott silt loam. It occurs in small areas throughout the slowly permeable till regions, but is most extensive south of Chatsworth and east and southeast of Strawn.

Soil profile. Where present, the surface soil is a brown to light-brown silt loam

4 to 6 inches thick, medium in organic matter and nitrogen, and medium acid. The subsurface is a yellowish-brown silt loam. At 8 to 12 inches it grades into the subsoil, which is a yellowish-brown medium-plastic silty clay loam. Below 25 to 30 inches the material is compact medium-plastic calcareous glacial till, identical with that found under Elliott silt loam (see page 31) and Elliott silt loam, plastic till phase (page 27). In many areas most of the surface, subsurface, and even the subsoil have eroded away. The severely eroded areas of Elliott silt loam or Elliott silt loam, plastic till phase in Livingston county are included on the map with Varna silt loam.

Use and management. Surface runoff on Varna silt loam is very rapid. To avoid erosion, this soil type should be cropped as little as possible. When manured and limed it makes fairly good permanent hay and pasture land unless erosion has removed all of the silty loess cover.

If it becomes necessary to crop areas of Varna, all plowing and cultivating should be done on the contour. A rotation of crops should be adopted which includes as little corn or other cultivated crops and as much small grain, hay, and pasture crops as possible. Such a rotation will provide good winter cover. Fall plowing should be strictly avoided.

The full value from barnyard manure is likely to be realized only if the acidity of the soil has been corrected. In order to grow sweet clover, an application of limestone is necessary unless erosion has been so severe that the limey glacial till has become exposed.

How to use areas that are eroded so severely that the unproductive subsoil or glacial till is exposed is a difficult problem, and no satisfactory solution has been found. It is doubtful that grass will grow.

Eylar silt loam (228)

Eylar silt loam is a light-colored soil formed from thin loess, a wind-blown silt, on compact plastic calcareous (limey) glacial till. In Livingston county it has developed on land varying from nearly level to strongly sloping. It occurs in heavy till regions on areas that used to be forested, and mainly in association with Elliott silt loam, plastic till phase, and Clarence silt loam.

Soil profile. Where present, the surface soil is a yellowish-gray silt loam rarely more than 6 inches thick. It is low in organic matter and nitrogen and probably low in available phosphate and potash. In undisturbed forest areas the upper 2 or 3 inches of soil is dark brownish gray due to an accumulation of decaying leafmold. The subsurface is a yellowish-brown to yellowish-gray silt loam. The subsoil, which begins at a depth of 12 to 16 inches, is a yellowish-gray compact plastic clay. Below 25 to 30 inches is a heavy and plastic calcareous glacial till similar to that found under Clarence silt loam or Elliott silt loam, plastic till phase.

Use and management. Eylar silt loam is not a productive soil. The slow underdrainage and strong tendency to erode even on gentle slopes, together with its rather low natural productivity, make this soil difficult to manage. It is better adapted to wheat than to corn, but is best used as permanent pasture and meadow. It should be tested for acidity and limestone applied as needed so that clovers may be grown. Areas that slope more than 4 or 5 percent should not be cultivated but kept in permanent grass.

An eroded, unproductive pasture on Eylar silt loam with a 3-percent slope. Areas like this have little agricultural value and probably cannot be restored. Slow underdrainage and erosion make Eylar hard to manage. It is best used as pasture. Fig. 9

No productive use is now known for those areas where erosion has exposed the glacial till — not even trees will survive. Fortunately this is a minor type in Livingston county, occupying only about 1,100 acres in all.

Monee silt loam (229)

Monee silt loam is a medium-dark soil formed from a thin deposit of loess, a wind-blown silt, or from water-laid silt on calcareous (limey) glacial till that is heavy and plastic. This type has developed on nearly level or slightly depressed areas under weed and grass vegetation. It occurs as small patches in regions of heavy till and is most extensive near Cayuga, Rowe, and Manville. It is a minor type in Livingston county.

Soil profile. The surface of this type varies in color from grayish brown to dark gray and in texture from a silt loam to a silty clay loam. It is 4 to 6 inches thick, medium low in organic matter and nitrogen, and medium acid. The subsurface varies from 0 to 6 inches in thickness. Where present it is usually a gray to dark-gray silt loam. The subsoil, which begins at a depth varying from 6 to 20 inches, is a pale brownish-gray to olive-brown or olive, plastic clay, and is frequently mottled with pale yellow or with rusty brown. Beneath the subsoil there is sometimes a few inches of rather loose silty or loamy material below which lies heavy plastic calcareous till. Quite often, however, the loose material is absent, and the subsoil grades directly into the underlying heavy till. This till is the same as that under Clarence silt loam.

Use and management. Monee silt loam is a poor soil, similar in many respects to the nearly level portions of Eylar silt loam (opposite page). The physical limitations are such that expensive treatment is not justified. The productive level will remain low regardless of any

present known treatment. Small grains and soybeans may produce fair yields in favorable years. The growing of sweet clover is recommended, though some limestone and possibly a phosphate fertilizer will be needed before this crop can be grown.

Surface drainage can be provided by open ditches or surface inlets to tile, but water moves into and through the subsoil and underlying glacial till so slowly that the soil is cold and wet. Plant roots do not readily penetrate the subsoil; consequently where the combined surface and subsurface horizons are only 6 to 8 inches thick, the feeding space and the supply of available soil moisture are limited.

Clarence clay loam to silty clay loam[1] (230)

Clarence clay loam to silty clay loam is a dark soil formed from local deposits of heavy sediments on very plastic calcareous (limey) glacial till. This type has developed under swampy weed-and-grass vegetation, mainly on areas that are nearly level or somewhat lower than surrounding lands. It occurs mainly north of Vermilion river in association with Clarence silt loam.

This type is somewhat variable. The depressed areas, with their grayish surface, resemble Monee silt loam and may be mistaken for it, but they are somewhat more productive. Some areas with a black surface resemble Elliott clay loam to silty clay loam, plastic till phase. Other areas with a very heavy surface and thick local deposit of sediment resemble Drummer clay. A few areas are covered by silty sediment recently washed from adjacent slopes of silt loam. These and other minor variations are not shown on the soil map.

[1] Subsequent to the preparation of the Livingston county soil map the name Clarence clay loam to silty clay loam was changed to Rowe clay loam to clay.

Soil profile. The surface varies from a very dark-gray to grayish-black silty clay loam to clay. It is 6 to 8 inches

Small patches of Drummer clay like this occur in the Clarence silt loam region. Having no natural outlet, these spots become shallow ponds in spring and fall. They have little agricultural value and interfere with the working of the rest of the field. Fig. 10

thick, medium to high in organic matter and nitrogen, and slightly acid to neutral. The subsurface is difficult to distinguish as a separate horizon, or layer, but is usually a dark-gray heavy silty clay loam to clay. At a depth of 12 to 16 inches it grades into a dark-gray or olive-gray plastic clay and is mottled with yellowish gray. Below a depth of 30 to 35 inches there frequently is a layer of several inches of looser material, beneath which lies heavy plastic calcareous till. This till is the same as that found under Clarence silt loam and Monee silt loam.

Use and management. The heavy nature of Clarence clay loam to silty clay loam makes it necessary to provide surface drainage or surface inlets to the tiling system. Tile do not draw fast enough to be effective. Great care must be used not to cultivate this soil when it is too wet. It should be fall-plowed; otherwise spring work is likely to be delayed too long. It is advisable to test this soil for acidity and for phosphate and potash even though it usually is not acid or is only slightly acid and is well supplied with available phosphate and potash. Crop yields are limited by physical condition rather than by deficiencies of plant nutrients. This is one of the soils in the state that demands skilful farming if fairly satisfactory yields are to be obtained and a poor physical condition avoided. Continued growing of only shallow-rooted crops, such as corn and soybeans, results in the development of a compacted layer below the surface soil. This condition is very unfavorable to plant growth and its correction is probably slow and difficult.

Clarence silt loam, rolling phase (231)[1]

Clarence silt loam, rolling phase, is a medium-dark soil formed from thin loess, a wind-blown silt, on plastic calcareous (limey) till. This type has developed on moderately sloping to strongly sloping land under prairie vegetation. It occurs in small areas in Livingston county near Cayuga and northwest to Blackstone. Many severely eroded areas of Clarence silt loam are included on the map with this phase though they have less slope.

Soil profile. Where a surface layer is present, it is a light-brown to grayish-brown silt loam 4 to 6 inches thick, medium in organic matter and nitrogen, and medium acid. The subsurface is a yellowish-brown silt loam. The subsoil, which begins at a depth of 12 to 14 inches, is a dull yellowish-brown very plastic silty clay loam to clay. Beneath the subsoil the material is heavy plastic calcareous till. Occasionally silt and gravel pockets occur within the till, but these in general had little effect on the character of the soil layers as they formed.

Use and management. The subsoil and underlying glacial till of Clarence silt loam, rolling phase, are very plastic and very slowly permeable to water. It erodes easily, and if the subsoil is exposed, this soil is probably permanently destroyed. The subsoil and underlying glacial till are so heavy that if the overlying loessial (silty) material is lost, very little plant growth is possible. This soil should not be cultivated but used permanently for pasture and meadow.

[1] Subsequent to the printing of the Livingston county soil map the number (231) was changed to (239).

Elliott clay loam to silty clay loam[1] (232)

Elliott clay loam to silty clay loam is a dark soil formed from thin local wash on compact calcareous (limey) glacial till. This type has developed on nearly level to very gently sloping areas under heavy marsh-grass vegetation. It occurs extensively in the northeastern and southwestern parts of Livingston county. A few spots of Drummer clay are mapped with this type because they are too small to be shown separately.

Soil profile. The surface of this type is dark-brown to black in color, and in texture is a granular clay loam to silty clay loam. It is 6 to 12 inches thick, high in organic matter and nitrogen, and neutral to slightly acid. The subsurface is seldom a definite layer, but generally changes gradually from the surface to the subsoil. The subsoil, which begins at a depth of 15 to 18 inches, is dark grayish brown to mottled yellowish gray in color, and in texture is a plastic clay loam or silty clay loam. Beneath the subsoil there is usually several inches of silty or loamy sediment below which lies compact calcareous till. This underlying till is the same as that found under Elliott silt loam (page 31).

