HENDERSON COUNTY SOILS

SOIL REPORT 77

UNIVERSITY OF ILLINOIS
AGRICULTURAL EXPERIMENT STATION

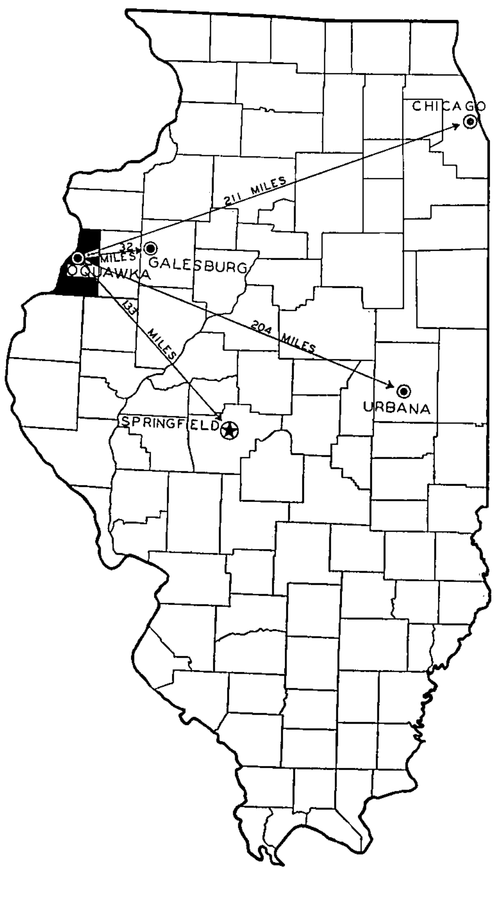
COVER PICTURE

The picture on the cover of this report shows how a part of Henderson county appears from the air. The town of Lomax appears in the center of the photograph. Dugout creek, winding out of the upland that lies east and southeast of Lomax, flows west and northwest into an embayment of the Mississippi river.

The steeper parts of the bluff just to the south and southeast of Lomax, along with the larger gullies, are covered with woods and brushy pasture. The soils are Hopper silt loam and Hickory loam. The cleared areas in the extreme lower right of the photograph are pastures and grain fields on the less sloping upland. Here the soils are primarily Seaton and Decorra silt loams.

Along the foot of the bluff is some Worthen silt loam bordered by Littleton silt loam. Much of the southern part of Lomax is located on Littleton soil. To the north and west of Lomax are various sandy and silty terrace soils, while the more recently deposited bottomland and alluvial fan material from Dugout creek is primarily Huntsville silt loam.

(Picture supplied by
Agricultural Conservation and Stabilization Service,
U. S. Department of Agriculture)



Henderson county lies in the northwestern part of Illinois. The county is mainly agricultural. About 130,000 acres, or a little more than half the land area, were used for cultivated crops in 1949. About 11,300 acres of farmland were wooded, and about 13,900 acres were in plowable pasture.

There are no large cities. Oquawka, the county seat and largest town, had a population of 777 in 1950. It is 211 miles from Chicago, 204 miles from Urbana, and 133 miles from Springfield. Burlington, Iowa, is just across the Mississippi river from the south-central part of the county.

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The authors are indebted to the Agronomy Department staff members in charge of experiment fields for the data in Tables 3, 5, 6, and 7; to R. W. Lorenz for Fig. 14; and to W. F. Purnell and R. S. Smith for most of the other figures. Field mapping and correlation in Henderson county were conducted by the University of Illinois Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture.

Urbana, Illinois — January, 1956

HENDERSON COUNTY SOILS

By P. T. Veale and H. L. Wascher

THIS SOIL REPORT has been prepared primarily for the farmers of Henderson county. Its purpose is to help answer these questions: *What soils occur in the county? How should they be managed? What crop yields can be expected on each soil type?*

The county soil map, found in the pocket at the back of the report, shows the location and extent of the various soils. Altogether 42 different soil types have been mapped in the county. The map also indicates the slope of the land and the amount of erosion at the time the map was made.

Directions for using the soil map are given in the text. Also included is information as to yields you can expect, the basic requirements of good soil management, and ways to work out a detailed program for your farm. This is followed by descriptions of the soil types shown on the map, together with suggestions for their use, conservation, and management. Each soil type has its peculiarities and each requires somewhat different management if it is to give the best returns now and in the years to come.

Scenes like this are common in Henderson county. Limestone bluffs, covered by 25 feet or more of loess, rise 150 to 200 feet above the floodplains and terraces of the Mississippi. Beyond the bluffs stretch upland timber and prairie soils. Fig. 1

HOW TO KNOW YOUR SOILS AND PLAN THEIR MANAGEMENT

Examine the Soil Map

Note numbers and names of types. Turn to the soil map and note the numbers and names of the soil types in the area in which you are interested. The map has been divided into five parts on the basis of township survey number and has been printed on four sheets of paper. On the back of each sheet is indicated the area of the county covered.

Each type is shown on the map by a distinguishing color. The soil type number is also given for each soil area. Where an area is too small to put the number in it, the number is placed next to the area and connected with it by a line. A legend on each sheet gives the name and number of each soil type, and the color used to distinguish it.

Note slope and erosion. The map shows not only the soil type but also the approximate slope and erosion of each soil area. Four ranges of slope are indicated in the following manner: (1) areas with slopes greater than 15 percent are shown by vertical red lines, (2) areas of 8 to 15 percent slope have diagonal red lines, (3) slopes ranging from 3 to 8 percent are indicated by horizontal red lines, and (4) areas without any lines have less than 3 percent slope.

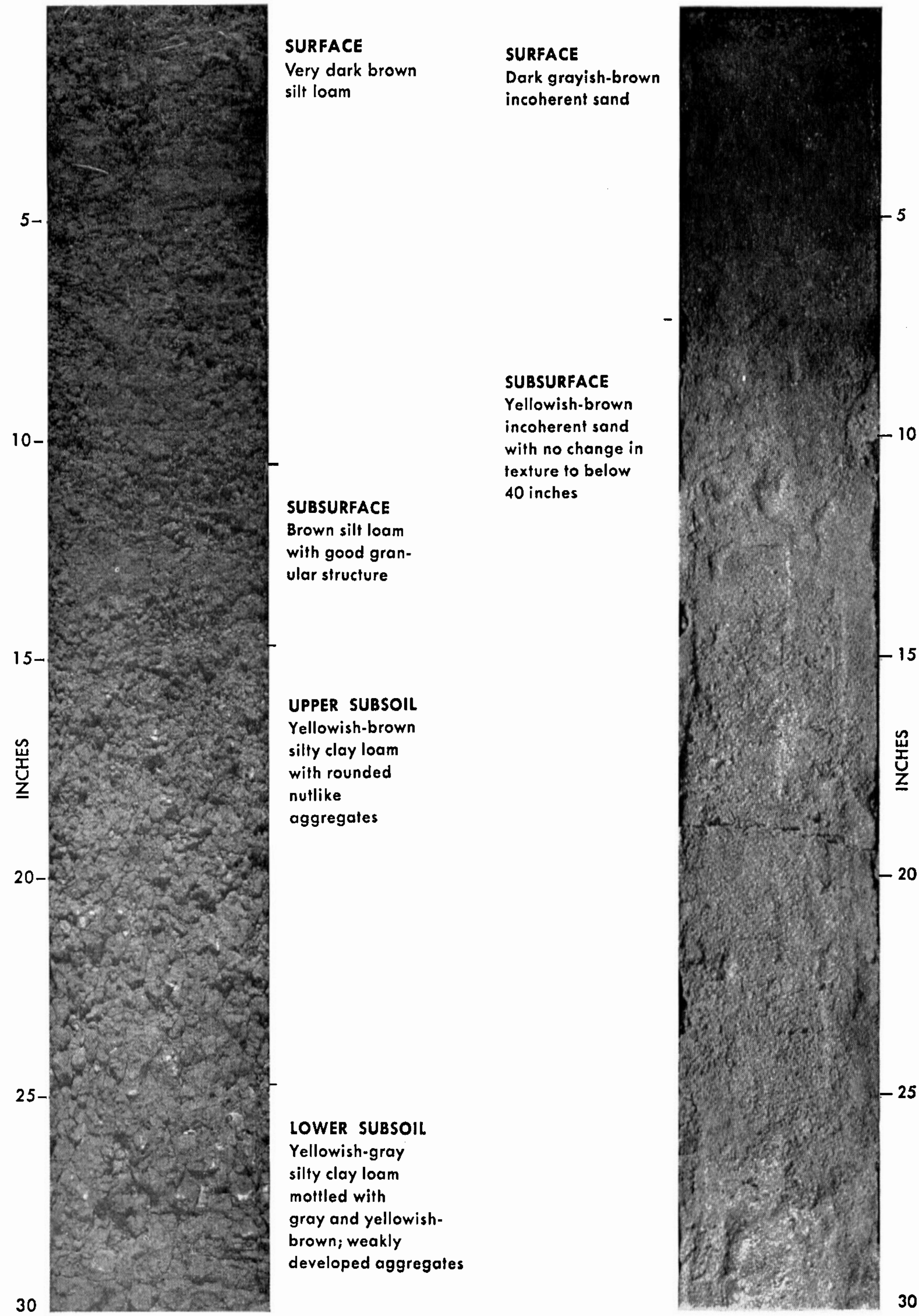
Two degrees of erosion are shown: (1) Areas with one or more inverted-V symbols (∧) are severely eroded. The surface soil is usually less than 3 inches on at least 40 percent of the area, and the plowed layer is made up mostly of subsoil or deeper underlying material. (2) Areas with no erosion symbol are not eroded, or at worst are only moderately eroded. The surface layer varies from 3 or 4 inches to 16 inches or more in thickness but usually averages around 9 inches.

Study Your Soils

Entire soil profile is important. Soil types are differentiated on the basis of their characteristics to a depth of 40 inches or more—not on the surface alone (Fig. 2). Often the surface layer of one type is little or no different from that of another, and yet the two types may differ widely in the character of the subsurface or subsoil and hence in agricultural value.

The high quality of Muscatine silt loam and the low quality of Oquawka sand, for example, depend as much on the nature of the deeper horizons as on the nature of the surface (Fig. 3). Muscatine has a well-aggregated subsoil that is easily penetrated by plant roots and permeable to water and at the same time has good water-holding capacity. The deeper horizons of Oquawka, on the other hand, are primarily loose or in-

Soil mappers study the different layers in a profile of Oquawka sand that has been exposed by a road cut. Fig. 2



Profiles of two very different soils. Muscatine silt loam (left) is high in organic matter, has good structure and excellent water-holding capacity, and is very productive. With good treatment, Muscatine gives an average corn yield of 98.8 bushels (Table 6). Oquawka sand (right) is low in organic matter, has poor structure, very poor water-holding capacity, and low to medium productivity. Average corn yield with good treatment is 63.7 bushels (Table 3).

Fig. 3

coherent sand with low water-holding capacity.

Variations occur within each type. It is also important to remember that the characteristics of a given soil type may vary from area to area. This is particularly true at the boundary between two soil types. There is usually a transition area that has 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.

Occasionally types are so intermingled that it is impossible to show them separately. The Hopper silt loam and Hickory loam complex (shown as 281-8 on the map) is an example of intermingled types. They are indicated in the descriptions as "undifferentiated."

Type differences have definite causes. Soils do not occur at random, nor is their nature a matter of chance. A soil type is primarily the product of five factors: (1) kind of parent material, (2) topography or lay of the land, (3) native vegetation, (4) age, commonly related to degree of profile development, and (5) climate. Man may also sometimes be considered a factor because of his use of limestone, fertilizers, and various cultural practices.

In general, one type differs from another because one of the above-mentioned factors is different. Fayette silt loam and Tama silt loam, for example, developed under different kinds of vegetation. Fayette had a forest type of vegetation and Tama a grass or prairie type. As a result, the surface of Fayette is light-colored and that of Tama is dark-colored. This difference is responsible for a difference in productivity (Table 1) and in agricultural value.

If you know the conditions under which a soil type has developed, this report will give you a mental picture not just of the character of the soil, but also of the slope on which it occurs, the native vegetation that once grew on it, its drainage needs, and other conditions that affect the present and future uses of the soil.

Compare Your Yields With Test Yields

High crop yields year after year are possible only with both 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 other faulty management.

Use five-year averages. The yields you can expect from Henderson county soils are shown in Table 1.[1] This table gives the average yields of corn, soybeans, oats, winter wheat, and alfalfa that may be expected over a period of years under a moderately high level of soil management. Average your own yields for five years or longer and compare them with those shown in the table for your soil types. At least five years are necessary for a valid comparison, because of the wide variations that occur from year to year in rainfall, temperature, wind, and insect and disease injury. If you find that your average yields are much below those shown in Table 1, it will pay you to examine your management practices to see where changes should be made.

Still higher yields are possible. On most soils you can get even higher yields than those shown in Table 1, if you apply ad-

[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.

Table 1. — AVERAGE YIELDS OF CROPS

To Be Expected on Henderson County Soils Over a Period of Years Under a Moderately High Level of Management[a]

Figures in **bold face** are based on long-time records kept by farmers in cooperation with the Department of Agricultural Economics; the others are estimated yields.