Use and management. Elliott clay loam to silty clay loam is a moderately productive soil (see Table 1). The major problems in its management are drainage and maintenance of good physical condition. Both surface and underdrainage are slow, and measures should be taken that will drain the surplus water off promptly. Tile draw but not so freely as in a more open soil. The tile should be laid closer together and as shallow as is safe. Open ditches or furrows to supplement the tile may be used to advantage in places where the "lay of the land" permits.

The soil can be kept in good physical condition by the use of a good rotation, including deep-rooted legumes, together with tillage practices suited to a heavy soil. Working this soil when it is too wet puts it in a poor physical condition that persists through at least one winter. Plowing in the fall is advisable, as it improves the physical condition of the soil and avoids the danger of having to plant late in the spring.

The soil tests should be made, and if limestone is needed for the growing of legumes, it should be applied. If there is a shortage of phosphate or potash, it should be corrected only after drainage has been provided and organic-matter needs have been met. Because there is no experiment field on this soil type, little information can be given for fertilizing it. Where phosphate is very deficient, rock phosphate will probably give satisfactory crop increases if applied for the legume crop. If the test shows that phosphate is only medium or slightly deficient, superphosphate would probably be better than rock phosphate; and if both phosphate and potash are deficient, a 0-12-12 or similar fertilizer is probably advisable.

Elliott clay loam to silty clay loam, plastic till phase[1] (235)

Elliott clay loam to silty clay loam, plastic till phase, is a dark soil formed from heavy local sediment on plastic calcareous (limey) glacial till. The type has developed on nearly level to gently sloping land under a covering of heavy prairie grass or marsh grass. It occurs extensively in the northern and eastern

[1]After the Livingston county soil map was made, the names of these two soil types were changed to Ashkum clay loam to silty clay loam and to Bryce clay loam to clay, respectively.

parts of Livingston county. It often grades gradually into Elliott clay loam to silty clay loam and into Clarence clay loam to silty clay loam.[1] In general it is intermediate between these two types in permeability to water, in productivity, and in response to soil treatment. A number of spots of Drummer clay, too small to be shown on the map, are included with this type.

Elliott clay loam to silty clay loam, plastic till phase, is good corn soil but hard to drain and heavy to work. Wise use of legumes and crop residues will improve tilth. For good drainage, surface inlets may be needed to supplement tiling. Fig. 11

Soil profile. The surface of this type ranges from a black clay loam to a very dark-brown silty clay loam. It is 8 to 12 inches thick, high in organic matter and nitrogen, and neutral to slightly acid. The subsurface is a dark grayish-brown to black clay loam or clay. It seldom occurs as a well-defined layer but changes gradually from the surface to the subsoil. The subsoil, which begins at a depth of 12 to 16 inches, is a dark-gray plastic clay mottled with pale yellow and dull rusty brown. Beneath the subsoil there sometimes is a narrow layer only a few inches thick of silty clay loam sediment, below which lies heavy plastic calcareous till. This underlying till is the same as that found under Elliott silt loam, plastic till phase, as mapped in Livingston county (see page 27).

Use and management. Drainage and the maintenance of good tilth are the first problems in the management of this soil. Tile are only moderately effective because water moves so slowly through

[1] For changes in the names of these two types, see pages 46 and 44.

the subsoil and underlying glacial till. Surface drainage is slow on the more level portions of the type. If a tiling system is installed, surface inlets might well supplement underdrainage with surface drainage.

It is important to keep this soil in as good tilth as possible; otherwise a good seedbed becomes more and more difficult to prepare. Good tilth can be maintained by supplying plenty of fresh organic matter through the use of deep-rooting legumes and crop residues and by working the soil only when it is neither too wet nor too dry.

If the soil tests show acidity, the required amount of limestone should be applied so that clovers may be grown. If phosphate is very deficient, rock phosphate will probably give satisfactory crop increases. If the phosphate test is medium, superphosphate would probably be better than rock phosphate. If both phosphate and potash are deficient, a 0-12-12 or similar fertilizer is probably advisable.

Drummer clay (238)

Drummer clay is a dark soil formed from heavy local water-deposited sediments. It has developed in depressed areas under a covering of coarse grass and sedge. It is a minor type and is found in small areas throughout most of the county. Most of it occurs in those heavy till regions where water penetrates slowly. A few areas are large enough to occupy several acres, but most of them are small. Many are too small — 1/10 or 1/20 of an acre — to be shown on the map.

Soil profile. The soil layers of this type are very poorly defined, and no definite separation into surface, subsurface, and subsoil can be made. In general, however, the surface is a black to grayish-black very heavy clay loam or clay, varying from 8 or 10 inches to as much as 20 or 25 inches thick. It is high in organic matter and nitrogen and usually is not acid. Beneath the surface soil the material is a dark-gray to grayish-black clay loam to clay that grades into a dark-gray plastic clay with occasional mottlings of pale yellow or rusty brown. The clayey sediment usually becomes less plastic at a depth of 30 to 35 inches, whereas glacial till or permeable outwash may lie below 45 or even 50 inches.

Use and management. There is no surface drainage on Drummer clay, and underdrainage is slow. Tile do not draw readily. After heavy rains, surface runoff from surrounding higher land collects and often drowns the crops.

Drummer clay is difficult to farm profitably. It is often in such small isolated spots that no special treatment is justified, and when undrained, these small areas remain wet long after the adjacent soils are ready to be cultivated. Since these patches often must be avoided in plowing and left unplanted when the rest of the field is prepared, they interfere with work and make tillage more difficult.

Surface drainage can sometimes be provided by open ditches. If this method is impractical, a catch basin or open tile inlet is often advisable. When this soil is well drained it is best adapted to corn and sweet clover. A potash fertilizer may be needed in order to get satisfactory corn yields. Small grains tend to grow very rank and lodge.

Areas of Drummer clay that cannot be drained and are left in weeds and shrubs can be useful as a refuge for wildlife.

HOW LIVINGSTON COUNTY SOILS WERE FORMED

To use and manage soils intelligently does not require that one know anything about the origin of the materials from which the soils developed nor about the processes that were active in their development. Many people, however, are interested in an explanation of facts as well as in the facts themselves. The information given here is intended for those who would like a brief statement of some of the interesting points about the development of the Livingston county soils.

Origin of the soil materials. The upland and terrace soils of Livingston county have developed from materials deposited during those millions of years known as the Glacial Epoch. The bottomland soil materials were deposited by streams during more recent times and the soil particles are more or less assorted as to size.

During the Glacial Epoch the climate alternated between long periods when it was much like our climate today and other periods of prolonged cold. In the colder periods the average temperature was so low that the snow which fell in winter did not entirely melt the following summer. As time went on huge amounts of snow and ice piled up in the northern parts of our continent. The pressures that developed in this great ice mass caused it to push outward, forming glaciers (Fig. 12).

Courtesy of Bradford Washburn

This picture of the Columbia glacier in Alaska illustrates how glaciers form and move. Note that the small valley glaciers in the background have joined together into a large glacier in the foreground. This larger glacier is pushing into Prince William sound. The dark streaks are glacial till imbedded in the ice. This glacier is very small compared with the ice sheets that covered most of Illinois in past ages. Fig. 12

Aided by further accumulations of snow and ice at their margins, the glaciers advanced, moving chiefly southward until they reached a region where the climate was warm enough to melt the ice as rapidly as the glacier moved forward. In moving across the country, the ice sheets picked up great masses of rock, gravel, sand, silt, and clay, ground them together, and carried them along. Most of these materials were deposited within a hundred miles or less of the point where they were picked up, but some were carried for hundreds of miles. The moving ice leveled off hills and filled in old valleys, often completely changing the surface features of the areas over which it passed. The mixture of materials left by a glacier is known as *glacial drift* and *glacial till*,[1] terms which appear frequently in descriptions of soils.

The area that is now Livingston county was covered by at least two of the four major glacial advances of ice from the north, but only the last, called the Wisconsin ice sheet, had much influence on the present soils of the county. The retreat, or melting back, of this glacier was not a continuous process but was often interrupted. Besides the periods when the ice advanced, there were long periods when the margins of the ice were nearly stationary. During these long nearly stationary periods the ice melted as rapidly as it pushed forward, and the sediments deposited by the melting ice piled up in the form of ridges, or moraines. The Chatsworth moraine, of which Cayuga ridge is a part, was formed in this way. It enters Livingston county just east of Streator and crosses the county in a southeasterly direction.

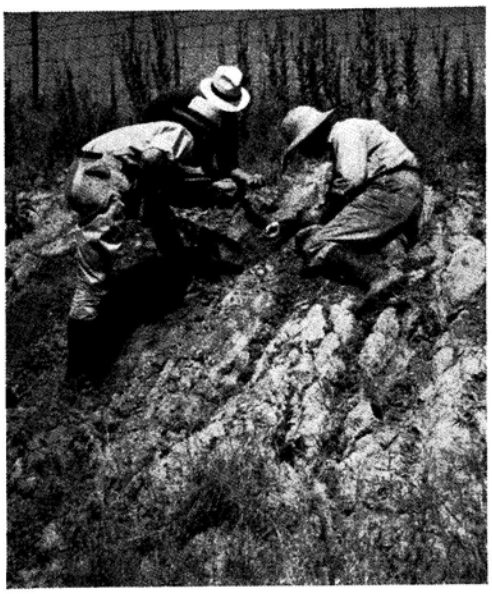
As the ice of the Chatsworth moraine melted, the waters spread out over the region along Vermilion river, sorting and depositing beds of gravel, sand, and silt. These deposits are called *outwash*. At about this same time, the winds laid down a blanket of silt, called *loess*. The thickness of this loess blanket in Livingston county varies from about 2 feet in the southern and eastern parts of the county to about 6 feet in the northwestern corner. Later, after the ice had melted in the region of Livingston county, more deposits of outwash (waterlaid materials) were left in the northeastern corner of the county and in places along Vermilion river.[2]

Composition of the soil materials. The nature of any glacial till (the material deposited direct from glacial ice without being sorted or reworked by water) depends on the kind of rocks that make it up. To the south and west of Forrest the till is composed of many different materials, mainly coarse-grained igneous rocks (rocks formed by fire or heat) and sandstone with some limestone and a small amount of shale. In other areas of the county, notably along Cayuga ridge, the till is composed almost entirely of shale and limestone, with very little or none of the coarser grained rocks. These differences in the till are of considerable agricultural importance because of their effect on underdrainage. When the till is a mixture of sandstone, limestone, and igneous rocks, with only a small amount of shale, it is permeable to water; when the mixture is mainly shale and limestone, water penetrates it very slowly

[1] *Drift* is defined as all material of glacial origin, whether stratified (sorted into layers of different sized particles) or unstratified, and whether deposited by the ice itself or by the glacial waters. *Till* is defined as unstratified drift deposited directly from the ice.

[2] For a more thorough discussion of the geology of Livingston county, see Illinois State Geological Survey Bulletin 66, "Geology and Mineral Resources of the Marseilles, Ottawa, and Streator Quadrangles," 388 pp. 1942.

and drainage is difficult. Over most of the county the till deposits are relatively high in shale. Where the shaley till is not buried deep enough, it restricts underdrainage and lowers the productivity of the soil (see Fig. 14).



Soil survey men study a soil profile. The different layers, or "horizons," are exposed by the cut made for a road. Fig. 13

How the soils were developed. As soon as the parent materials — loess, till, or outwash — were deposited, they were subjected to weathering forces, and the processes of soil development began. When first deposited, the parent materials were high in lime and the mineral elements of plant food but very low in nitrogen. As time elapsed, the rain water, the oxygen and carbon dioxide of the air, and the products of decaying plants attacked the minerals, leaching out the free lime and changing some of the minerals into clay. Since the forces that cause weathering are most active near the surface and less active with increasing depth, various stages of weathering occur at different depths. Thus carbonates are leached first from the surface, and it is there that the minerals are broken down most rapidly. Most of the organic matter accumulates in the surface, as is indicated by the darker color of the surface soil. The clay particles that form at or near the surface are gradually carried downward by the percolating waters to a point where they accumulate, forming a subsoil high in

Table 8. — LIVINGSTON COUNTY SOILS

Grouped According to Parent Materials, Permeability, Vegetation, and Slope

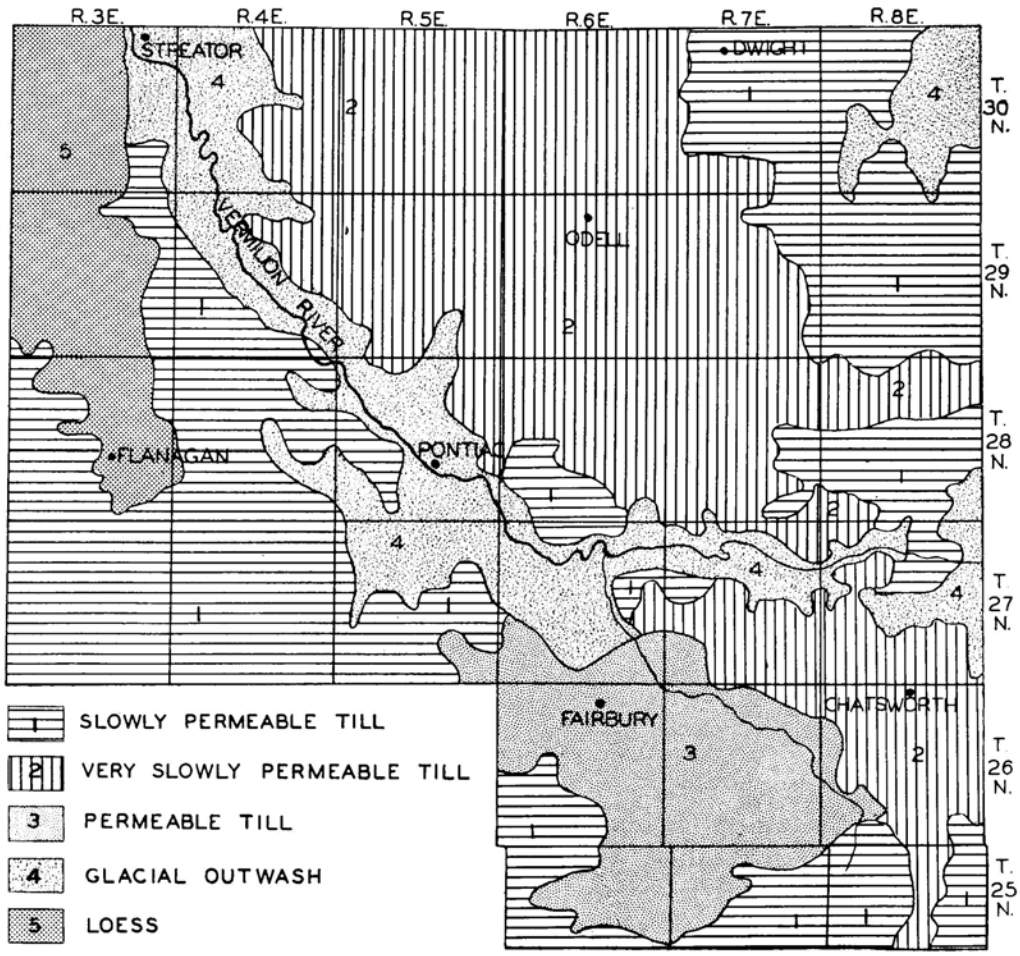
Parent materials	Vegetation	Soil type[a] and predominant slope			
		Nearly level	Gently sloping	Strongly sloping	Steep
Slowly permeable till	Prairie	67, 232, 238	146, 157	223	..
	Timber	23	23	...	25
Very slowly permeable till	Prairie	229, 230, 235	91, 147	231	..
	Timber	228	228	...	25
Permeable till	Prairie	59, 67	145	60	..
	Timber	.....	24	...	25
Glacial outwash (including river terraces)	Prairie	67, 81, 149, 152, 156, 206	80, 148, 149, 150, 159	...	..
	Timber	158	134, 144, 158	...	25
Loess	Prairie	45, 67, 68	41, 154	36	..
	Timber	.....	.....	...	..

[a] Types 40, 73, and 103 are not included in this table because they do not fit into any of the categories.

clay. Thus horizons, or layers, differing in physical and chemical composition gradually develop, and the parent material takes on characteristics that justify our calling it a soil.

As soon as the physical and chemical forces of weathering began acting on the slowly soluble minerals, plant nutrients in available form were released. Then vegetation started spreading over the land, more slowly perhaps in the regions where the till contained more shale.

Two types of vegetation — prairie and forest — were important influences in the development of the soils of Livingston county. Where prairie grasses grew, their extensive and fibrous roots decayed in the soil, adding much organic matter and producing the dark soils of the county. Where forests grew for long periods of



An important thing to know about soils to be used for farming is whether or not they underdrain freely. The above map gives this information for the farm land in Livingston county. In Area 1, which occupies about one-third of the county, the underlying till is only slowly permeable to water, making some of the soils in this area hard to tile. In Area 2, which also makes up about one-third of the county, tiling is not usually satisfactory. In Areas 3, 4, and 5, making up the other third of the county, tiling systems draw well. Fig. 14

time, light-colored soils developed. These soils have little organic matter because leaves dropped by the trees stay on the surface of the land and decay rapidly.

Drainage is another great influence on the development of soils. A high water table speeds up the decomposition of minerals but retards leaching and the decay of organic matter. Soils that were wet throughout their development are therefore characterized by a heavier surface texture, less acidity, and more organic matter than those developed under conditions of good drainage.

Not all parent materials are affected to the same extent by the weathering processes. Where they are permeable to water, a large part of the rainfall penetrates deeper into the soil and deeper leaching takes place than where the soil materials absorb water only slowly. Moreover when water penetrates slowly, more of it runs off the surface and there is more rapid loss of soil material by erosion. Thus on the slowly permeable till in Livingston county we find shallow soils that usually contain lime at a depth of only about 2 or 2½ feet; whereas on moderately permeable till and on outwash or loess the lime is usually deeper —3 to 4 feet.

Variations in the soils of Livingston county, as elsewhere, thus trace back to differences in the parent materials, in the native vegetation, the drainage, and the topography or the "lay of the land."

GROUPING OF THE SOILS OF LIVINGSTON COUNTY

The soils of Livingston county may be placed into groups based on the kind of parent material from which they have developed, the slope on which they occur, and the native vegetation which originally covered them. As seven soil types occupy a little over 82 percent of the county, it is rather easy to get a good understanding of the soil situation. These extensive soil types are Nos. 91, 145, 146, 147, 152, 232, and 235.

In Table 8 the types shown on the soil map are arranged in groups. The location of the groups is shown in Fig. 14. It will be helpful in studying these soil groups to refer to Table 4, page 14, where the characteristics and properties of the various soils in the county are tabulated.

GEOGRAPHICAL AND HISTORICAL FEATURES

Physiography and drainage. Livingston county is located in the Illinois river basin in a region of low relief. Several morainal ridges cross the county in a southeast-northwest direction, giving some topographic variation to the landscape. The Middle Cropsey and Inner Cropsey moraines cross the southwest corner of the county. The Chatsworth moraine crosses the county east of Pontiac and still farther northeast the Marseilles moraine extends in the same general direction.

During glacial times and more recently, the region between the Inner Cropsey ridge and the Chatsworth ridge was occupied by a shallow lake known as Lake Pontiac. The northeast corner of the county, east and north of the Marseilles moraine, was also a lake known

as Lake Wauponsee. Drainage of the county is largely into Illinois river, most of it through Vermilion river.

Climate of Livingston county. The climate of Livingston county is characteristic of that in the north-central part of the United States. There is a wide range in temperature between the extremes of winter and summer; and the rainfall, though irregularly distributed, is usually abundant so far as the total annual amount is concerned. Rainless periods long enough to be harmful are, however, not uncommon during the growing season. The following temperature, frost, and rainfall data for the twenty-one years 1926-1946 are based on the records of the weather station at Pontiac.