Type No.	Type name	Hybrid corn	Soy-beans	Oats	Wheat	Alfalfa	Mixed pasture
		bu.	*bu.*	*bu.*	*bu.*	*tons*	*days*[b]
28	Jules silt loam, bottom	58(D)	25(D)	40(D)	26(D)	2.2(D)	120
30	Hamburg silt	N	N	N	N	1.8	80
34	Tallula silt loam	64(E)	25(E)	46(E)	27(E)	3.0	130
36	Tama silt loam	**69**(E)	**29**(E)	**50**(E)	**30**(E)	**3.2**	155
37	Worthen silt loam	67(E)	27(E)	49(E)	29(E)	3.0	145
41	Muscatine silt loam	**78**	**34**	**56**	**32**	**3.3**	165
54	Plainfield sand	N	N	N	N	1.5	70
61	Atterberry silt loam	**70**	28	**48**	28	3.0	140
68	Sable silty clay loam	**77**	**34**	**54**	**30**	**3.1**	150
73	Huntsville loam, bottom	57(D)	26(D)	**40**(D)	26(D)	2.6(D)	140
77	Huntsville silt loam, bottom	**70**(D)	30(D)	45(D)	28(D)	2.8(D)	155
80	Alexis silt loam, terrace	65(E)	27(E)	44(E)	28(E)	2.9	130
81	Littleton silt loam, terrace	**75**	32	53	31	3.1	150
88	Hagener loamy sand, terrace	**45**(E)	18(E)	**30**(E)	**19**(E)	2.0	90
103	Muck	66	28	N	N	N	120
107	Sawmill silty clay loam, bottom	**67**(D)	30(D)	40(D)	26(D)	N	135
125	Selma loam, terrace	**68**	29	46	27	2.7	130
136	Brooklyn silt loam, terrace	45	23	33	22	N	100
187	Milroy sandy loam, terrace	40	19	30	18	N	85
188	Beardstown loam, terrace	51	23	38	24	2.3	110
206	Thorp silt loam	**60**	27	**42**	26	2.4	120
261	Niota silt loam, terrace	40	20	30	20	N	90
262	Denrock silt loam, terrace	59	27	42	25	2.4	120
263	Fall silt loam	69	29	48	28	2.8	140
265	Lomax loam, terrace	58	25	42	26	2.7	130
266	Disco sandy loam, terrace	50	22	38	24	2.4	110
267	Curran silt loam, terrace	48	23	37	24	2.3	110
268	Mt. Carroll silt loam	65(E)	27(E)	46	27	2.8	135
269	Muskrat loam, terrace	V	V	V	V	N	95
270	Oquawka sand, terrace	39(E)	15(E)	28(E)	16(E)	1.7	80
271	Timula silt loam	52(E)	N	38(E)	25(E)	2.5	120
272	Edgington silt loam	56	26	39	25	N	115
273	Decorra silt loam	**64**(E)	25(E)	**44**	26	2.9	135
274	Seaton silt loam	60(E)	23(E)	42(E)	25(E)	2.8	130
275	Joy silt loam	**75**	**31**	**53**	31	**3.3**	150
276	Biggsville silt loam	**69**(E)	28(E)	**50**(E)	29(E)	3.2	145
277	Port Byron silt loam	67(E)	27(E)	49(E)	28(E)	3.1	145
278	Stronghurst silt loam	**65**	26	**45**	27	**2.9**	135
279	Rozetta silt loam	**60**(E)	23(E)	**42**(E)	24(E)	**2.8**	130
280	Fayette silt loam	**62**(E)	**24**(E)	**43**(E)	**26**(E)	**2.9**	135
281-8	Hopper silt loam-Hickory loam, undifferentiated	N	N	N	N	2.0	85
282	Chute fine sand	N	N	N	N	1.7	75

LETTERS HAVE THE FOLLOWING MEANINGS: D = Yields for bottomland types, assuming less than 10 percent damage by flooding. E = Erosion by water or wind is often a problem. Estimated yields are for areas which are uneroded or only slightly eroded. For detailed information concerning crop adaptation and the kind of cropping systems suitable for controlling erosion refer to the use and management discussion for each soil type. N = Crop not adapted. V = Variation in frequency of overflow and variability of soil as mapped make yield estimate impossible.

[a] A moderately high level of management includes these things: adequate drainage, timely use of adapted cultural practices, careful handling of manure, a cropping system which minimizes erosion and helps maintain good tilth and the nitrogen supply, the application of supplemental nitrogen where needed, and the application of limestone, phosphate, and potash according to the needs indicated by soil tests. Crop yield estimates are based on the assumption that during a four-year period a total of 265 pounds per acre of nitrogen, 150 pounds of P_2O_5, and 140 pounds of K_2O were supplied from various sources or were presumed to be available from previous treatments, with each corn crop receiving 30 to 40 percent of the total four-year amount.

[b] Estimated number of days that one acre will carry one cow.

ditional fertilizer containing nitrogen, phosphate, potash, or perhaps the minor elements. Superphosphate drilled with wheat and certain other small grains will, in many seasons, produce profitable increases in yield. There is also evidence that corn yields can be increased by certain starter fertilizers such as 3-12-12 or 4-16-16.

Thus, while yields below those shown in Table 1 probably indicate faulty management, higher yields are not out of the question.

Since new crop varieties, new cultural and fertilizer practices, and new plant diseases and insect pests may change yield levels in future years, the figures in Table 1 must be regarded as mainly of current interest. Later figures can be obtained from time to time by writing the Department of Agronomy, Agricultural Experiment Station, Urbana, Illinois.

Know the Requirements of Good Soil Management

The basic requirements for good management are similar for all the soils of Henderson county. These requirements are discussed in the following paragraphs. In addition, many of the soil types have special requirements which must be met if good yields are to be obtained. These are discussed in the "Use and management" paragraphs included in the descriptions of the individual soil types (pages 15 to 55).

Provide good drainage. You do not get good yields year after year from a poorly drained soil. Soils that cannot be effectively underdrained need special attention. The problem is to recognize these soils and provide a surface drainage system that will carry off excess water.

Soils that cannot be tile-drained cannot be penetrated easily by roots. Thus these soils tend to be drouthy. Crops growing on them are sensitive to seasonal conditions and are likely to suffer from dry weather sooner than crops on more permeable soils.

Have your soils tested. Each crop that is removed from the land takes away some of the soil nutrients. The dissolving-and-leaching action of rain also depletes soil fertility. Eventually soils become acid and deficient in available plant nutrients. They will no longer produce satisfactory yields.

Soil tests will show what nutrients are lacking and how much limestone, phosphate, or potash you need to apply. Often parts of a field will need no limestone or fertilizer, while other parts of the same field are acid or low in available phosphorus or potassium. By studying the soil map and the results of the soil tests together, you can decide just where to apply limestone and fertilizer, as well as how much to apply.

Apply limestone, phosphate, and potash. If the soil test shows that a soil is acid, an application of ground limestone will easily correct this condition. Apply potash fertilizer, straw, or strawy manure to soils deficient in available potassium; and phosphate fertilizers to soils low in available phosphorus.

On many soils rock phosphate and superphosphate can be used interchangeably or together. On some soils, however, one form of phosphate is better than the other. For example, superphosphate should be used on calcareous (limey) soils. If one form of phosphate is definitely preferable on a soil type, that fact is mentioned in the "Use and management" discussion of the type (pages 15 to 55).

Add organic matter and nitrogen frequently. An adequate supply of nitrogen and decaying organic matter must be maintained in the soil. Large amounts of nitrogen are necessary for vigorous crop growth. Unlike phosphorus and potassium, nitrogen is not one of the soil minerals — it comes largely from decaying soil organic matter (humus), leguminous crop residues, manure, and nitrogen fertilizers. Since many soils are too low in humus for maximum crop yields, nitrogen should be supplied through crop residues, manure, or fertilizer.

Decaying organic matter not only supplies nitrogen — it also helps to keep the soil in good physical condition. It loosens up sticky clay, clay loam, and silty clay loam soils, making them more "mellow" and easier to till. It also binds together the particles in coarse-textured soils, such as loose sands, loamy sands, and sandy loams, so that they are less easily moved by wind and retain more moisture.

Use a good crop rotation. A good rotation includes deep-rooting legumes and fibrous-rooted grasses. Without these crops, many soils develop a compacted surface and a "plow sole" (a compacted layer just beneath the surface). Such layers make it hard for water and roots to penetrate the soil. The deep-rooting legumes, such as alfalfa and sweet clover, together with the fibrous-rooted grasses, will help keep both the surface and the deeper layers of the soil porous. Also, as already mentioned, legumes supply nitrogen to the soil; and the decaying residues of legumes, grasses, and other crops help to keep the soil in good physical condition.

To get these benefits it isn't enough just to adopt a good rotation: It is essential to return to the soil all crop residues and part of the top growth of the legumes. If all top growth is taken off or closely grazed, much of the value of the rotation will be lost.

Four-field rotations. Following is a four-field cropping system that has many advantages for corn-belt farms:

Year	Field 1	Field 2	Field 3	Field 4
First......	Corn	Corn	Oats (sweet clover)	Alfalfa-brome
Second....	Corn	Oats	Corn	Alfalfa-brome
Third......	Oats (sweet clover)	Alfalfa-brome	Corn	Corn
Fourth....	Corn	Alfalfa-brome	Oats	Corn
Fifth......	Corn	Corn	Alfalfa-brome	Oats (sweet clover)
Sixth......	Oats	Corn	Alfalfa-brome	Corn
Seventh....	Alfalfa-brome	Oats (sweet clover)	Corn	Corn
Eighth.....	Alfalfa-brome	Corn	Corn	Oats

In this system the legumes are grown when the nitrogen supply in the soil is lowest. Corn follows either alfalfa or a sweet-clover catch crop and thus benefits from the nitrogen that the deep-rooting legumes supply. The alfalfa-brome stays down two years, thus saving on seeding costs.

Good stands and growth of the sweet-clover catch crop are essential for the success of this rotation. To obtain such stands, proper soil treatment and other good farming practices — including the control of such insects as sweet clover weevil — are necessary. On soils that should be fall-plowed (such as Types 68 and 107), the sweet clover will be hard to kill.

A four-field cropping system like this one can be fitted into various situations. It can be adjusted to differences in soil productivity or in 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

The soybeans on this untreated, severely eroded hillside were scarcely worth harvesting. In contrast, the uneroded ridge top produced an excellent stand. Fig. 4

choices and split cropping on one or more fields give the flexibility necessary for meeting these problems.[1]

Following are seven other rotations, which further illustrate the flexibility of a four-field system. In Rotations 4 to 7 the fields have been split some years, so that two different crops can be grown.

Rotation No.				
1	Corn	Corn	Oats	Sod
2	Corn	Soybeans	Oats	Sod
3	Corn	Soybeans	Wheat	Sod
4	Corn	Corn-soybeans	Oats-barley	Sod
5	Corn	Oats-soybeans	Wheat-barley	Sod
6	Corn	Soybeans-barley	Oats-wheat	Sod
7	Corn	Corn-soybeans	Oats-wheat	Sod

(Sod here = legumes or mixed legumes and grasses)

Other rotations than the four-field system can be used. Where the land is rolling, longer rotations, with more of the land in sod crops, are advisable. On a 16-percent slope at La Crosse, Wisconsin, less than half as much soil was lost under a corn, oats, sod, sod, sod rotation than under a corn, oats, sod rotation (Table 2).

On many of the nearly level, dark-colored permeable soils in Henderson county a three-year rotation of corn, soybeans, oats (with a legume catch crop) is a possibility. To keep yields at a high level, however, heavier fertilization is needed than when a standover legume is grown. Also, when legume catch crops are substituted for standover legumes, the plowed layer of soil tends to become more compact and less porous.

In the "Use and management" discussions for the different soil types (pages 15 to 55), specific rotations are suggested for each type.

Control erosion. Even on moderately sloping land, erosion can be a problem. On most gentle slopes, however, it can be held at a minimum with the right rotations, properly handled — unless so much soil has already been lost that a vigorous vegetative growth cannot be obtained (Fig. 4). On all sloping areas of such types as 34, 36, 271, 273, 274, 276, 279, and 280, however, full use should be made of grass waterways (Fig. 7),

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

Table 2. — Summary of Runoff and Soil Loss From Fayette Silt Loam[a]

(Upper Mississippi Valley Conservation Experiment Station, La Crosse, Wisconsin, 1933-1953[b])

Plot No.	Years	Crop[c]	Treatment[d]	Length of slope	Slope gradient	Water losses: Growing season[e]	Water losses: Yearly[f]	Soil loss per acre: Growing season	Soil loss per acre: Yearly
				ft.	*percent*	*in.*	*in.*	*tons*	*tons*
1	1933-1938	Continuous R	None	36.3	16	6.46	9.38	64.59	68.47
3	1933-1938	Continuous R	None	72.6	16	6.43	9.87	99.37	111.67
2	1933-1938	Continuous R	None	145.2	16	6.36	9.10	123.59	137.40
4	1933-1938	Continuous G	None	72.6	16	5.25	7.19	14.80	16.76
5, 6, 7 (aver.)	1933-1938	R-G-M	Lime	72.6	16	3.40	5.75	23.59	27.82
10	1933-1938	Bluegrass (protected)	None	72.6	16	.03	1.87	.01	.09
12	1933-1938	Bluegrass (protected)	None	72.6	30	.62	1.87	.06	.07
16	1942-1953	R-G-M	MLPK	72.6	16	1.15	2.71	7.76	9.12
4, 5, 6, 7, and 17 (aver.)[g]	1942-1953	R-G-M-M-M	MLPK	72.6	16	.68	2.81	3.25	3.78
2, 3, 8, 9, and 18 (aver.)[h]	1942-1953	R-G-M-M-M	MLPK	72.6	16	.88	3.70	3.37	3.82
1	1942-1953	G-M-M-M-M	LPK	72.6	16	.18	2.26	.17	.24
10	1942-1953	Bluegrass (clipped)	None	72.6	16	.07	1.95	.01	.02

[a] The soils on this station have been correlated with the Fayette series; however, recent field and laboratory studies indicate that these soils probably correlate with the Seaton series.
[b] Data for 1933-1943 from U. S. Dept. Agr. Tech. Bul. 973, 1949. Data for 1944-1953 obtained by personal correspondence with Project Supervisor O. E. Hays.
[c] **R** = corn; **G** = small grain; **M** = rotation hay.
[d] **M** = manure at 8 tons per acre on cornland; **L** = limestone to maintain approximately neutral soil reaction; **P** = phosphate to maintain available P at 75 lb. per acre; and **K** = potash to maintain available K at 200 lb. per acre.
[e] Average precipitation at La Crosse for the growing season (April 16 to November 15, inclusive) was 25.50 in. during 1933-1938; 22.91 in. during 1942-1953.
[f] Average annual precipitation at La Crosse was 33.81 in. during 1933-1938; 30.56 in. during 1942-1953.
[g] Plots 4, 5, 6, 7, and 17 were moderately eroded during 1942-1953.
[h] Plots 2, 3, 8, 9, and 18 were severely eroded during 1942-1953.

winter cover crops, contour cultivation, and other erosion-control practices.