The mean summer temperature during this period was 74.2° F., the mean winter temperature 28.3°, and the average mean yearly temperature 52.6°. The highest temperature recorded was 108° in July, 1936 and the lowest was –24° in January, 1927. Temperatures between 90° and 100° F. are common during June, July, and August.

The average date of the last killing frost in the spring was April 24 and that of the first killing frost in the fall was October 13. This gives an average frost-free season of 172 days. This long a season ordinarily provides ample time for all corn-belt crops to reach maturity. The latest recorded killing frost in the spring was on May 13, 1938, and the earliest in the fall on September 27, 1942. The shortest growing season, 152 days, occurred in 1941 and the longest, 209 days, in 1931.

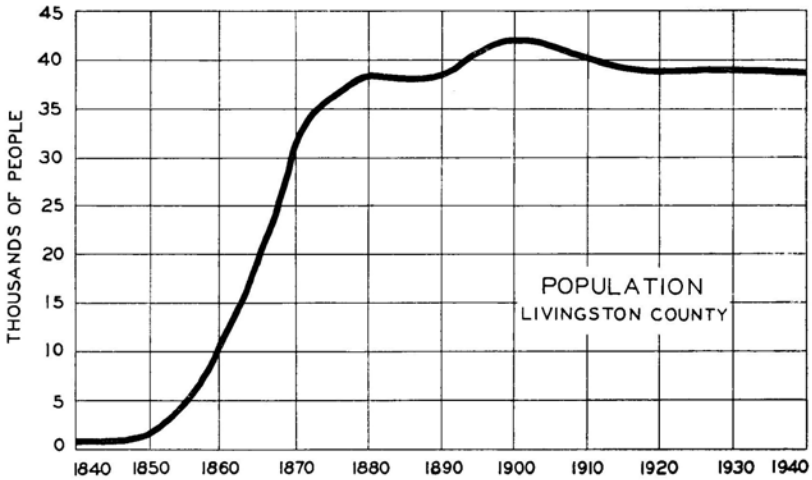
The average annual precipitation at Pontiac for these twenty-one years was 35.43 inches, including the water melted from an average snowfall of 26.4 inches (about 10 inches of snow being equivalent to one inch of rainfall). The driest year during this period was 1930, with a total precipitation of 22.63 inches; while 1927 was the wettest, with 47.43 inches of precipitation. The driest month, on the average, was February, with average precipitation of 1.48 inches. April, May, June, August, and September each averaged 3 inches or more and July had an average rainfall of 2.84 inches.

Of greater interest to farmers than the annual precipitation is the distribution of rainfall during the growing season. From April through September the amount ranged from 13.28 inches in 1930 to 31.67 inches in 1926. The average for these six months for the 1926-1946 period was 21.2 inches. Rainless periods[1] of 21 days or longer occurred 52 times during the growing season in this 21-year period. The longest rainless period was 103 days in 1934 and the next longest was 86 days in 1936. A rainless period long enough to be harmful to growing crops even on the better soils occurs nearly every year.

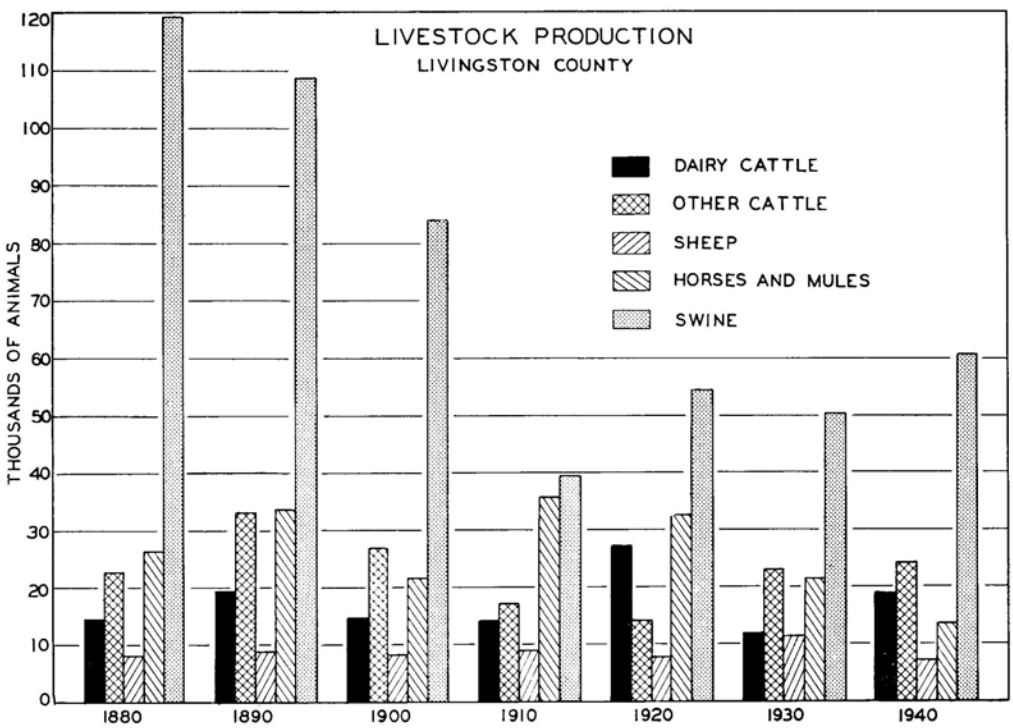
Settlement of Livingston county. Livingston county, the fourth largest county in Illinois, with a total area of approximately 1,036 square miles, lies a short distance to the northeast of the geographical center of the state. It was established by legislative act in 1837 from portions of McLean and LaSalle counties and named for Edward Livingston, Secretary of State in the cabinet of President Andrew Jackson. A site for the county courthouse was chosen in 1838, and the town of Pontiac was built around this location.

Because of the small amount of rolling

[1] The term "rainless period" as used in this report is defined as an interval during which no precipitation exceeding ½ inch is recorded in any consecutive 24 hours.



The population of Livingston county is now about 39,000. The peak was reached in 1900, when there were about 42,000 people in the county. A slight decline occurred between 1900 and 1915; since then there has been only a little change. Fig. 15



Wide fluctuations have occurred in the number of the various classes of livestock kept on the farms of Livingston county during the sixty years represented in this graph. While considerably fewer animals are shown for the last thirty years than previously, livestock, particularly swine, are still an important source of farm income. Fig. 16

forest land, Livingston county was slow to attract settlers. The first settler, Valentine W. Darnell, erected a cabin in 1829 in Indian Grove, now a part of Belle Prairie township, and the following year Frederick Rook settled about 5 miles west of Pontiac on the creek which now bears his name.

Settlement proceeded slowly at first, and by 1850 there were only 1,500 inhabitants in the county, according to the United States Census. Following 1850, however, the population increased rapidly, until by 1880 there were over 38,000 inhabitants. Since 1880 the population has remained fairly constant at or near 40,000 (see Fig. 15).

Transportation facilities are well established. Direct routes to Chicago, Peoria, and Springfield are available by both railway and paved highway systems. The secondary road system of the county is well developed, nearly every farmstead being provided with an all-weather road.

Agricultural production. Agriculture is the leading industry in Livingston county. The major portion of the county is tillable, and many of the soils, when well farmed, are productive.

Corn is the most important crop from the standpoint of both acreage and value. During the sixteen years 1929-1944 corn was harvested on an average area of 263,000 acres. The annual acre production ranged from a low of 18 bushels in 1934 to a high of 57 bushels in 1941.[1]

Oats, soybeans, wheat, tame hay, alfalfa, and sweet clover all occupied fairly extensive acreages throughout this period. The area planted to soybeans increased significantly after 1934, until by 1942 more than 80,000 acres were grown.

Of the 645,000 acres of land in farms in Livingston county in 1935, less than 1,000 acres were in unpastured woodland, according to the United States Census, although there were 13,000 acres in woodland pasture.

Although this county is located in what is commonly known as the cash-grain farming area, livestock production is an important enterprise. Some idea of the trend in the production of animals can be gained from Fig. 16, which shows the numbers of cattle, sheep, horses and mules, and swine in Livingston county at ten-year intervals from 1880 to 1940 inclusive.

[1] All crop and livestock statistics are from either the United States Census or *Illinois Crop and Livestock Statistics,* a joint publication of the Illinois State Department of Agriculture and the U.S. Department of Agriculture.

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SOIL REPORTS PUBLISHED

1 Clay, 1911
2 Moultrie, 1911
3 Hardin, 1912
4 Sangamon, 1912
5 LaSalle, 1913
6 Knox, 1913
7 McDonough, 1913
8 Bond, 1913
9 Lake, 1915
10 McLean, 1915
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68 Jasper, 1940
69 Cumberland, 1940
70 Warren, 1941
71 Cass, 1947
72 Livingston, 1949

(No longer available. Also note that No. 25 has been replaced by No. 72.)*

Requests from libraries and other public agencies desiring to complete their files of these reports will be given special consideration.

8M—8-49—41228

WHAT CROPS WILL GROW BEST ON MY FARM?

WHAT TREATMENT DOES MY SOIL NEED TO MAKE IT YIELD ITS BEST?

WHAT YIELDS CAN I EXPECT?

These are the questions this Soil Report aims to answer for the farmers and landowners of Livingston county. Careful reading will repay all who own or operate farms in this county . . . .