In Table 2 you can see the soil and water losses on slopes of varying length when different rotations and soil treatments were followed. The plots were on light-colored, weakly developed, deep loess soils.

More soil was lost from long slopes than from short (*see* plots 2, 3, and 1) even though the amount of runoff was about the same. On slopes of the same length, the soil loss under continuous small grain (plot 4) was only about half as great as the loss under a rotation of corn, small grain, meadow (plots 5, 6, 7). And only about one-sixth as much soil was lost from continuous grain (plot 4) as from continuous corn (plot 3). The losses from a corn–small-grain–meadow rotation were only one-third as great when full soil treatment was applied as when only lime was applied (plots 5, 6, 7, and 16). Under ungrazed bluegrass practically no losses occurred, even on a 30-percent slope.

A few soils of Henderson county, particularly Types 8, 30, and 281, should be kept in permanent woods or permanent pasture, or used only for meadow to avoid excessive erosion.

If erosion-control measures are necessary on a soil type, suggestions are given in the "Use and management" section included with the soil type description. 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."

Use good tillage practices. For maximum crop yields, soils must be kept in good physical condition. This is hard to do when soils are cultivated frequently.

Two soil types, 68 and 107, present special difficulties. Covering about 8 percent of the area of Henderson county, these soils have fine-textured surfaces which are sticky when wet. If plowed when too moist, these soils dry hard and cloddy and may also develop a plow sole. Fall-plowing will help to keep these unfavorable conditions from developing. When fall-plowed, these heavy, nonerosive soils granulate during the winter, making it easier to prepare a good seedbed in the spring. Fall-plowing also reduces the danger of too much delay in preparing the seedbed.

Soil areas with slopes greater than about 3 or 4 percent should be plowed on the contour and only in the spring. On most such areas in Henderson county, the producing capacity will not be completely destroyed by erosion. If erosion is allowed to go unchecked, however, the productivity can be so seriously reduced that farming to grain crops could become unprofitable.

Sandy soils present special problems. Sandy soils cover about 28,000 acres in Henderson county. All are drouthy — some more so than others. Plainfield (54) and Chute (282) are perhaps the most drouthy, with Hagener (88) and Oquawka (270) next. Milroy (187) and Disco (266) are probably the least drouthy of these soils.

None of these soils is well adapted to grain crops that grow throughout the summer although some, particularly Disco, produce fairly good corn and soybean crops if well farmed with a good rotation and properly limed and fertilized. All of them are better adapted to fall-seeded crops such as wheat and rye, to deep-rooting legumes such as alfalfa, or to timber.

Soil tests were made in 1951 on samples of sandy soils collected from untreated areas in Henderson county. The soils were mostly about medium acid

Table 3. — AVERAGE ANNUAL YIELDS PER ACRE, 1937-1951, ON SOIL MOSTLY OQUAWKA SAND (270)

(Oquawka Soil Experiment Field, Henderson County: Standard Treatment Plots)

Treatment	Hybrid corn 15 crops[a]	Soybeans 15 crops[a]	Wheat 15 crops	Rye 15 crops	Alfalfa 15 crops
	bu.	*bu.*	*bu.*	*bu.*	*tons*
0	34.1	9.6	7.5	9.2	0
M	51.0**	13.6*	13.1*	11.8	.2
ML	64.6*	17.5‡	21.8*	14.8‡	1.7**
MLP	63.7‡	18.3‡	22.1‡	14.7‡	1.6‡
0	38.1	9.7	9.2	8.9	0
R	45.0	10.4	8.7	9.5	0
RL	55.9‡	15.3*	16.0*	12.4†	1.4**
RLP	54.1‡	14.3†	15.4†	12.4†	1.3‡
RLPK	60.9*	19.3*	18.6‡	13.1†	2.2*

CROPPING PRACTICES: Corn, soybeans, rye, hay, wheat (le), alfalfa (6 years). The legume (le) was plowed under as a green manure.

KEY TO STANDARD SOIL TREATMENTS APPLIED: **0** = no treatment; **M** = manure (1 ton for each ton dry weight of crops removed); **R** = crop residues (stover, straws, legumes); **L** = limestone; **P** = rock phosphate; **K** = muriate of potash.

[a] 1951 yields missing for first-year hybrid corn and soybeans on check plot in manure system and on residue plot in residue system.

* Increase over preceding treatment significant. ** Increase over preceding treatment highly significant. † Increase over check plot significant, but not significant over preceding treatment. ‡ Increase over check plot highly significant, but not significant over preceding treatment.

Nine-year-old pine tree shelter break. Such plantings may be used on sandy soils to help protect adjacent fields from wind erosion. Fig. 5

(except Chute, which was alkaline), medium to high in available phosphorus, and low to medium in available potassium. Plainfield (54) and Oquawka (270) tended to be somewhat lower in both available phosphorus and available potassium than the other soils. Individual samples varied, however, and the results indicate that all these sandy soils should be systematically sampled and tested when a soil treatment program is being planned.

How the sandy soils respond to treatment is indicated by results from the Oquawka Experiment Field (Table 3). This field is located on Oquawka sand (270), which is intermediate in character between Plainfield sand (54) and Hagener loamy sand (88). The untreated plots test medium acid, high in available phosphorus (an average of 93 pounds an acre), and slight to medium in available potassium (an average of 108 pounds an acre). On this field limestone has increased the yields of all crops grown. Manure has also given good increases and should be beneficial on all the sandy soils of the county. Potash has given slight to moderate increases for most of the crops, especially in recent years. Phosphate, primarily in the form of rock phosphate, has given no significant increases in crop yields.

Results from the application of nitrogen fertilizers are meager and probably inconclusive. According to the little amount of data available, a side-dressing of nitrogen probably increases corn yields regardless of other fertilizer treatment. The nitrogen is more apt to produce significant increases, however, where other basic treatment is also given.

Most of the sandy soils in this county have only a slight to moderate amount of organic matter in the surface layer, and all but Milroy have little or no clay in the upper 40 inches. The sand grains are not bound together well and are rather easily moved by the wind. As a result, it is hazardous to grow clean-cultivated crops on these soils.

A number of special practices will help reduce wind movement of sandy soils, thus improving crop growth and increasing yields. These are the things that can be done: Keep the soil surface well covered by a thick growth of vegetation. Leave crop residues partly or wholly on the surface. Cover exposed areas with manure or other organic materials. Plow ridges and furrows at right angles to prevailing winds. Plant clean-tilled crops in strips at right angles to prevailing winds and preferably not more than 20 rods wide, alternating these strips with strips of small grains and forage crops. Use shelter belts. Certain trees, especially adapted conifers, grow well on sandy soils (Figs. 5 and 14).

More specific treatment and management problems are discussed in the "Use-and-management" paragraphs for each soil type.

Work Out a Detailed Program

After you have identified the soil types on your farm, noted the general recommendations for good soil management, and also studied the special recommendations for your soils, you will be able to work out an efficient program of land use and soil management.

A large map is helpful. In order to study field arrangement, cropping systems, and soil-treatment programs, you may find it helpful to enlarge the soil map of your farm. This can be easily done by following these directions:

First find on the colored soil map the section or sections in which your farm lies. Beginning at the section lines, draw lines 3/8 inch apart through this area. The lines should go both across the area and up and down. Since the scale of the colored map is 1½ inches to the mile, the lines 3/8 inch apart will represent quarter-mile lines and each 3/8-inch square a 40-acre tract.

Now, on a separate sheet of paper, draw lines 2 inches apart, making 2-inch squares. With the 3/8-inch squares on the colored map as guides, and with the outline of your farm in mind, you can mark your farm's soil areas in the 2-inch squares. You will then have an enlarged map of your farm, with a 2-inch square for a 40-acre tract, or a scale of 8 inches to the mile.

You can, of course, enlarge the soil map to any other scale by using different-sized squares.

Study field boundaries. After you have enlarged the soil map, you can draw in fence lines and field boundaries.

On most farms in Henderson county, fences and field boundaries follow straight lines with little or no relation to soil types or slopes. Straight boundaries are an advantage on nearly level areas where the various soil types have similar use-and-management requirements. In more rolling areas, however, field boundaries must be changed to conform to soil types and slopes if the land is to remain permanently productive. Many fields, especially in the rolling areas, contain two or more soils that call for widely different management and different kinds of crops. If one of the soil areas is very small, it may have to be farmed the same as the rest of the field. Often, however, the soil areas are large enough that rotations can be split or field boundaries rearranged so that each type can be devoted to its best use.

Adjust cropping system. Usually several good field arrangements and cropping systems can be worked out for any given farm. Some farms may require two or more different cropping systems. For example, a farm that includes overflow bottomland, rolling upland, and level upland or terrace may need three different crop rotations if these three kinds of land are to be used to best advantage. The three rotations must be coordinated, of course, to make an efficient cropping system for the farm as a whole.

Follow good management practices. In drawing up your plan, consider carefully the requirements for good management (pages 8 to 14): adequate drainage; testing for acidity, phosphorus, and potassium; application of limestone and fertilizers; selection of a good crop rotation to provide organic matter and nitrogen; erosion control; and good tillage practices.

No set order for changes. No matter how good your plan is on paper, it isn't doing you any good until you put it into operation. There isn't any set order for making changes — just where you should start depends on your farm. If drainage is not adequate, you will need to correct this before you can get the best returns from a good crop rotation and soil treatment. Also, on acid soils limestone will need to be added early in the soil-improvement program. Otherwise you will not be able to grow the deep-rooting legumes that are part of a good rotation.

Keep plans up-to-date. It is important to keep in touch with the latest information on cropping practices and soil treatments. Your farm adviser will be glad to help you plan a good crop and soil-management program for your farm and keep it up to date.

SOIL TYPES OF HENDERSON COUNTY, THEIR USE AND MANAGEMENT

In the following section, the various soil types in Henderson county are discussed in *numerical* order, as they are listed in Table 1 on page 7. Another numerical list is given in Table 4, which shows the area each soil occupies in the county. An *alphabetical* list is given on page 64, along with the page number within this section where each soil type is discussed. For a tabulated summary of the characteristics and properties of the soils, see Table 8, page 56.

Jules silt loam, bottom (28)

A light-colored soil found in the bottoms, Jules silt loam is derived from limey sediments washed down from the adjacent hills. The total area in Henderson county is about 295 acres.

Soil profile. The soil material is a yellowish-gray to yellow silt loam containing free lime and ranging from 2 feet to 15 feet or more in thickness. It has been recently deposited on top of an older darker-colored bottomland soil. It is very permeable but is often wet because it is subject to frequent overflow.

Use and management. Where this soil floods frequently it can only be used for pasture. If protected from overflow it is well adapted to cultivated crops. An R-R-G-M[1] rotation is recommended.

Jules does not need limestone. Since the phosphorus test is unreliable on

[1] R = row crop; G = small grain; M = rotation hay or pasture.

Table 4. — HENDERSON COUNTY SOILS: Areas of the Different Types

Type No.	Type name	Acres of miscellaneous conditions	Acres of various slope and erosion groups: Slope—0 to 3%: Swamp, no erosion	Slope—0 to 3%: Erosion none to moderate	Slope—3 to 8%: Erosion none to moderate	Slope—3 to 8%: Erosion severe	Slope—8 to 15%: Erosion none to moderate	Slope—8 to 15%: Erosion severe	Slope—15% or more: Erosion none to moderate	Slope—15% or more: Erosion severe	Total acres of each soil type	Total square miles of each soil type	Percent of total area
28	Jules silt loam, bottom	.....	.....	295	.....	.....	.....	.....	.....	.....	295	.46	.12
30	Hamburg silt	.....	.....	11	69	.....	90	18	72	44	304	.48	.12
34	Tallula silt loam	.....	.....	.....	375	.....	202	59	58	.....	694	1.08	.28
36	Tama silt loam	.....	.....	806	13 191	334	4 628	1 276	.....	.....	20 235	31.62	8.14
37	Worthen silt loam	.....	.....	486	635	.....	114	38	.....	.....	1 273	1.99	.51
41	Muscatine silt loam	.....	.....	33 242	2 643	.....	.....	.....	.....	.....	35 885	56.07	14.44
54	Plainfield sand	.....	.....	471	2 797	.....	3 563	.....	444	.....	7 275	11.37	2.93
61	Atterberry silt loam	.....	.....	1 956	599	.....	157	.....	.....	.....	2 712	4.24	1.09
68	Sable silty clay loam	.....	8	6 210	.....	.....	.....	.....	.....	.....	6 218	9.72	2.50
73	Huntsville loam, bottom	.....	.....	160	.....	.....	.....	.....	.....	.....	160	.25	.06
77	Huntsville silt loam, bottom	.....	.....	16 955	.....	.....	.....	.....	.....	.....	16 955	26.49	6.83
80	Alexis silt loam, terrace	.....	.....	155	135	.....	.....	.....	.....	.....	290	.45	.12
81	Littleton silt loam, terrace	.....	.....	6 733	206	9	.....	.....	.....	.....	6 948	10.86	2.80
88	Hagener loamy sand, terrace	.....	.....	3 479	775	.....	133	.....	.....	.....	4 387	6.85	1.77
103	Muck	.....	.....	246	.....	.....	.....	.....	.....	.....	246	.38	.10
107	Sawmill silty clay loam, bottom	.....	5 512	9 079	.....	.....	.....	.....	.....	.....	14 591	22.80	5.87
125	Selma loam, terrace	.....	127	815	.....	.....	.....	.....	.....	.....	942	1.47	.38
136	Brooklyn silt loam, terrace	.....	208	86	.....	.....	.....	.....	.....	.....	294	.46	.12
187	Milroy sandy loam, terrace	.....	.....	104	.....	.....	.....	.....	.....	.....	104	.16	.04
188	Beardstown loam, terrace	.....	.....	704	13	.....	.....	.....	.....	.....	717	1.12	.29
206	Thorp silt loam	.....	148	414	.....	.....	.....	.....	.....	.....	562	.88	.23
261	Niota silt loam, terrace	.....	.....	50	.....	.....	.....	.....	.....	.....	50	.08	.02
262	Denrock silt loam, terrace	.....	.....	177	.....	.....	.....	.....	.....	.....	177	.28	.07
263	Fall silt loam	.....	.....	2 849	763	10	86	.....	.....	.....	3 708	5.79	1.49
265	Lomax loam, terrace	.....	43	2 032	41	.....	.....	.....	.....	.....	2 116	3.31	.85