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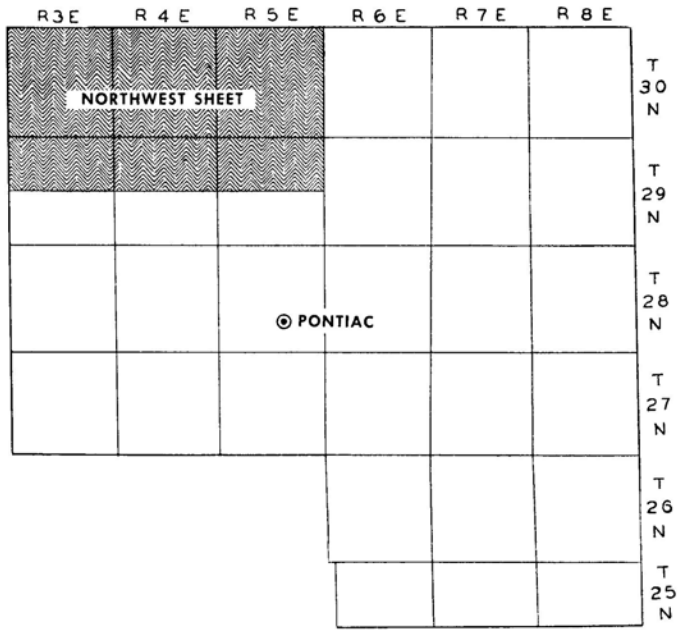
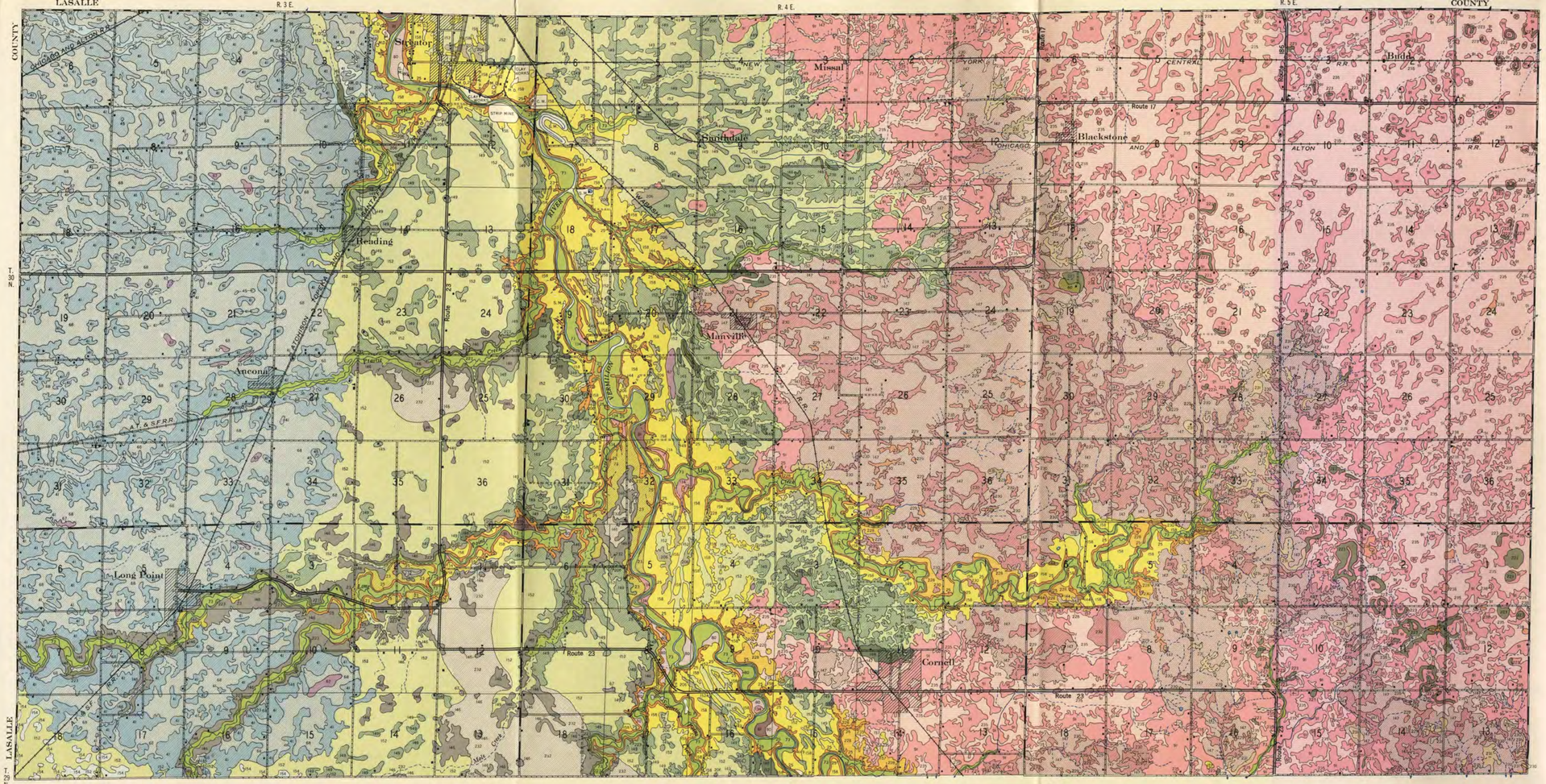


LIVINGSTON COUNTY SOIL MAP



LEGEND

23	Blount silt loam	81	Littleton silt loam, terrace	156	Ridgeville sandy loam
24	Miami silt loam	91	Elliott silt loam, plastic till phase	157	Rankin sandy loam
25	Hennepin gravelly loam, eroded	103	Muck	158	Vance silt loam
36	Tama silt loam	134	Camden silt loam, terrace	159	Pilot silt loam
40	Dodgeville silt loam	144	Alvin sandy loam	206	Thorp silt loam
41	Muscatine silt loam	145	Saybrook silt loam	223	Varna silt loam
45	Denny silt loam	146	Elliott silt loam	228	Eylar silt loam
59	Lisbon silt loam	147	Clarence silt loam	229	Monee silt loam
60	LaRose silt loam	148	Proctor silt loam	230	Clarence clay loam to silty clay loam
67	Harpster clay loam	149	Brenton silt loam	231	Clarence silt loam, rolling phase
68	Sable silty clay	150	Onarga sandy loam	232	Elliott clay loam to silty clay loam
73	Huntsville loam, bottom	152	Drummer clay loam	235	Elliott clay loam to silty clay loam, plastic till phase
80	Alexis silt loam, terrace	154	Flanagan silt loam	238	Drummer clay

CONVENTIONAL SIGNS

- House
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- Church
- Store building
- Cemetery
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- C.W. Clay Works
- Limestone outcrop

Scale

0 ¼ ½ 1 2 Miles

1938

R. S. Smith, In Charge Soil Survey

Soils Surveyed by
Eric Winters, in charge,
Herman Wascher, in charge,
G. D. Smith,
E. P. Whiteside,
R. T. Odell,
P. T. Veale,
F. F. Riecken,
T. G. Pearse,
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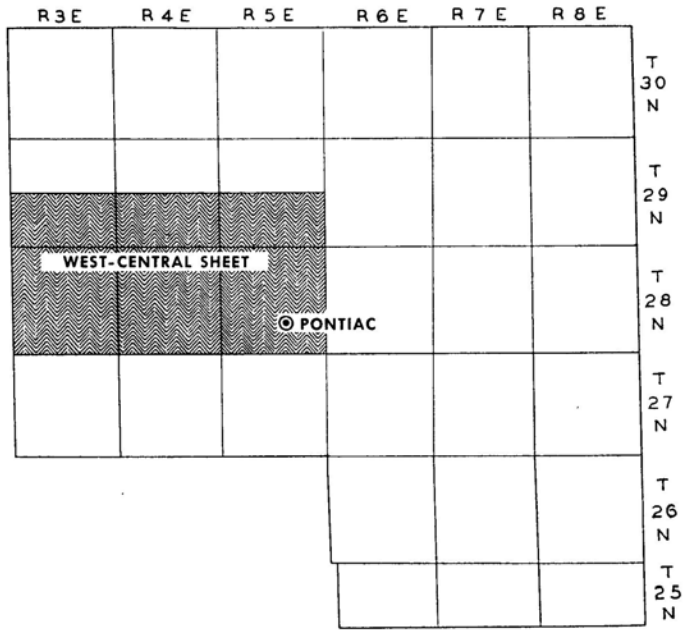
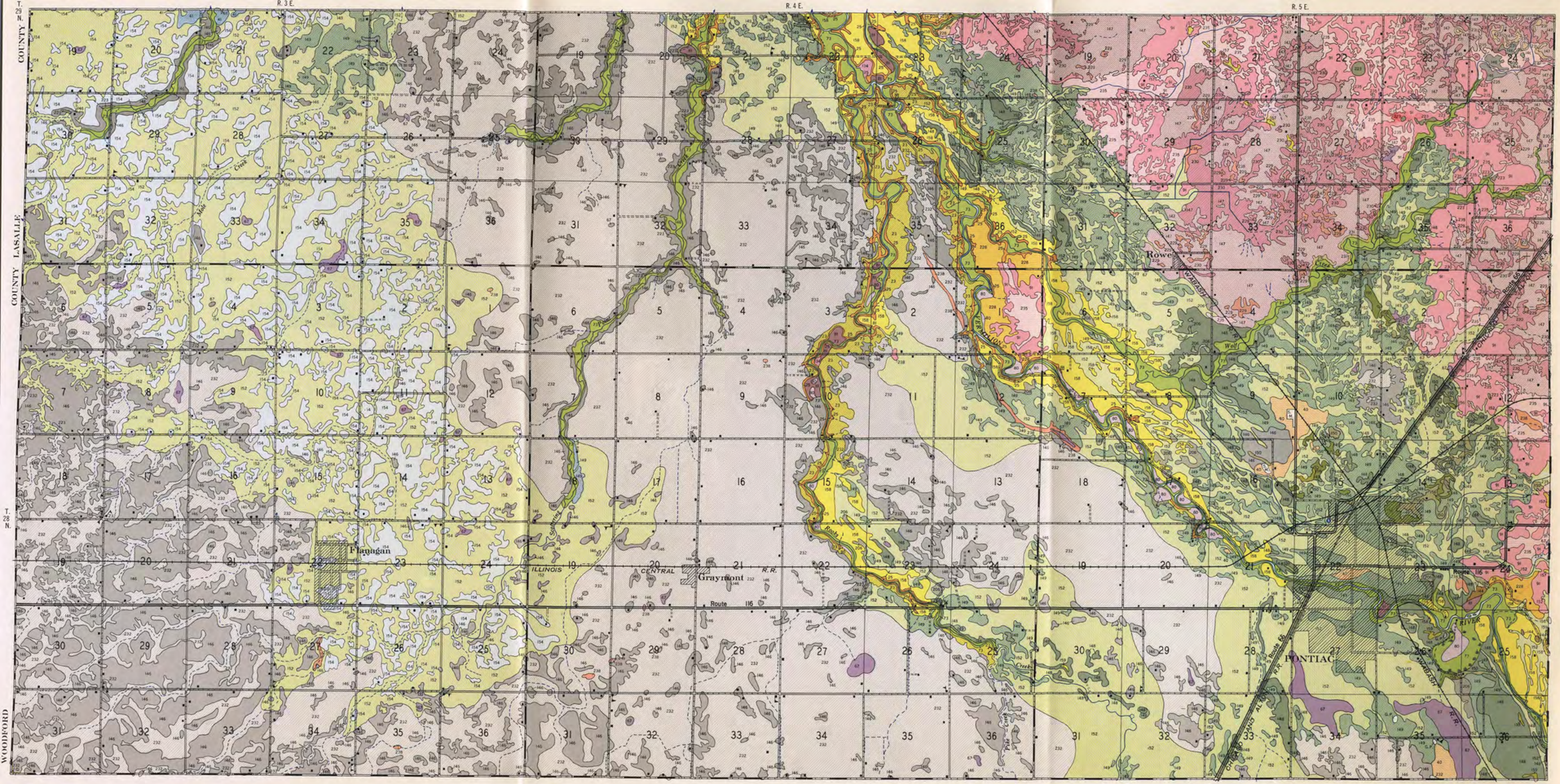
SOIL SURVEY MAP OF LIVINGSTON COUNTY