Table 4. — Concluded

Type No.	Type name	Acres of miscellaneous conditions	Acres of various slope and erosion groups: Slope—0 to 3%		Slope—3 to 8%		Slope—8 to 15%		Slope—15% or more		Total acres of each soil type	Total square miles of each soil type	Percent of total area
			Swamp, no erosion	Erosion none to moderate	Erosion none to moderate	Erosion severe	Erosion none to moderate	Erosion severe	Erosion none to moderate	Erosion severe			
266	Disco sandy loam, terrace	.....	.....	4 280	741	.....	25	.....	.....	.....	5 046	7.88	2.03
267	Curran silt loam, terrace	.....	.....	433	183	.....	38	4	.....	.....	658	1.03	.26
268	Mt. Carroll silt loam	.....	.....	346	30	.....	68	11	.....	.....	455	.71	.18
269	Muskrat loam, terrace	.....	622	181	.....	.....	.....	.....	.....	.....	803	1.25	.32
270	Oquawka sand, terrace	.....	.....	4 452	5 855	.....	664	24	.....	.....	10 995	17.18	4.42
271	Timula silt loam	.....	.....	......	145	10	484	61	236	24	960	1.50	.39
272	Edgington silt loam	.....	.....	710	.....	.....	.....	.....	.....	.....	710	1.11	.29
273	Decorra silt loam	.....	.....	3 697	2 039	54	2 297	1 648	.....	.....	9 735	15.21	3.92
274	Seaton silt loam	.....	.....	1 586	2 007	3	426	152	.....	.....	4 174	6.52	1.68
275	Joy silt loam	.....	.....	12 365	.....	.....	.....	.....	.....	.....	12 365	19.32	4.98
276	Biggsville silt loam	.....	.....	......	6 253	29	470	401	.....	.....	7 153	11.18	2.88
277	Port Byron silt loam	.....	.....	160	968	.....	72	.....	.....	.....	1 200	1.88	.48
278	Stronghurst silt loam	.....	.....	5 235	.....	.....	.....	.....	.....	.....	5 235	8.18	2.11
279	Rozetta silt loam	.....	.....	......	3 810	254	5 514	4 859	.....	.....	14 437	22.56	5.81
280	Fayette silt loam	.....	.....	311	439	.....	258	23	.....	.....	1 031	1.61	.41
281-8	Hopper silt loam—Hickory loam, undifferentiated	.....	.....	......	.....	.....	.....	.....	20 908	6 527	27 435	42.87	11.04
282	Chute fine sand	.....	.....	40	20	.....	59	29	30	.....	178	.28	.07
B.O.	Blowout	350	.....	......	.....	.....	.....	.....	.....	.....	350	.55	.14
B.P.	Borrow Pit	31	.....	......	.....	.....	.....	.....	.....	.....	31	.05	.01
G.P.	Gravel Pit	9	.....	......	.....	.....	.....	.....	.....	.....	9	.01	Trace
L.Q.	Limestone quarry	227	.....	......	.....	.....	.....	.....	.....	.....	227	.35	.09
	Swamp (soil types not identified)	7 605	.....	......	.....	.....	.....	.....	.....	.....	7 605	11.88	3.06
	Water	10 598	.....	......	.....	.....	.....	.....	.....	.....	10 598	16.56	4.26
	Total	18 820	6 668	121 311	44 732	703	19 348	8 603	21 748	6 595	248 528	388.33	100.00
	Percent of total area	7.6	2.7	48.8	18.0	.3	7.8	3.4	8.7	2.7	.....	....	100.00

calcareous soils such as Jules, a soluble phosphate fertilizer should be used first on a trial basis. If a need for phosphorus is indicated, add more soluble phosphate. Rock phosphate is not effective on soils that contain a supply of free lime. Jules may respond well to potash — this is often true of limey soils.

Hamburg silt (30)

Hamburg silt is a light-colored bluff-knob soil formed from calcareous (limey) coarse-textured loess (wind-deposited silt). The surface, which is moderately loose and incoherent, is susceptible to erosion by wind and water. Water moves through the soil moderately fast, and the water table is deep. This soil is a minor type in Henderson county, occupying only about 300 acres.

Soil profile. The surface, where it exists, is brown to dark-brown friable calcareous (limey) silt up to 4 inches thick. It may sometimes be lacking because of erosion. The underlying material is buff to very pale-brown calcareous silt, which is frequently mottled with gray and reddish brown. It may contain numerous lime concretions and snail shells or shell fragments.

Use and management. Hamburg silt should be used for pasture or woods. It is not suited to cultivation because of its steep slopes. No soil treatment is suggested, although moderate applications of potash and superphosphate may increase the production of pasture. In general, the quality and yield of pasturage will be improved by a mixture of legumes with the grasses.

Care should be used to prevent overgrazing. Because this soil tends to be moderately drouthy, more forage can be produced if the land is grazed for two or three weeks and then rested for four to six weeks than if grazed continuously.

Tallula silt loam (34)

Tallula silt loam is a dark-colored upland soil formed from loess, a wind-deposited silt. It occurs in the Mississippi bluff region on moderate to steep slopes formerly covered by native grasses. There are about 700 acres of Tallula in Henderson county.

Soil profile. The surface layer is 6 to 8 inches thick and is dark brown and friable. The subsurface, which extends to a depth of 15 to 20 inches, is a brown friable silt loam. It rests directly on unweathered loess, as no subsoil has developed. This loess is calcareous (limey) yellowish silt loam with some reddish-brown and gray mottlings. These mottlings often become more pronounced with depth.

Use and management. Since Tallula occurs on moderate to steep slopes, it erodes rapidly when cultivated. Gullies form quickly and once begun are almost impossible to control (*see* Fig. 16, page 54). Care must therefore be taken to keep them from getting started.

In general, a good rotation alone will not control erosion.[1] Contour cropping and grass waterways are needed, and terraces may be used to advantage if good outlets can be established.

Fertilizer response is variable. Soil tests should be made before adding fertilizers. The organic-matter content is medium. If you grow and plow under legumes frequently, you will both in-

[1] For possible exceptions, see table on page 19.

crease the nitrogen content of the soil and improve the structure.

Each slope and erosion combination within the type needs separate management practices. In the following table, rotation recommendations are given for every slope and erosion combination found. The rotations are the most intensive ones possible if soil loss is to be no more than 4 tons per acre per year. Less intensive rotations would of course reduce erosion losses further and are desirable. On slopes longer than 300 feet less intensive rotations *must* be used if erosion losses are to be held to a minimum.

Rotations and conservation practices recommended for different degrees of slope and erosion on Tallula silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with—			
			No conservation practices	Contouring	Strip cropping	Terracing
34	3–8	None to moderate	R-G-M-M-M	R-R-G-M-M	R-R-G-M-M	R-R-G-M
34	8–15	None to moderate	G-M-M-M	R-G-M-M-M-M	R-G-M-M-M	R-G-M-M
34	8–15	Severe	Pasture	G-M-M-M-M	R-G-M-M-M-M	R-G-M-M-M
34	15 plus	Moderate	Pasture	Pasture	R-G-M-M-M-M	Terraces not recommended

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Tama silt loam (36)

Tama silt loam is a dark upland prairie soil found on gently to strongly sloping areas. It is formed from loess, a wind-deposited silt. The total area of Tama in Henderson county is about 20,235 acres.

Soil profile. The surface is a brown to dark-brown silt loam 12 to 16 inches thick. The upper subsoil is dark yellowish-brown to brownish-yellow silty clay loam that is permeable to water. It extends to a depth of about 24 inches. Below 24 inches the subsoil changes to a moderate yellowish-brown silty clay loam with occasional grayish-brown and rusty-brown mottlings. These spots often become more pronounced with depth. Carbonates are usually found at a depth of 80 to 120 inches.

Use and management. Tama is a good general farming soil (Table 5). Because of its rolling character, however, it is subject to moderate to serious sheet and gully erosion (Fig. 6).

It is hard to get highest yields on this soil once the surface has washed away. Experiments on Tama showed that corn yields are reduced about 1 bushel per acre for each inch of surface soil lost. While this loss is not large, it does become significant after several inches of topsoil are gone. Erosion-control practices are therefore important. Where the slopes are gentle to moderate, erosion can be controlled fairly well by the use of a good rotation, grass waterways, and contour planting (Fig. 7).

In Henderson county Tama was

Table 5. — AVERAGE ANNUAL YIELDS PER ACRE, 1937-1951 ON SOIL MOSTLY TAMA SILT LOAM (36)

(Mt. Morris Soil Experiment Field, Ogle County: Standard Treatment Plots)

Treatment	1st-year hybrid corn 15 crops[a]	2d-year hybrid corn 12 crops	Wheat 15 crops[b]	Oats 15 crops[a]	Hay 14 crops[c]
	bu.	*bu.*	*bu.*	*bu.*	*tons*
0	59.8[d]	....	25.0	53.7	1.5
M	85.9**	....	31.7	67.7	2.0
ML	95.5‡	....	35.2†	73.1†	2.5
MLP	95.7‡	....	35.4†	74.0†	2.3
0	41.5[d]	36.3	18.5	42.5	...
R	51.1	40.6	19.5	43.0	...
RL	81.2**	67.2**	27.5*	56.7**	...
RLP	86.3‡	69.6‡	30.6‡	59.1‡	...
RLPK	90.7‡	68.6‡	29.9‡	57.2‡	...

CROPPING PRACTICES: Manure (livestock) system, 1937-1941—corn, corn, oats (le), wheat (le); 1942-1947—corn, oats (le), wheat, hay; 1948-1951—corn, corn, oats, hay. Residue (grain) system, 1937-1948—corn, corn, oats (le), wheat (le); 1949-1951—corn, oats (le), wheat, hay. The legume (le) was plowed under as a green manure.

KEY TO STANDARD SOIL TREATMENTS APPLIED: **0** = no treatment; **M** = manure (1 ton for each ton dry weight of crops removed); **R** = crop residues (stover, straws, legumes); **L** = limestone; **P** = rock phosphate; **K** = muriate of potash.

[a] 1948 yields missing for first-year hybrid corn in residue system and oats in manure system because of changes made in the crop rotations.

[b] In the manure system wheat yields for 1949, 1950, and 1951 are missing because wheat is not grown in the new crop rotation established in 1948.

[c] Hay yield for 1946 is missing in manure system. The significance of differences in hay yields was not calculated because the kind of hay grown varied.

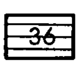
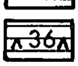
[d] Differences between the untreated plots in average yields is due to a difference in the rotations combined with a variation in soils.

* Increase over preceding treatment significant. ** Increase over preceding treatment highly significant. † Increase over check plot significant, but not significant over preceding treatment. ‡ Increase over check plot highly significant, but not significant over preceding treatment.

mapped with five slope and erosion combinations, each requiring somewhat different management. The table below gives the rotations and practices recommended for these different combinations on slopes between 200 and 300 feet long. These rotations permit up to 3½ tons of soil loss per acre a year, or 1 inch of surface loss in about 44 years. Less intensive rotations are of course

Rotations and conservation practices recommended for different degrees of slope and erosion on Tama silt loam

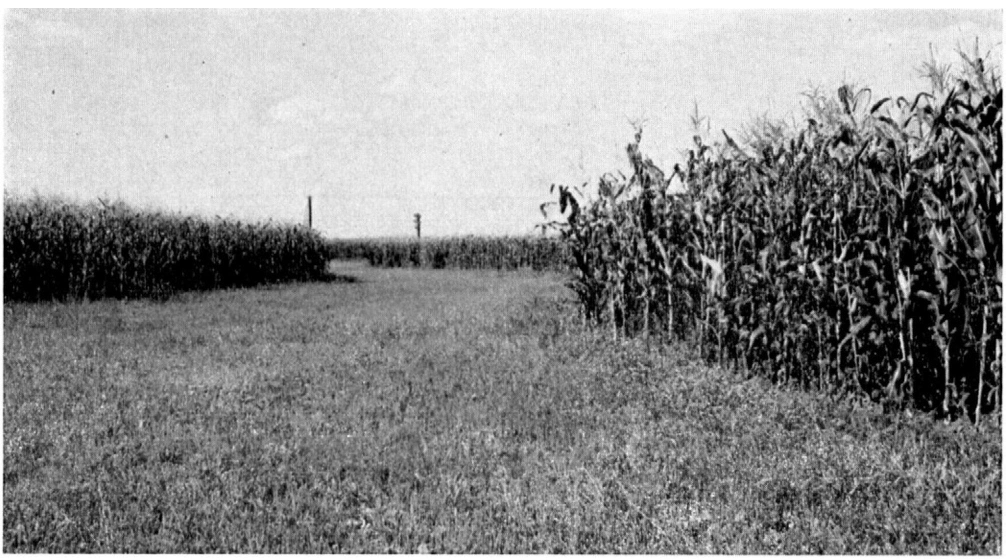
(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
36	0-3	None to moderate	R-R-G-M	(Conservation practices usually not recommended)		
	3-8	None to moderate	R-G-M-M	R-R-G-M-M	R-R-G-M-M	R-R-G-M
	3-8	Severe	R-G-M-M-M	R-G-M-M	R-R-G-M-M-M	R-G-M
	8-15	None to moderate	G-M-M	R-G-M-M-M	R-G-M-M	R-R-G-M-M-M
	8-15	Severe	Pasture	G-M-M-M	R-G-M-M-M	R-G-M-M-M

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Sheet erosion may be serious even on gentle slopes. This field of Tama silt loam is losing appreciable amounts of surface soil even though the slopes are no greater than 3 or 4 percent. Fig. 6



Grass waterways and contour planting will help reduce sheet erosion on gentle slopes. This is a good example of a well-kept grass waterway, and the corn, planted on the contour, shows the effect of good treatment. Fig. 7

desirable to reduce erosion losses still further. On slopes longer than 300 feet less intensive rotations *must* be used if soil losses are not to become excessive. More intensive rotations may be used on slopes shorter than 200 feet.

Soil tests should be made of each field to determine phosphorus and potassium requirements. Tests were made in 1946 on samples from the check plots of the Mt. Morris Experiment Field, which is primarily Tama silt loam. These tests indicated low to slight available phosphorous present. Although yield data from that field (Table 5) show small increases for rock phosphate on all crops grown in the residue system, the increases are not significant. For all practical purposes, rock phosphate gave no yield increases in the manure system. Possibly the soil organic matter releases enough phosphorus for good yields.

Potash tests indicated high amounts of available potassium, and potash fertilizer did not significantly increase crop yields.

Worthen silt loam (37)

A dark-colored soil, Worthen silt loam is found along the foot slopes of the Mississippi river bluffs. It developed under a grass vegetation on silty materials washed down from the bluffs. Slopes range from gentle to moderate. Worthen covers about 1,270 acres in Henderson county.

Soil profile. The surface is normally a dark grayish-brown friable silt loam, although in a few places the texture approaches that of a very fine sandy loam. Thickness of this layer varies between 10 and 25 inches. The subsurface, extending to about 36 inches, is a yellowish-brown friable silt loam. No well-developed subsoil is present. Below 36 inches are occasional gray coatings and low-contrast mottles.

A few acres of somewhat darker soils which are calcareous (limey) at 20 inches are included with Worthen silt loam on the soil map. Normally, however, Worthen is not calcareous above a depth of 40 inches.

Use and management. Worthen is an excellent general farming soil. Drainage is usually very good, and artificial drainage is rarely needed. Sweet clover and alfalfa will grow after liming requirements are met. The soil is high in the important plant nutrients, and turning under a crop of clover every fourth year is usually about all that is needed to produce high yields of other crops. Occasionally, however, applications of phosphate or potash may be needed for special crops or for very high yields. The soil should be tested before these materials are applied.

Rotations and conservation practices recommended for different degrees of slope and erosion on Worthen silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
37	0–3	None to moderate	R-R-G-M	(Conservation practices usually not recommended)		
37	3–8	None to moderate	R-G-M-M	R-R-G-M-M	R-R-G-M-M	R-R-G-M
37	8–15	None to moderate	G-M-M	R-G-M-M-M	R-G-M-M	R-R-G-M-M-M
37	8–15	Severe	Pasture	G-M-M-M	R-G-M-M-M	R-G-M-M

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Erosion losses may be severe. Rotations and control practices suggested for various combinations of slope percent and erosion on slopes between 200 and 300 feet long are given at the bottom of page 22. These rotations allow up to 4 tons of soil loss per acre per year, which is equal to 1 inch of soil in about 37 years. Rotations that have more hay and meadow and fewer cultivated crops will reduce losses still further and are therefore desirable.

On slopes shorter than 200 feet, more intensive rotations than those shown in the table may be used. On slopes longer than 300 feet, however, less intensive rotations *must* be used to guard against excessive soil losses.

Muscatine silt loam (41)

Muscatine silt loam is a dark upland soil found on very gently sloping areas in association with Tama silt loam and Sable silty clay loam. It usually occurs on slopes of 1 to 3 percent. Muscatine is one of the more extensive upland prairie types in Henderson county, occupying about 35,885 acres or 14.4 percent of the area of the county.

Soil profile. The surface, about 14 inches thick, is a very dark-brown friable silt loam. The upper subsoil, extending from 14 to about 24 inches, is mostly brownish-gray to dark-gray silty clay loam, slightly mottled with gray and yellowish brown. Below 24 inches the subsoil blends into a moderate yellowish-brown silty clay loam with gray and brown mottles which become more pronounced with depth. In Henderson county the subsoil of Muscatine tends to be rather thick, often extending down to about 60 inches. The calcareous (limey) unweathered loess usually occurs at about 70 inches from the surface.

Use and management. Muscatine is an

Table 6. — AVERAGE ANNUAL YIELDS PER ACRE, 1937-1951 ON SOIL MOSTLY MUSCATINE SILT LOAM (41)

(Kewanee Experiment Field, Henry County: Standard Treatment Plots)

Treatment	1st-year hybrid corn 15 crops	2d-year hybrid corn 12 crops	Oats 15 crops	Wheat 15 crops	Hay[a] 15 crops
	bu.	*bu.*	*bu.*	*bu.*	*tons*
0	69.0[b]	....	52.6	20.9	1.41
M	88.8**	....	66.2*	28.1*	1.89
ML	96.8‡	....	67.8†	31.4‡	2.23
MLP	98.8‡	....	69.8‡	34.1‡	2.41
0	57.8[b]	64.9	47.9	21.2	1.10
R	64.7	66.2	49.5	23.1	.86
RL	80.9*	77.8	55.3	27.6†	1.35
RLP	83.3‡	79.4	58.9	30.2‡	1.64
RLPK	82.0‡	76.0	55.1	27.8†	1.78

CROPPING PRACTICES: Manure (livestock) system, 1937-1948—corn, oats, wheat, legume hay; 1948-1951—corn, corn, oats, legume hay. Residue (grain) system, 1937-1948—corn, corn, oats, legume hay; 1948-1951—corn, oats (le), wheat, legume hay. The legume (le) was plowed under as a green manure.

KEY TO STANDARD SOIL TREATMENT APPLIED: **0**=no treatment; **M**=manure (1 ton for each ton dry weight of crops grown); **R**=crop residues (stover, straw, legumes); **L**=limestone (446 pounds an acre annually); **P**=rock phosphate (236 pounds an acre annually); **K**=muriate of potash (100 pounds an acre annually).

[a] The significance of differences in hay yields was not calculated.

[b] The difference between the untreated plots in average corn yields is due primarily to a difference in rotations.

* Increase over preceding treatment significant. ** Increase over preceding treatment highly significant. † Increase over check plot significant, but not significant over preceding treatment. ‡ Increase over check plot highly significant, but not significant over preceding treatment.

excellent general farming soil (Table 6). All grain crops suited to the region do well on it.

Although root and water penetration are deep, artificial drainage is usually necessary for early spring tillage and for maximum yields. Limestone should be applied in amounts indicated by soil tests, and a deep-rooting legume should be grown once every three to five years. A fair supply of available nitrogen can be maintained if one of these two practices is followed: (1) sweet clover is turned under as green manure every third or fourth year; (2) a legume or legume-grass mixture for hay or pasture is included in the rotation and animal manure is applied. Fields farmed heavily to corn may need applications of extra nitrogen to keep crop yields at a high level.

Superphosphate should be applied for wheat, especially where the wheat follows soybeans. Otherwise, phosphate should be applied only when soil tests indicate a need — and perhaps not even then. Tests were made in 1946 from the check plots of the Kewanee Experiment Field, which is primarily Muscatine silt loam. Although available phosphorus varied from low to medium, rock phosphate has not significantly increased crop yields on that field. It is possible that enough organic phosphorus becomes seasonally available in this soil to produce high crop yields without supplementary phosphorus. Also the use of manure and deep-rooted legumes will often postpone the need for phosphate fertilizer for many years. Potash should not be applied unless soil tests indicate it is deficient.

Rotation recommendations for Muscatine silt loam are given below.

Rotations and conservation practices recommended for different degrees of slope on Muscatine silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with—			
			No conservation practices	Contouring	Strip cropping	Terracing
41	0–3	None to moderate	R-R-G-M R-R-G(le)	(Conservation practices usually not recommended but drainage often needed)		
41	3–8	None to moderate	R-G-M-M	R-R-G-M-M	R-R-G-M-M	R-R-G-M

R = row crop; G = small grain; M = rotation hay or pasture; (le) = catch crop legume

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Plainfield sand (54)

Plainfield sand is a light-colored loose sandy soil, occurring on gently to strongly sloping areas on the Mississippi river terrace. It was formed originally by water-deposited sand but has since been reworked by wind. Native vegetation was timber, chiefly black oak. This type occupies about 7,275 acres in Henderson county.

Occasional small areas of Plainfield fine sand are found mixed with Plainfield sand in the upland. They are so small and so mixed with the Plainfield sand that they could not be shown separately on the soil map.

Soil profile. The surface, 2 to 4 inches thick, is dark in virgin areas because of the accumulation of leaf mold. Under cultivation this dark surface quickly disappears, and the plowed layer is a very pale-brown loose sand. From 6 to 44 inches or more the material is a brownish-yellow loose sand.

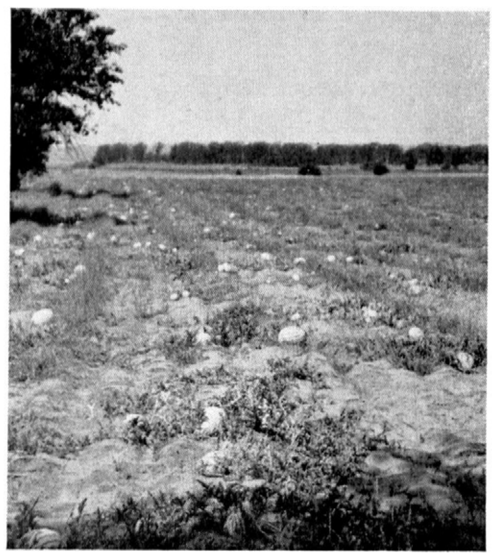
Use and management. Plainfield sand is acid, very low in plant nutrients, drouthy, and very susceptible to wind erosion. It is not a good soil for most crops. The early-maturing grains, such as rye; drouth-resistant crops, such as melons, cowpeas, and sweet potatoes; and deep-rooting crops, such as alfalfa, do fairly well in favorable seasons if properly fertilized. Very early sweet corn, properly fertilized, will often produce a fair crop before dry weather, but field corn often will not pay the cost of growing the crop.

One of the difficulties in handling this soil is its tendency to drift. Wind movement may be lessened or prevented by using shelter belts, reforesting blowouts and bare knolls, and keeping a protective cover of vegetation on the soil as much of the time as possible. Another good practice is to crop a field in strips laid out at right angles to the prevailing wind. The strips should be no more than 20 rods wide.

If this soil is to be farmed, soil tests should be made to determine fertilizer needs. However, crops on Plainfield sand usually respond only to limestone and potash, as indicated by results on Oquawka sand, a type similar to Plainfield (Table 3). Data from the Oquawka field also show that organic matter in the form of manure and crop residues is very important in increasing crop yields.

After fertilizer has been added according to soil tests, one year of rye or wheat followed by three or four years of alfalfa is recommended as a crop rotation. This leaves 75 to 80 percent of the land in hay crops at all times. Such a rotation should be planted in strips with the hay and small grain crop alternating.

Special farming enterprises have been profitable on this soil. Watermelons and cantaloupes grow well if fertilized and rotated in different fields (Fig. 8). Turkey raising has become popular in recent years. The droppings improve the fertility of the soil and make it easier to obtain satisfactory crops.



Certain special crops, such as watermelons, will often produce a better income from sandy soils than corn or soybeans. Fig. 8

On moderate to steep slopes, especially those steeper than about 4 or 5 percent, the land should be planted to trees. Certain pine trees have done well on the sandy soils of Henderson county and other counties in the state. Red, white, and jack pine have been found especially well adapted (Fig. 14, page 44). New information about how best to establish pine plantations may be obtained from the Department of Forestry, University of Illinois, Urbana. Information about shelter belts may also be obtained from the same source.

Atterberry silt loam (61)

Atterberry silt loam is a medium-dark soil that occurs in the upland as a transitional belt between Muscatine and Stronghurst soils. It may be considered a lightly forested Muscatine silt loam. It is usually found on areas of 1 to 3 percent slope but is occasionally found on slopes up to 10 percent. It occupies about 2,700 acres in Henderson county.

Soil profile. Atterberry is intermediate in character between Muscatine silt loam (41) and Stronghurst silt loam (278). The surface 6 inches is a grayish-brown to dark grayish-brown silt loam. The subsurface is a brown to light brownish-gray silt loam slightly mottled with gray and very pale brown. The subsoil starts at a depth of 18 inches. To about 36 inches, it is grayish-brown, moderately plastic, silty clay loam, mottled with brownish yellow and reddish brown. At 36 inches the color changes to a light brownish gray which is strongly mottled with yellowish brown and reddish brown. The texture is a light silty clay loam at 36 inches, grading into a silt loam at about 45 inches. Calcareous (limey) loess is found at depths of 60 to 80 inches. A small area of well-drained, unmottled, prairie-forest transitional soil, located about ½ mile north of the town of Media, is included with this type in Henderson county.

Use and management. Atterberry is somewhat less productive than Muscatine, although the land-use recommendations for Muscatine apply equally well to Atterberry. The chief differences are that Atterberry needs more organic matter and that extra nitrogen is necessary for consistently high yields of corn.

The most intensive rotations recommended for Atterberry on slopes between 200 and 300 feet long are given in the following table.

Rotations and conservation practices recommended for different degrees of slope on Atterberry silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
61	0–3	None to moderate	R-R-G-M	(Conservation practices usually not recommended but drainage sometimes needed)		
61	3–8	None to moderate	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M	R-R-G-M
61	8–15	None to moderate	Pasture	R-G-M-M-M-M	R-G-M-M-M	R-G-M-M

R = row crop; G = small grain; M = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Sable silty clay loam (68)

Sable silty clay loam is a deep, dark-colored, moderately fine-textured soil found on the uplands. Although it sometimes occurs in elongated drainageways, it more often occupies wide, nearly level areas or very shallow depressions. It has developed from loess under poor natural drainage and tall-grass vegetation. It occupies about 6,220 acres in Henderson county.