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION

2



LIVINGSTON COUNTY SOIL MAP



WEST-CENTRAL SHEET

LEGEND

23	Blount silt loam	81	Littleton silt loam, terrace	156	Ridgeville sandy loam
24	Miami silt loam	91	Elliott silt loam, plastic till phase	157	Rankin sandy loam
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Scale

0 ¼ ½ 1 2 Miles

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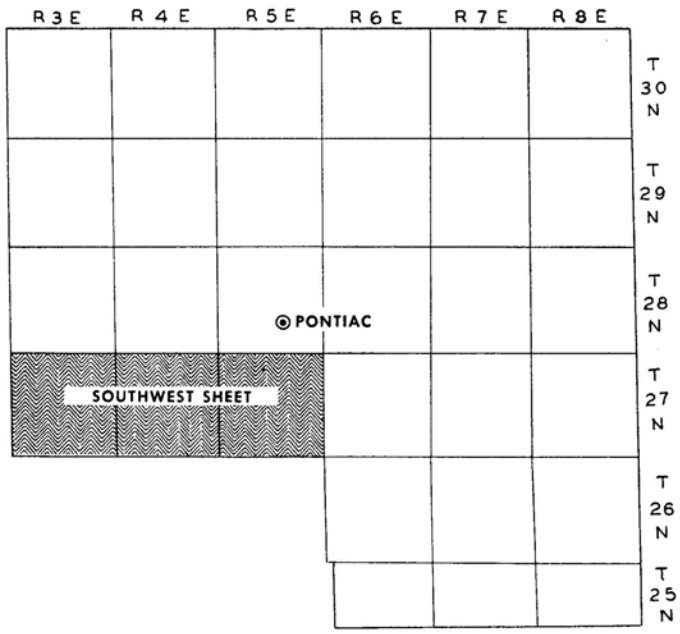
3



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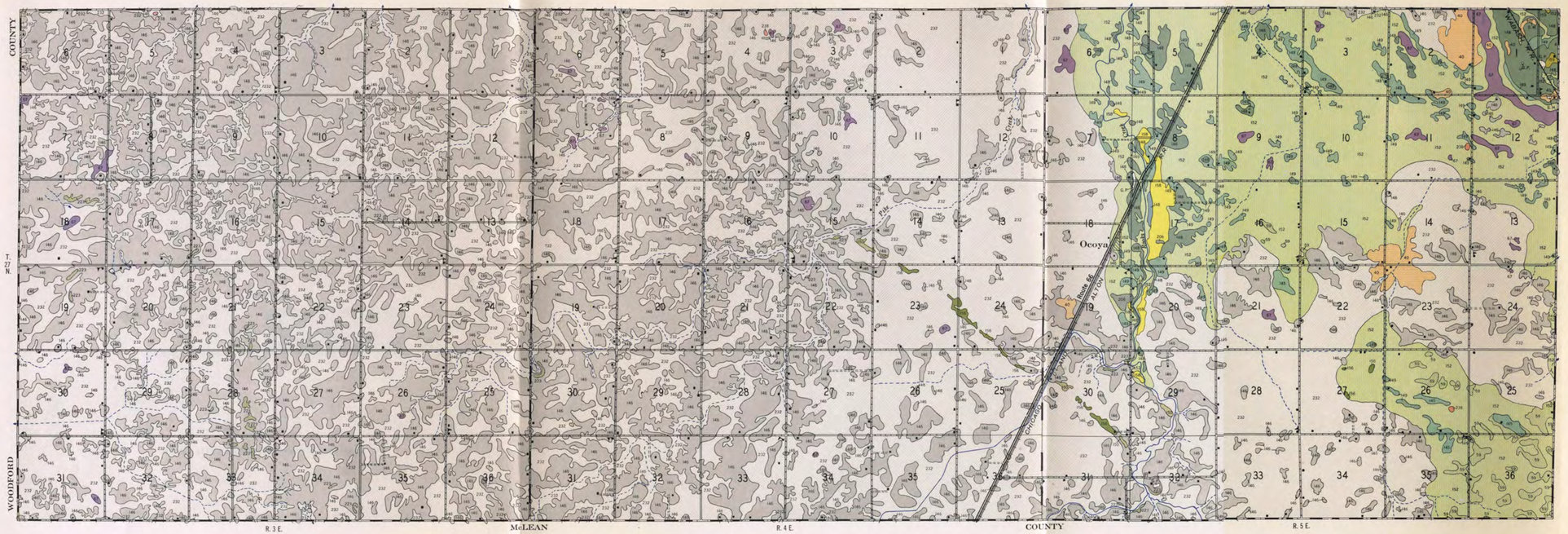

LEGEND

23	Blount silt loam	81	Littleton silt loam, terrace	156	Ridgeville sandy loam
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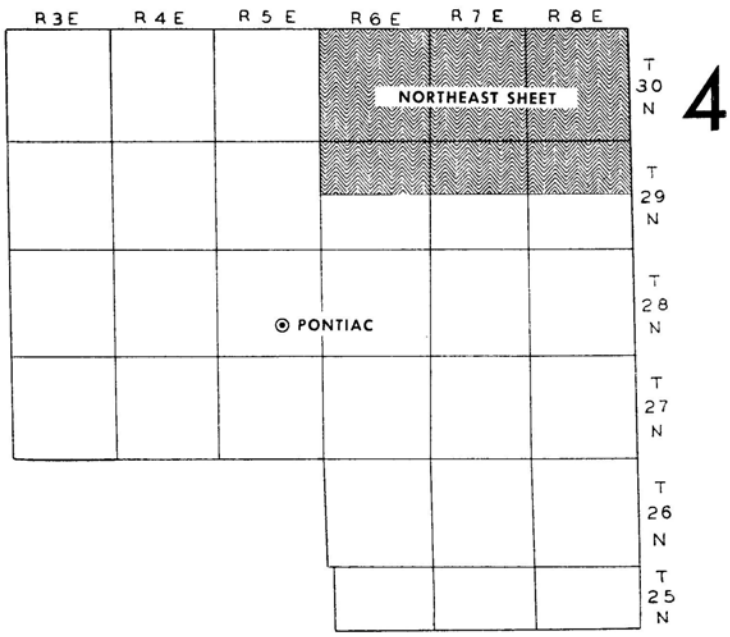

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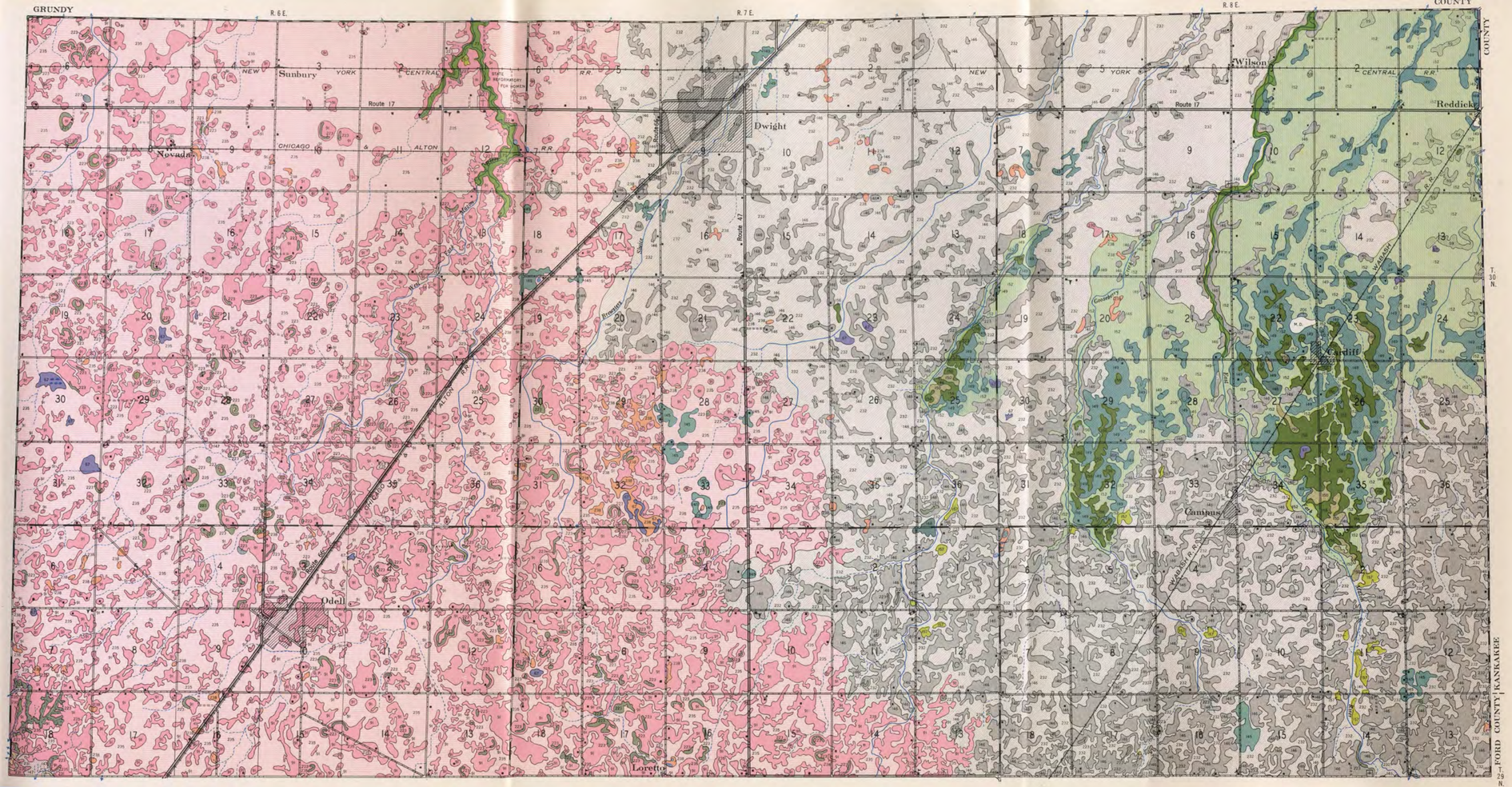

NORTHEAST SHEET

LEGEND

23	Blount silt loam	81	Littleton silt loam, terrace	156	Ridgeville sandy loam
24	Miami silt loam	91	Elliott silt loam, plastic till phase	157	Rankin sandy loam
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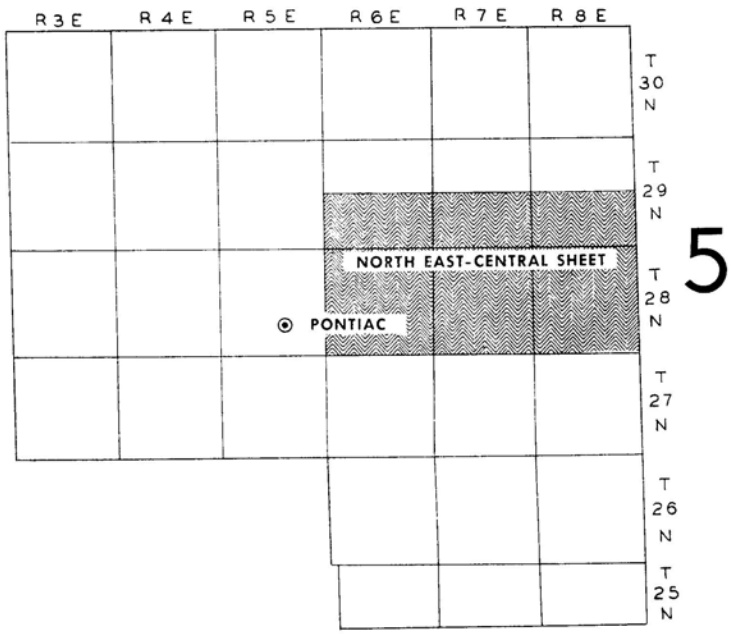
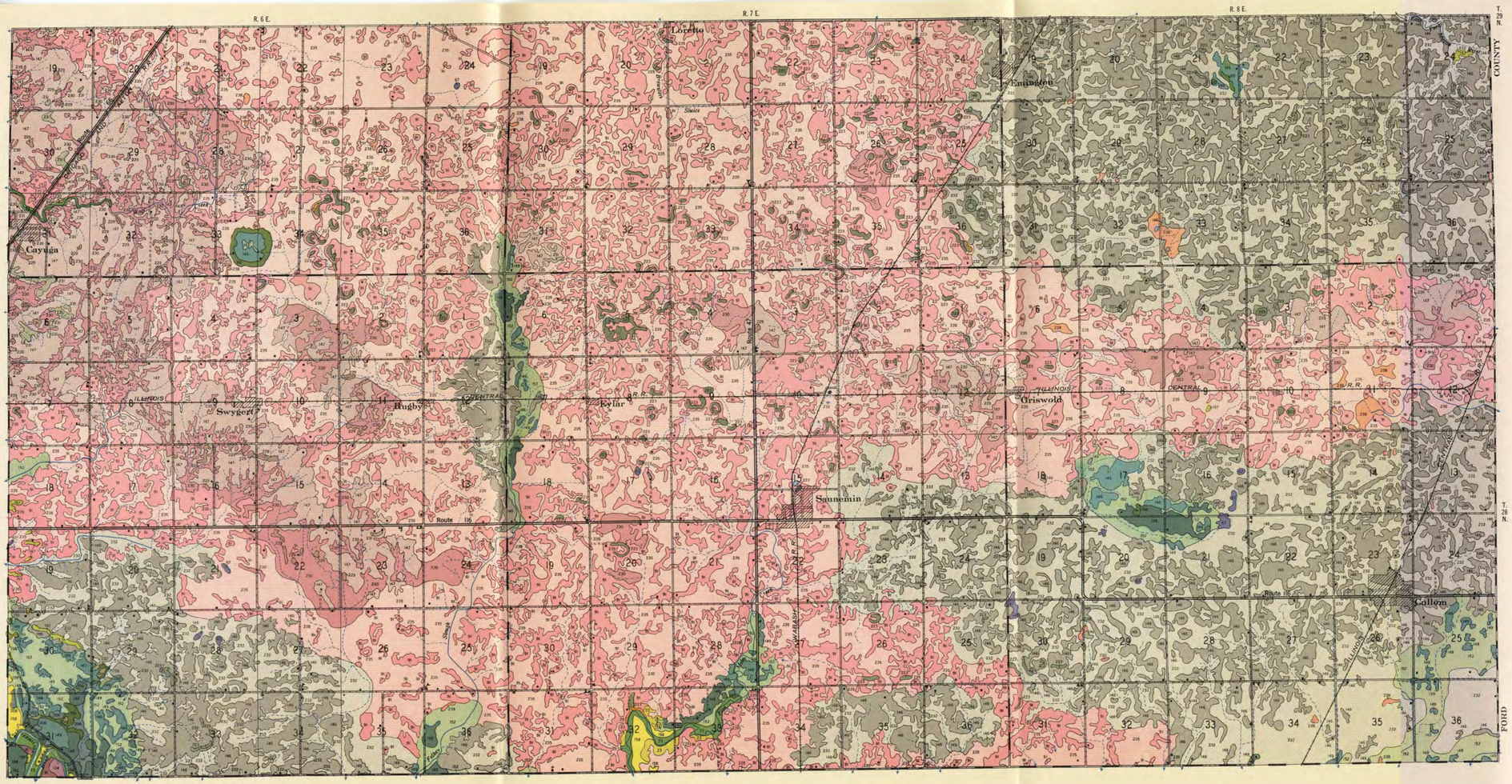


LIVINGSTON COUNTY SOIL MAP



NORTH EAST-CENTRAL SHEET

LEGEND

23	Blount silt loam	81	Littleton silt loam, terrace	156	Ridgeville sandy loam
24	Miami silt loam	91	Elliott silt loam, plastic till phase	157	Rankin sandy loam
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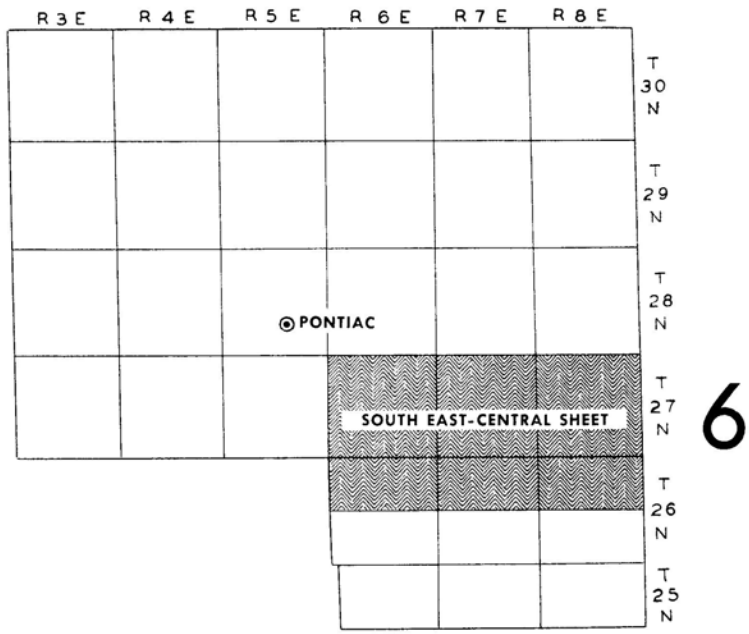