Table 7. — AVERAGE ANNUAL YIELDS PER ACRE, 1937-1951 ON SOIL CHIEFLY SABLE SILTY CLAY LOAM (68)

(Aledo Experiment Field, Mercer County: Standard Treatment Plots)

Treatment	1st-year hybrid corn 15 crops	2d-year hybrid corn 15 crops	Oats 15 crops	Wheat 15 crops	Clover-alfalfa hay 15 crops
	bu.	*bu.*	*bu.*	*bu.*	*tons*
0	75.8[a]	73.9	59.5	....	1.90
M	97.0**	94.2**	68.2	....	2.90*
ML	100.8‡	100.1‡	72.3†	....	3.62‡
MLP	101.7‡	99.9‡	71.4	....	3.73‡
0	57.2[a]	62.7	47.2	18.6	....
R	64.0	65.8	48.6	21.1	....
RL	86.0**	74.2†	53.2	27.0‡	....
RLP	86.5‡	76.3†	52.6	28.4‡	....
RLPK	88.8‡	80.6‡	52.6	29.5‡	....

CROPPING PRACTICES: Manure (livestock) system—corn, corn, oats, legume hay. Residue (grain) system—corn, corn, oats (le), wheat (le). The legume (le) was plowed under as a green manure.
KEY TO STANDARD SOIL TREATMENTS APPLIED: **0** = no treatment; **M** = manure (1 ton for each ton dry weight of crops removed); **R** = crop residues (stover, straws, legumes); **L** = limestone (488 pounds an acre annually); **P** = rock phosphate (195 pounds an acre annually); **K** = muriate of potash (100 pounds an acre annually).
[a] Differences between the untreated plots in average yields are due primarily to a difference in crop rotation.
* Increase over preceding treatment significant. ** Increase over preceding treatment highly significant. † Increase over check plot significant, but not significant over preceding treatment. ‡ Increase over check plot highly significant, but not significant over preceding treatment.

Soil profile. The surface layer is a black silty clay loam about 12 inches thick. It is high in organic matter and plant nutrients and is either sweet (neutral) or at most only slightly acid. The subsurface is a brownish-black silty clay loam with a few rusty iron mottles. The subsoil begins at a depth of 16 to 18 inches. To about 36 inches, it is a brownish-black silty clay loam, mottled with gray. At 36 inches the material is mixed yellowish-brown, gray, and brownish-gray silty clay loam. Between 40 and 60 inches it grades into grayish-brown calcareous silt loam.

Use and management. Sable is a highly productive soil when well drained (Fig. 9). For high yields of the common grain crops, it needs only occasional light applications of lime, a good rotation, and fresh organic matter (Table 7). A standover legume or legume-grass sod every fourth year is the best means of keeping this soil in a desirable physical condition and in a high state of productivity.

Crops are not likely to respond to potash on this soil. A soluble phosphate, or mixed fertilizer containing phosphorus, usually benefits wheat. For best results soil tests should be made before fertilizer is applied, as individual fields having different past management will require different kinds and amounts of plant nutrients.

An R-R-G-M rotation is recommended for this type. An R-R-G(le)[1] rotation may sometimes be used. With such a rotation, however, care must be taken to keep this moderately fine-textured soil from becoming too compact. Avoid excessive cultivation and return enough organic matter to the soil to keep it well aggregated or granulated.

Erosion is not a problem except possibly along some drainageways where excess surface water from adjacent higher land may cut channels. Fall-plowing of this heavy, nonerosive soil is recommended, as the plowed layer tends

[1] R = row crop; G = small grain; M = rotation hay or pasture; (le) = legume catch crop.

Corn and soybeans grow well on Sable silty clay loam once the soil has been properly drained. This soil needs very little treatment. Fig. 9

to granulate during the winter and can be worked early in the spring. Plowing under immature sweet clover or alfalfa in the fall presents a problem, however, as the plants are harder to kill than when plowed under in the spring.

Huntsville loam (73)

Huntsville loam is a dark-colored soil derived from recent alluvial sediments of mixed origin. It occupies about 160 acres in Henderson county. Although it is slightly coarser in texture than Huntsville silt loam (77), it is similar in most other respects and suggestions for use and management are similar.

Huntsville silt loam (77)

Huntsville silt loam is a dark-colored nonacid soil derived from sediments recently deposited in the overflow channels of Dugout, Honey, Ellison, Smith, and Henderson creeks. It occupies about 16,950 acres in Henderson county.

Soil profile. Huntsville silt loam is very dark-brown or very dark grayish-brown silt loam, extending sometimes as deep as 60 inches. Occasional mottlings of light gray and rusty brown are found below 12 inches. The deeper silty layers are often interstratified with thin layers of sand or clay. In Henderson county small areas of fine sandy loam are included with this silt loam type. These differences in texture are common in sediments recently laid down by running water. The underlying material is usually of medium texture and is not acid.

Use and management. Little of the Huntsville silt loam in Henderson county is protected from overflow, so crops are uncertain. A few areas are higher, however, and a few are protected by levees (Fig. 10). In these areas the soil is well adapted to corn and soybeans. No soil treatment is needed as fresh deposits of sediments are left from year to year by floodwaters.

A rotation such as R-R-G(le) or R-R-G-M[1] is recommended where land is not subject to frequent overflow. Otherwise, pasture is the best use.

[1] R = row crop; G = small grain; M = rotation hay or pasture; (le) = legume catch crop.

Alexis silt loam (80)

Alexis silt loam is a dark soil derived from water-deposited silty and sandy material. It occurs on some of the Henderson creek and Mississippi river terraces on gentle to moderate slopes (1 to 6 percent) in association with Littleton silt loam (81). A minor type in Henderson county, it occupies only 290 acres.

Soil profile. About 8 inches thick, the surface is a brown to dark-brown friable silt loam to fine sandy silt loam. The subsurface is a brown to light-brown friable coarse silt loam. The subsoil begins at about 16 to 18 inches and varies from yellowish-brown to dark yellowish-brown heavy silt loam or light silty clay loam. Below 30 inches the soil is brownish-yellow friable silt loam, becoming calcareous (limey) at depths of 40 to 60 inches.

In Henderson county this soil frequently has considerable amounts of fine to very fine sand mixed throughout the profile. This material, coarser than silt, is thought to be partially responsible for the good internal drainage of Alexis, even on 1-percent slopes.

Use and management. Lime and fertilizer should be applied if soil tests show they are needed. Suitable rotations with recommended erosion-control practices are given in the table below. These recommendations apply on slopes between 200 and 300 feet long.

Rotations and conservation practices recommended for different degrees of slope on Alexis silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
80	0–3	None to moderate	R-R-G-M	(Conservation practices usually not recommended)		
80 (boxed, with horizontal lines)	3–8	None to moderate	R-G-M-M	R-R-G-M-M	R-R-G-M-M	R-R-G-M

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Littleton silt loam (81)

Littleton silt loam is a dark soil occurring on terraces along the Mississippi river and some of its tributaries. The native vegetation was grass. Normally this soil occurs on nearly level or very gently sloping areas, but a few small spots in Henderson county are found on slopes as steep as 6 percent. Littleton occurs in association with Alexis silt loam (80) but is less well drained. The total area of Littleton in this county is about 6,950 acres.

Soil profile. The surface is a very dark-brown silt loam about 12 inches thick. The subsurface, from 12 to about 18 inches, is a dark grayish-brown friable silt loam. From about 18 to about 30 inches, the subsoil is a dark grayish-brown to brown heavy silt loam or light silty clay loam. Usually it is weakly mottled with gray and reddish brown. Below 30 inches the material is grayish-brown and brown heavy silt loam. The gray and reddish-brown mottlings in the upper subsoil increase in number and intensity below 25 or 30 inches, becoming moderate to strong. Calcareous (limey) silt loam is usually found below 50 inches.

Use and management. Recommended rotations for Littleton silt loam on slopes between 200 and 300 feet long with different erosion-control practices are given below.

Rotations and conservation practices recommended for different degrees of slope and erosion on Littleton silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with—			
			No conservation practices	Contouring	Strip cropping	Terracing
81	0–3	None to moderate	R-R-G-M R-R-G(le)	(Conservation practices usually not recommended. Drainage sometimes needed.)		
81	3–8	None to moderate	R-G-M-M	R-R-G-M-M	R-R-G-M-M	R-R-G-M
∧81∧	3–8	Severe	R-G-M-M-M	R-G-M-M	R-R-G-M-M-M	R-G-M

R = row crop; G = small grain; M = rotation hay or pasture; (le) = catch crop legume.

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Hagener loamy sand (88)

A moderately dark sandy soil developed under prairie vegetation, Hagener loamy sand is found in association with Plainfield sand and Oquawka sand. It differs from them, however, in having a deeper, darker surface. It occurs on slopes of 1 to 7 percent on sandy Mississippi river terraces and occasionally in small upland areas along the Mississippi river bluffs. The total area of Hagener in Henderson county is about 4,387 acres.

Soil profile. The surface is a brown to dark grayish-brown loamy sand 12 to 20 inches thick. Below the surface, to a depth of 4 or 5 feet or more, the material is loose incoherent light yellowish-brown sand. There is no textural subsoil development above a depth of 4 feet. Some thin bands or lenses of clay and iron compounds often occur below that depth.

Use and management. Hagener is medium acid, low to medium in plant nutrients, and drouthy. When not protected, it can be moved easily by strong winds.

Hagener is a moderately good soil for early-maturing small grains, such as rye and wheat, or drouth-resistant crops, such as melons, cowpeas, sweet potatoes, and alfalfa. As a rule, it is best used for these crops. On highly fertilized fields, however, fair to good yields of corn may be obtained when rainfall is adequate throughout the growing season (*see* results on Oquawka sand, Table 3).

To prevent or minimize wind erosion one or more of these three important things are needed: (1) wind breaks or shelter belts (Fig. 5), (2) complete vegetative cover, (3) large amounts of fresh organic matter covering the soil or partially plowed into the soil.

After limestone and organic matter have been supplied to sandy soils in Henderson county, lack of potash may soon limit crop growth, especially that of legumes. Muriate of potash (0-0-50 or 0-0-60) or a mixed fertilizer high in potash, such as 0-9-27 or 0-10-20, is usually necessary for good stands of sweet clover, alfalfa, and other legume crops. Potash significantly increased yields of corn, soybeans, and alfalfa on the Oquawka Experiment Field, which is located on Oquawka sand (270), a soil similar to Hagener (Table 3). To date on this field, however, rock phosphate has not significantly increased yields of corn, soybeans, rye, wheat, clover, or alfalfa where limestone and either manure or residues have been added.

Contouring and terracing are not usually needed on sandy soils such as Hagener, because water penetrates these soils rapidly, and runoff is normally slight. Strip cropping, however, is recommended. To be most effective, the strips should be at right angles to the prevailing wind and should be no more than 20 rods wide. With this type of strip cropping, one year of either soybeans, wheat, or rye, and three years of hay have been a satisfactory rotation on slopes as steep as 8 percent. On steeper slopes, however, the soil tends to drift badly if plowed, and here pasture or woodland (Fig. 14) is recommended. If pastures are occasionally reseeded, retreated, and renovated, they will not only be more productive but will also give better protection against movement by the wind.

Rotations recommended for Hagener loamy sand in Henderson county on varying degrees of slope are given below.

Rotations and conservation practices recommended for different degrees of slope on Hagener loamy sand

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with—	
			No conservation practices	Strip cropping
88	0–3	None to moderate	G-M-M	R-G-M-M
88	3–8	None to moderate	G-M-M-M	R-G-M-M-M
88	8–15	None to moderate	Pasture	Pasture

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Muck (103)

Muck is found in a few scattered areas in abandoned channels and oxbows of the Mississippi river. This type occupies only about 246 acres in Henderson county.

Soil profile. Muck is a black to dark-brown organic soil consisting of almost completely decomposed remains of sedges, grasses, and other native plants. Brown peat is usually found below 30 to 40 inches. In a few small areas, however, mineral soil material occurs at about 36 inches. Because these areas cover such a small acreage, they are not separated from the deeper muck deposits in Henderson county.

Sometimes shallow muck deposits of 20 inches or less are found on mineral soil types. Such areas are mapped with the soil type they most closely resemble, usually Muskrat loam (269).

Use and management. Two problems need to be solved before good crop yields can be obtained on muck: The soil must be adequately drained, and it must be supplied with potash. If properly drained and fertilized, muck will produce good crops of corn and many of the vegetables.

Open ditches work better than tile on muck, since tile may get out of line and fail to carry off the water efficiently. If tile are used they should be placed on boards or planks for support. Use of a mole plow as a supplement to open ditches has sometimes helped to improve drainage in muck. This practice is temporary in its effect and usually needs to be repeated every year or two.

After drainage has been provided, potash fertilizer will often bring about very marked increases in crop yields. Fertilizers high in potash — such as 0-9-27, 0-10-20, 0-0-50, or 0-0-60 — are therefore suggested. Erosion is not a problem in the muck areas of Henderson county, and one cultivated crop after another is common practice, especially where heavy applications of potash are made.

Sawmill silty clay loam, bottom (107)

Sawmill silty clay loam is a dark soil found on broad, nearly level flats or in slight depressions of the river flood plains. It is developed from sediments deposited by slack water. There are about 14,600 acres of this soil in Henderson county.

Soil profile. Normally the surface of Sawmill is a black clay loam to silty clay loam 8 to 10 inches deep. In Henderson county the texture ranges to silty clay and color varies from black to very dark gray. The silty clay loam subsurface, extending to 18 or 20 inches, is very dark gray splotched with brown and brownish yellow. Below 20 inches the soil material is gray to dark-gray silty clay loam mottled with brown and yellowish brown. There is little or no true subsoil development, and the tex-

Since being protected from flooding by the Mississippi river (the levee is shown in the distance) and drained by dredge ditches, this field of Sawmill silty clay loam is adapted to intensive farming. Fig. 10

ture is usually similar from the surface to about 40 or 50 inches. Below 4 feet sandy lenses are often present.

Use and management. Sawmill is naturally poorly drained and can seldom be cultivated without flood protection and artificial drainage (Fig. 10). A combination of levee protection, tile, open ditches, and pumping stations is the best way of providing drainage.

This soil is so sticky that it is often hard to work. Sweet clover grown every three or four years and plowed under adds fresh organic matter which improves soil structure and tilth and also adds nitrogen. If possible, plowing should be done in the fall, although the sweet clover will be harder to kill at that time. Freezing and thawing can then break down any large clods, so that a good seedbed can be prepared easier and earlier than if spring plowing is done. All plowing and other tillage operations should be done only when moisture conditions are good; otherwise, hard clods are formed.

Test the soil before adding limestone or fertilizer. Sawmill is naturally sweet (neutral), and lime is seldom needed to obtain good stands of legumes. As a general rule phosphate and potash fertilizers are not needed either, although light applications at planting time will give crops a quick start. Lack of nitrogen may sometimes limit corn yields, especially during seasons that are wetter than normal.

This is a good soil for corn and soybeans and sometimes for winter wheat. It is not well adapted to spring grains because it tends to stay too wet and cold for early planting. An R-R-G-M or R-R-G(le)[1] rotation is recommended for this soil where it is adequately drained. Where it floods frequently, it is probably best used for pasture or woodland.

Selma loam, terrace (125)

Selma loam is a dark-colored, medium-textured soil occurring in low-lying, swampy areas in association with many of the sandy and silty terrace soils. It also occurs to some extent as low rises associated with Sawmill and other bottomland soils. It occupies about 940 acres in Henderson county.

Soil profile. The surface, which extends to a depth of about 10 inches, is a black to very dark-brown loam or sandy silt loam. The subsurface, extending from 10 to about 18 inches, is dark-gray sandy loam to sandy clay loam. The subsoil, from 18 to about 36 inches, is gray to dark-gray sandy loam to sandy clay loam, mottled with brown and yellowish brown. Below 36 inches the material is mostly stratified alluvial sediments of sandy loam and silt loam.

Use and management. Most areas of Selma soils need drainage. Many also need protection from flood waters. After adequate flood protection and drainage are provided, Selma loam is a good general farming soil. It is well adapted to growing corn and the other grain crops common to the region.

Selma is mostly about neutral in reaction, and little or no limestone is needed for growing clover and alfalfa. Available phosphorus and potassium tend naturally to be medium to high. They generally do not need to be added for high crop yields, although light applications at planting time will give most crops a quick start. The soil should be tested every few years, especially where

[1] R = row crop; G = small grain; M = rotation hay or pasture; (le) = legume catch crop.

it is heavily cropped to corn and soybeans, to check for any harmful increase in acidity or decrease in phosphorus or potassium. An R-R-G-M or R-R-G(le)[1] rotation is recommended for this soil where it is adequately drained.

Brooklyn silt loam, terrace (136)

Brooklyn is a medium-dark soil found in wet depressional areas on the silt loam river terraces. It has developed under a prairie vegetation from silty water-laid sediments. Not an extensive type in Henderson county, it occupies only about 290 acres. A few very small areas of Thorp silt loam (page 36), too small to be shown separately, have been mapped with Brooklyn.

Soil profile. The surface, to a depth of 8 inches, is dark-gray to grayish-brown friable silt loam. Normally extending from 8 to 20 inches, the subsurface is light-gray ashy silt loam. The subsoil, usually extending from 20 to 36 inches, is gray, compact and plastic silty clay, mottled with yellowish brown and reddish brown. In some areas, however, the subsoil is as close as 12 inches to the surface. Below 36 inches the stratified alluvial (water-deposited) material is variable, ranging from silt to sand.

Use and management. Brooklyn is naturally a wet, swampy soil with a subsoil that is tight and very slowly permeable to water. The chief problem in its management is drainage. Tile are not effective unless an open inlet is installed to let the surface water pass directly into the tile. Drainage by surface ditches is recommended, but since Brooklyn usually occurs in depressions that have no surface outlet, this type of drainage system is often impractical.

Brooklyn is acid and low in plant nutrients. After adequate drainage has been provided, soil tests should be made and limestone and fertilizers applied as needed. Phosphate and potash will need to be added regularly unless fairly heavy applications of barnyard manure can be made. Either stable manure or green manure should be added frequently to supply nitrogen and organic matter. An R-G-M-M or R-R-G-M-M[1] rotation is recommended where drainage and fertility are adequate. Where drainage is poor, this soil is best used for pasture.

Milroy sandy loam, terrace (187)

Milroy sandy loam is a medium-dark soil found in some of the depressional areas on the sandy terraces of the Mississippi river and Henderson creek. It has developed from old sandy river deposits under a prairie vegetation. A minor type in Henderson county, it occupies only about 100 acres.

Soil profile. The surface is dark-gray to very dark-gray sandy loam, 6 inches thick. Extending to about 18 inches, the subsurface is a gray, very friable sandy loam to loamy sand. The subsoil is a compact, plastic sandy clay to clay, very slowly permeable to water. It is gray, heavily mottled with yellowish brown and reddish brown. It is usually 18 inches thick, extending from 18 to 36 inches. In a few small areas, however, it is as thin as 12 inches or even less. Variable water-deposited materials, ranging from loamy sands to sandy loams, occur beneath the subsoil.

[1] R = row crop; G = small grain; M = rotation hay or pasture; (le) = legume catch crop.

Use and management. Even with the best management, Milroy is not highly productive. Poor drainage is one of the chief problems. Because water moves slowly through the subsoil, you'll have to rely chiefly on open ditches, furrows, open inlets into tile, or a combination of these practices. It is often difficult to obtain an outlet for the water, as the soil normally occupies low-lying areas.

If the soil can be adequately drained, it should be tested and at least some of the necessary materials applied. Since productivity of this soil is not high under full treatment, however, the costs of such treatment should be carefully compared with the possible increased returns (Table 1) before it is applied. The rotation should include a high proportion of legumes or legume-grass sod crops. An R-G-M-M rotation is recommended. (R = row crop; G = small grain; M = rotation hay or pasture.) Growing hay on the land half the time should help both to improve soil structure and to raise the fertility level.

Beardstown loam, terrace (188)

A medium-dark soil, Beardstown loam is found on the older sandy alluvial deposits along the Mississippi river. Although a few acres were mapped on slopes greater than 3 percent, it occurs primarily on areas with slopes of ½ to 1½ percent. It occupies about 717 acres in Henderson county.

Soil profile. The surface is dark grayish-brown friable loam, although a few small areas with sandy loam surfaces are included with this type in Henderson county. The subsurface is pale-brown to yellowish-brown compact loam, strongly mottled with reddish brown and gray. The subsoil is usually pale-brown to very pale-brown plastic clay loam, strongly mottled with reddish brown and gray. In a few areas, however, the subsoil seems to be a layer of stratified water-laid clay loam material rather than a developed soil horizon.

Normally the surface is 12 inches thick, the subsurface extends from 12 to about 20 inches, and the subsoil from about 20 to 30 inches. The depth to subsoil, however, ranges from about 12 inches to 24 inches. Below 30 inches are stratified sands and silts which usually have a fair moisture-holding capacity.

Use and management. Beardstown loam has moderate surface drainage, which can usually be improved by surface ditches. Underdrainage is somewhat slow, but tile draw well when a good outlet is provided.

Rotations and conservation practices recommended for different degrees of slope on Beardstown loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing[b]
188	0–3	None to moderate	R-G-M-M	(Conservation practices not recommended but drainage usually needed)		
188	3–8	None to moderate	R-G-M-M-M	R-G-M-M	R-G-M-M	R-G-M-M

R = row crop; G = small grain; M = rotation hay or pasture.

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

[b] If terraces are constructed, make every effort to backfill as the subsoil is very difficult to grow crops on.

The soil should be tested to determine lime, phosphate, and potash requirements, and these materials should be added where needed. A rotation with a high percentage of hay is desirable, as organic matter and nitrogen are naturally low. Rotation recommendations are given on page 35.

Thorp silt loam, terrace (206)

Thorp silt loam is a moderately dark, medium-textured soil, occurring in slight depressions or on low-lying, nearly level areas of the silt loam terraces of the Mississippi river and Henderson creek. It occupies about 560 acres in Henderson county.

Soil profile. The surface, 7 inches deep, is dark grayish-brown to dark-brown friable silt loam. The subsurface, extending from 7 to about 18 inches, is a very friable silt loam. Dark gray or very dark gray in the upper part, it grades into lighter gray in the lower part. The subsoil, from about 18 to about 36 inches, is a compact, plastic silty clay loam, slowly permeable to water. It is dark gray to very dark gray, mottled with yellowish brown and reddish brown. Below 36 inches are water-laid stratified friable silts and sands.

Most areas of Thorp include small areas of Brooklyn silt loam (page 34). The main differences between Thorp and Brooklyn are that the profile of Thorp is less gray and the subsoil is slightly more permeable to water.

Use and management. Thorp silt loam is a moderately productive soil. Drainage is naturally slow and needs to be supplemented by tile or open ditches. Tile draw slowly. Open inlets into tile will help remove surface water in the wetter pockets.

After drainage is established the soil should be tested and fertilizer applied as needed. An R-G-M-M[1] rotation is suggested for Thorp silt loam in Henderson county. The high percentage of deep-rooting legumes in such a rotation will help to open up the subsoil and to build up the organic-matter supply.

Niota silt loam, terrace (261)

Niota silt loam is a grayish soil composed of silts and clays deposited by slowly moving waters. It occurs in slight depressions on low terraces. The subsoil is a very heavy claypan, which in some areas is rather shallow. Niota is a very minor type in Henderson county, occupying only about 50 acres.

Soil profile. The surface, 6 inches deep, is a dark-gray compact silt loam to silty clay loam. The subsurface, if it is present, extends from 6 to about 14 inches. It is a light-gray compact silty clay loam to silty clay, slowly permeable to water. This layer is absent in some Niota areas of Henderson county. The subsoil extends to a depth of about 30 or 35 inches. Normally it is dark reddish-brown dense clay, but in many areas the reddish color is replaced by gray. This horizon, like the one above, is very slowly permeable to water. As a result, many areas stay ponded for prolonged periods. Beneath the subsoil the material is strongly spotted yellowish-brown and pale reddish-brown sandy clay, often stratified with silt loam and sandy loam. These lower horizons are more friable than the subsoil but are somewhat sticky when wet and hard when dry.

[1] R = row crop; G = small grain; M = rotation hay or pasture.

Use and management. Most areas of Niota are ponded during a good part of the growing season. Tile do not draw well and the poor physical condition of the soil limits the yields of the grain crops. Niota is best used for pasture.

Denrock silt loam, terrace (262)

Denrock silt loam is a dark-colored soil. It occurs on nearly level areas of the heavy-textured terraces along the Mississippi river and Henderson creek. It is a minor type in Henderson county, occupying only about 175 acres.

Soil profile. Eight inches deep, the surface is dark-brown to dark grayish-brown friable silt loam. The subsurface, extending from 8 to 13 inches, is grayish-brown light silty clay loam or heavy silt loam. The upper subsoil, from 13 to about 32 inches, is pale reddish-brown silty clay, which is moderately compact and very slowly permeable to water. The lower subsoil, from about 32 to about 44 inches, is dark yellowish-brown sandy clay to silty clay, mottled with gray and rusty iron stains. Below 44 inches the material is spotted yellowish-brown and pale reddish-brown sandy clay loam to sandy clay with lenses of silt loam and sandy loam. The subsoil probably is not a developed soil horizon but consists of heavy-textured backwater sediments.

Use and management. The very slow permeability of the subsoil makes drainage a problem. Since tile draw very slowly, open ditches are generally used for drainage. Erosion is not a problem, as Denrock occurs on nearly level terrace areas.

Plant roots are mostly restricted to the layers above the clayey subsoil, and thus crop yields may be limited. In general, however, medium to high yields may be obtained if the soil is adequately drained, is treated according to tests, and is planted to a good rotation. An R-R-G-M-M[1] rotation is suggested. Two years of hay crops in five should help replenish organic matter and nitrogen.

Fall silt loam (263)

A moderately dark upland prairie-timber transition soil, Fall silt loam is intermediate between Joy silt loam, a prairie soil, and Decorra silt loam, a timber soil. It is usually found within about 4 miles of the Mississippi river bluffs. Mostly it occurs on slopes of ½ to 1½ percent, although some areas are on steeper slopes. It occupies about 3,700 acres in Henderson county.

Soil profile. The surface is grayish-brown to dark grayish-brown friable silt loam, about 10 inches thick. The subsurface, about 5 inches thick, is light brownish-gray friable silt loam with some weak mottles of light gray. The upper subsoil extends from 15 to about 30 inches. It is light yellowish-brown heavy silt loam, weakly mottled with reddish brown and gray. The lower subsoil, from 30 to 42 inches, is very pale-brown compact silt loam, mottled with brown, yellow, and gray. Below 42 inches the material is similar to the 30- to 42-inch horizon except that it is more friable and the mottles become more prominent. Calcareous (limey) material is found at 70 to 90 inches.

Use and management. Fall silt loam should be limed and fertilized according to the results of soil tests. Usually some limestone is required to correct soil acidity, and sometimes phosphorus is needed. Potash is usually not needed on this

[1] R = row crop; G = small grain; M = rotation hay or pasture.

young soil. Nitrogen should be added in the form of manure, leguminous crop residues, or commercial fertilizers. Since Fall is moderately low in organic matter, this material should be added frequently and regularly.

Rotations recommended for the various slope gradients and erosion conditions are given below. They are for slopes between 200 and 300 feet long. While more intensive rotations may be used on shorter slopes, less intensive rotations *must* be used on longer slopes to guard against excessive soil losses.

Rotations and conservation practices recommended for different degrees of slope and erosion on Fall silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with—			
			No conservation practices	Contouring	Strip cropping	Terracing
263	0–3	None to moderate	R-R-G-M-M	(Conservation practices usually not recommended)		
263	3–8	None to moderate	R-G-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M-M
263	3–8	Severe	R-G-M-M-M-M	R-G-M-M-M	R-G-M-M	R-G-M-M
263	8–15	None to moderate	Pasture	R-G-M-M-M-M	R-G-M-M-M	R-G-M-M

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Lomax loam, terrace (265)

Lomax loam is a deep, dark soil. Usually it occurs as nearly level areas on some of the dark-colored sandy terraces of the Mississippi river. Sometimes, however, it forms a border between the dark sandy terraces and the dark silty terraces. It is found on slopes of ½ to about 3 percent and occupies about 2,116 acres in Henderson county.