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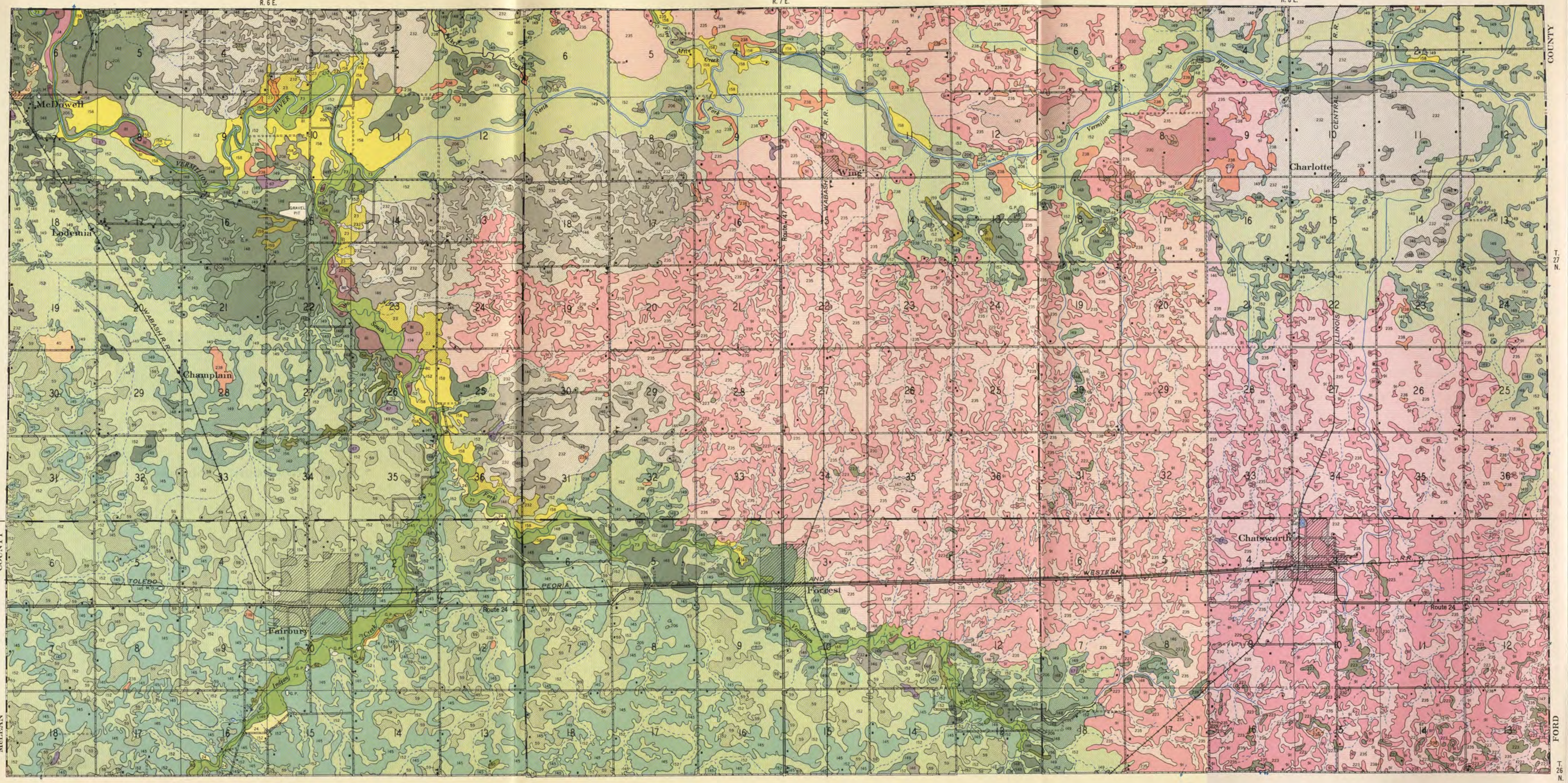
LIVINGSTON COUNTY SOIL MAP



LEGEND

23	Blount silt loam
24	Miami silt loam
25	Hennepin gravelly loam, eroded
36	Tama silt loam
40	Dodgeville silt loam
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150	Onarga sandy loam
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156	Ridgeville sandy loam
157	Rankin sandy loam
158	Vance silt loam
159	Pilot silt loam
206	Thorp silt loam
223	Varna silt loam
228	Eylar silt loam
229	Monee silt loam
230	Clarence clay loam to silty clay loam
231	Clarence silt loam, rolling phase
232	Elliott clay loam to silty clay loam
235	Elliott clay loam to silty clay loam, plastic till phase
238	Drummer clay

CONVENTIONAL SIGNS

- House
- School
- Church
- Store building
- Cemetery
- Elevator
- Railroads
- Paved roads (two lane)
- Metalled (allweather) roads
- Improved dirt and oiled roads
- Secondary Dirt and Private Roads
- Township boundary lines
- County boundary lines
- Streams (flowing)
- Streams (intermittent)
- Lakes and Ponds
- Swamps
- Fords
- M.D. Mine Dump
- G.P. Gravel Pit
- S.M. Surface Mines and Quarries
- C.W. Clay Works
- Limestone outcrop

Scale

0 ¼ ½ 1 2 Miles

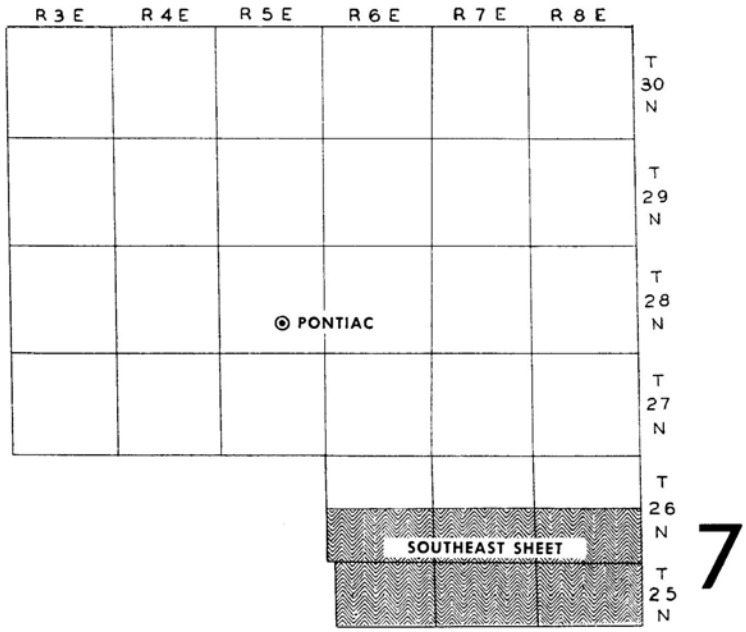
1938

R. S. Smith, In Charge Soil Survey

Soils Surveyed by
Eric Winters, in charge,
Herman Wascher, in charge,
G. D. Smith,
E. P. Whiteside,
R. T. Odell,
P. T. Veale,
F. F. Riecken,
T. G. Pearse,
J. S. McVickar,
J. B. Fehrenbacher,

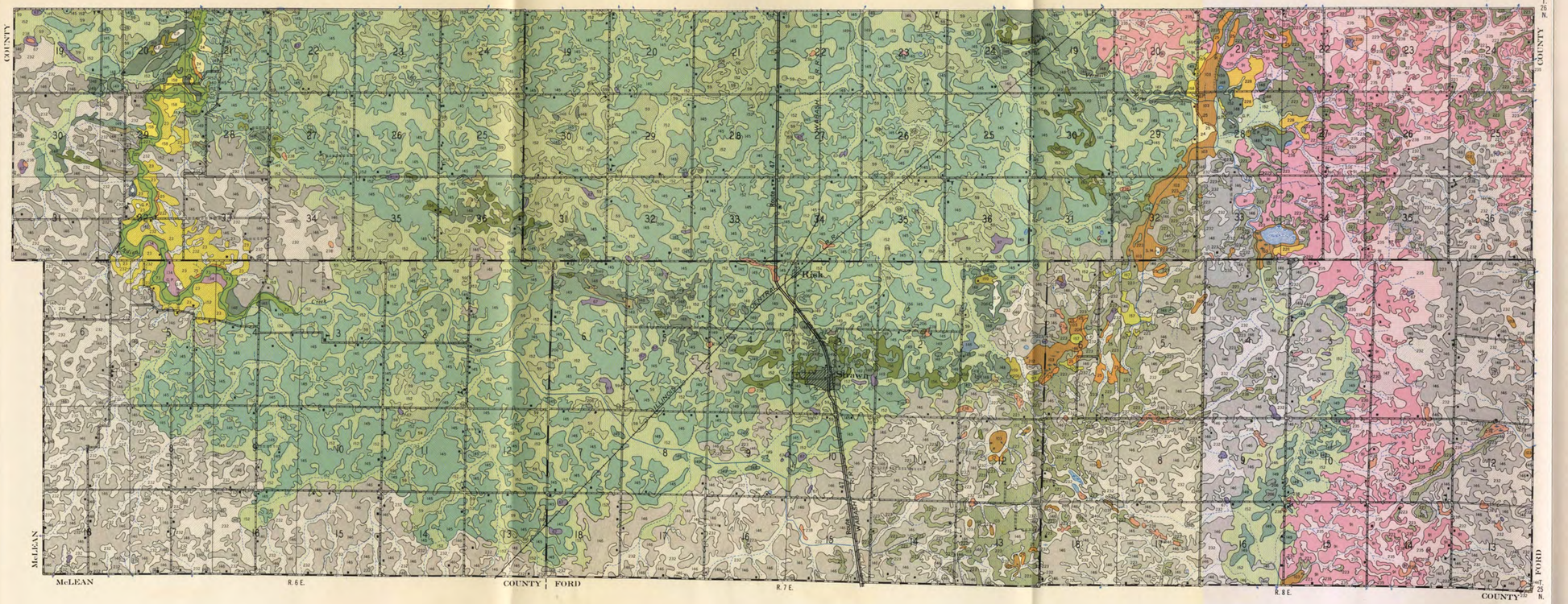
SOIL SURVEY MAP OF LIVINGSTON COUNTY

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION



7

LIVINGSTON COUNTY SOIL MAP



SOUTHEAST SHEET

LEGEND

23	Blount silt loam	81	Littleton silt loam terrace	156	Ridgeville sandy loam
24	Miami silt loam	91	Elliott silt loam, plastic till phase	157	Rankin sandy loam
25	Hennepin gravelly loam, eroded	103	Muck	158	Vance silt loam
36	Tama silt loam	134	Camden silt loam, terrace	159	Pilot silt loam
40	Dodgeville silt loam	144	Alvin sandy loam	206	Thorp silt loam
41	Muscatine silt loam	145	Saybrook silt loam	223	Varna silt loam
45	Denny silt loam	146	Elliott silt loam	228	Eylar silt loam
59	Lisbon silt loam	147	Clarence silt loam	229	Monee silt loam
60	LaRose silt loam	148	Proctor silt loam	230	Clarence clay loam to silty clay loam
67	Harpster clay loam	149	Brenton silt loam	231	Clarence silt loam, rolling phase
68	Sable silty clay	150	Onarga sandy loam	232	Elliott clay loam to silty clay loam
73	Huntsville loam, bottom	152	Drummer clay loam	235	Elliott clay loam to silty clay loam, plastic till phase
80	Alexis silt loam, terrace	154	Flanagan silt loam	238	Drummer clay

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