Soil profile. The surface is dark-brown to very dark-brown loam or sandy silt loam, about 12 to 15 inches thick. The upper subsoil, from 12 or 15 inches to about 29 inches, is very dark-brown heavy loam. Extending to 36 inches, the lower subsoil is grayish-brown to dark yellowish-brown heavy loam, slightly mottled with rusty iron stains. Below 36 inches the material is brown loam to sandy loam, slightly mottled with rusty brown.

Use and management. Lomax is a fairly productive soil — more so than the sandy soils with which it is associated. It has an unusually deep, dark surface, and natural drainage is adequate for most farm crops.

Small fruits, tomatoes, and various other vegetables, as well as grain and hay, will grow well on this soil. Sweet clover or alfalfa should be grown every three or four years for green manure to replenish the supply of fresh organic matter. Light applications of lime are probably needed to get good stands of alfalfa or sweet clover. Little is known about the fertilizer requirements of this soil, and treatments should be based on soil tests.

Rotation recommendations for slopes between 200 and 300 feet long are given at the top of the next page.

Rotations and conservation practices recommended for different degrees of slope on Lomax loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
265	0–3	None to moderate	R-R-G-M-M	(Conservation practices usually not recommended. Drainage sometimes needed.)		
265	3–8	None to moderate	R-G-M-M	R-G-G-M-M	R-R-G-M-M	R-R-G-M

R = row crop; G = small grain; M = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Disco sandy loam, terrace (266)

Disco sandy loam is a dark sandy soil, found on the sandy terraces of the Mississippi river in association with Lomax loam (265) and Hagener loamy sand (88). It occurs on slopes ranging from 1 to 7 percent and occupies over 5,000 acres in Henderson county.

Soil profile. The surface is very dark-brown friable to loose sandy loam 18 or more inches thick. The subsoil is dark-brown to dark grayish-brown loam to sandy loam, very slightly compact and very slightly cohesive. It extends from a depth of about 18 inches to a depth of 36 to 42 inches. Below 36 to 42 inches the material is a brown loam to sandy loam with occasional faint mottles of yellowish brown and reddish brown.

This soil differs from Lomax loam (265) in having a somewhat coarser texture throughout, less subsoil development, and a shallower and somewhat lighter-colored surface. It differs from Hagener loamy sand (88) in having a deeper surface and in having more medium- and fine-textured material throughout.

Use and management. Disco is somewhat more drouthy than Lomax but less so than Hagener, Oquawka, and Plainfield. Deep-rooting crops such as alfalfa and sweet clover or early-maturing crops such as wheat and rye are recommended.

Fertilizers should be applied according to soil tests. The soil is often moderately acid, but light applications of lime (1 to 2 tons every five years) usually meet all requirements.

Since this soil is subject to wind erosion, a cover crop should be kept on it as much of the time as possible. On level areas, crops should be planted in strips no more than 20 rods wide and at right angles to prevailing winds. On sloping land contour strip cropping may conserve moisture and lessen the effects of wind erosion. An R-G-M-M[1] rotation is recommended for this soil in Henderson county.

Curran silt loam, terrace (267)

Curran silt loam is a medium-dark to light-colored soil. It occurs on the low-lying silty and clayey terraces of the Mississippi river and Henderson creek. In general it is found on slopes of 0 to 1½ percent, although a small acreage

[1] R = row crop; G = small grain; M = rotation hay or pasture.

was mapped on greater slopes. It is a minor type in Henderson county, occupying only about 660 acres.

Soil profile. The surface is dark-gray silt loam, 3 to 7 inches thick. The subsurface is pale-brown to light brownish-gray silt loam mottled with reddish brown, gray, and light gray. The subsoil, extending from about 18 to about 36 inches, is a grayish-brown heavy compact dense silty clay loam to silty clay strongly mottled with reddish brown and gray. Below 36 inches are found more friable, stratified sands and silts which are strongly mottled with reddish brown and gray. In most areas the subsoil seems to be derived from slack-water deposits and does not represent true development.

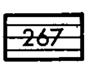
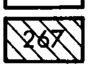
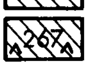
Use and management. The nearly level areas of Curran silt loam have a serious drainage problem. Surface runoff is very slow to ponded, and internal drainage is slow. Tiling has not as yet been proved effective, but unless adequate drainage is provided, little can be done with Curran.

After drainage is provided, the needs on this soil are generally for lime, nitrogen, and phosphorus in about that order. Since Curran is acid, some limestone is needed for good stands of clover and alfalfa. Any long-time program of soil treatment, however, should be based on soil tests.

Pasture is probably the best use for this soil, particularly on slopes greater than 4 or 5 percent. If the soil is drained and fertilized, and a good rotation is followed, fair yields of corn, wheat, and clover may be obtained. The recommended rotations for slopes between 200 and 300 feet long are given below.

Rotations and conservation practices recommended for different degrees of slope and erosion on Curran silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
267	0–3	None to moderate	R-G-M-M	(Conservation practices not recommended but drainage usually needed)		
	3–8	None to moderate	R-G-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M-M
	8–15	None to moderate	Pasture	Pasture	R-G-M-M-M	R-G-M-M
	8–15	Severe	Pasture	Pasture	Pasture	Pasture

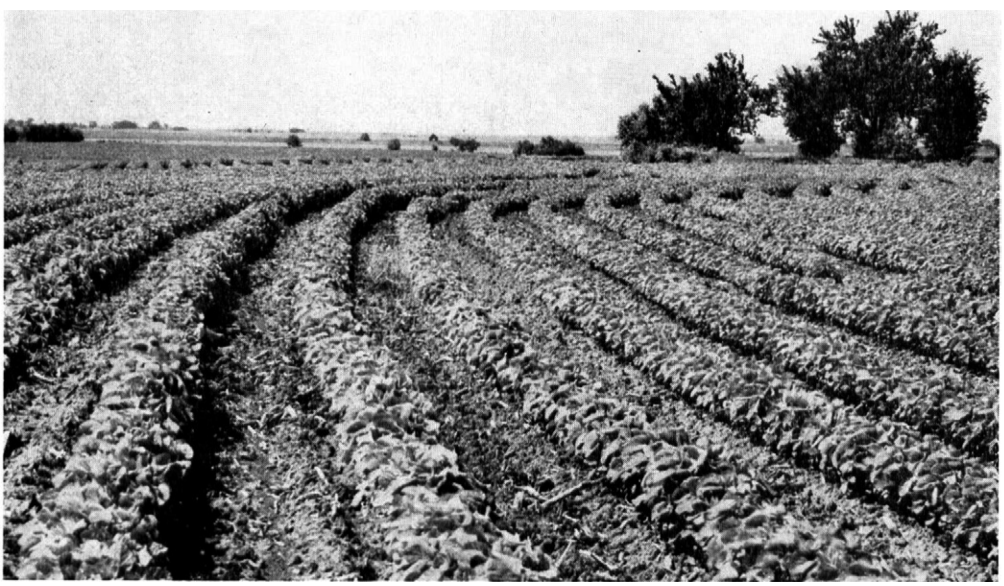
R = row crop; G = small grain; M = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Mt. Carroll silt loam (268)

Mt. Carroll silt loam is a moderately dark soil which is transitional in character between the light-colored Seaton soils (page 47) and the dark-colored Port Byron soils (page 50). It developed from loess (a wind-blown silt) under conditions of good drainage. It occurs in a belt about 4 miles wide on the upland next to the Mississippi river bluffs. Slopes range from 1 to 15 percent. Mt. Carroll occupies only 455 acres in Henderson county.

Erosion on long, gentle slopes of Mt. Carroll silt loam is often severe. Note total loss of crop in bottom of channel and reduced growth along both sides. Fig. 11



This field lies next to the one shown in Fig. 11. Here contour farming helps not only to reduce sheet erosion but also to increase plant growth and crop yield. Fig. 12

Soil profile. The surface is dark grayish-brown silt loam, 10 inches thick. The subsurface is light-brown friable silt loam. The upper subsoil, from about 15 to about 25 inches, is moderately compact silt loam. It is yellowish brown with some thin gray coatings on the weakly developed aggregates. The lower subsoil, extending to 42 inches, is a heavy silt loam or very light silty clay loam. It is yellowish brown grading into grayish brown, usually with faint mottles of grayish brown and dark grayish brown throughout. The parent material, below 42 inches, is very pale-brown friable coarse silt loam, normally mottled with gray, yellowish brown, and reddish brown. Sometimes the subsoil and parent material are not mottled. If mottles are present, they seem to represent a varicolored material rather than poor underdrainage. Calcareous (limey) loess is usually found at depths of about 60 to 70 inches.

Use and management. Mt. Carroll is adapted to general farm crops. The soil works easily and has no undesirable physical characteristics. Erosion may be a problem on the sloping areas (Fig. 11), and here the soil should have a crop cover as much of the time as possible (*see* Table 2).

Mt. Carroll is naturally low to medium in nitrogen and organic matter. So for high corn yields some nitrogen fertilizer should be applied or legumes should be grown and plowed under as green manure at least once every four years. In addition, to keep this soil productive, you need to fertilize according to the needs indicated by soil tests and use a good rotation with proper erosion-control measures (Fig. 12). Rotation and erosion-control recommendations for various slope gradients and degrees of erosion are given in the following table. (All recommendations are for slopes between 200 and 300 feet long.)

Rotations and conservation practices recommended for different degrees of slope and erosion on Mt. Carroll silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
268	0–3	None to moderate	R-G-M	(Conservation practices usually not recommended)		
268	3–8	None to moderate	R-G-M-M-M	R-G-M	R-R-G-M-M-M	R-R-G-M-M
268	8–15	None to moderate	G-M-M-M	R-G-M-M-M-M	R-G-M-M-M	R-G-M-M
268	8–15	Severe	Pasture	Pasture	G-M-M-M	R-G-M-M-M

R = row crop; G = small grain; M = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Muskrat loam, terrace (269)

Muskrat loam is a dark, wet soil formed under slough-grass vegetation from alluvial (water-deposited) materials. It occurs in old shallow swampy stream channels on the sandy terraces of the Mississippi river. It is a minor type in Henderson county, occupying about 800 acres.

Soil profile. This soil is variable. The surface is usually black to very dark-brown loam about 6 inches thick. The texture may, however, range from loam to clay loam or sandy clay loam, and shallow muck layers 2 to 12 inches thick are common.

The subsurface is brownish-gray sandy loam to sandy clay loam, mottled with reddish brown and gray. The subsoil is a black sandy clay that is compact, sticky, and very slowly permeable. This layer, however, is often absent. Its presence or absence, its thickness, and the depth to it are all unpredictable. In general, if it is present, it is found between 30 and 40 inches. Below 40 inches the material is gray loamy sand to sand.

Use and management. Muskrat loam is a poor agricultural soil. Drainage is difficult, as the soil occupies very low depressional areas. Tiling is not recommended since the soil usually has an impervious subsoil over loose sand. Open ditches have been used to some extent, but adequate outlets are hard to find. In favorable seasons quick-growing, shallow-rooted crops can be grown. However, this soil is probably best used for pasture.

Little is known about the lime and fertilizer requirements of Muskrat. Before any of these materials are used, the soil should be tested, and then the materials should be applied only on a trial basis as the poor drainage and physical properties of this soil will limit crop response. Because of the drainage problem, a regular rotation is not recommended.

Oquawka sand, terrace (270)

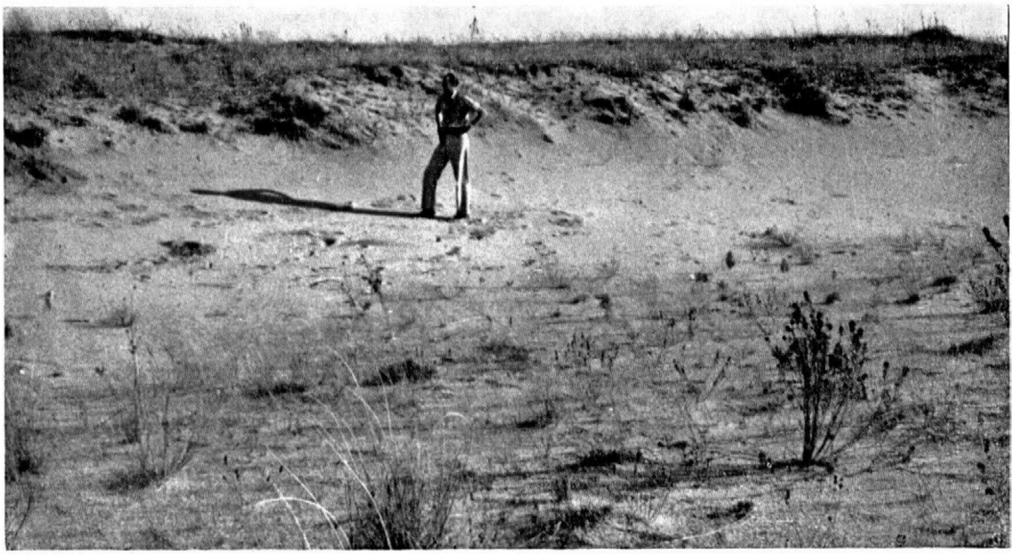
Oquawka sand is a medium-dark soil intermediate in color and thickness of surface between the deeper, darker Hagener (page 30) and the thinner, lighter-colored Plainfield (page 24). It occurs on the sandy terraces of the Mississippi river, occupying slopes ranging from 1 to 12 percent. It is developed from sandy, water-laid deposits that have been reworked by the wind. About 11,000 acres of this type are found in Henderson county.

Soil profile. The surface is dark grayish-brown friable to loose sand varying from about 5 to 11 inches in thickness. Below the surface the material is light yellowish - brown to brownish - yellow loose sand. Lenses or bands of brown sandy loam are frequently present at about 70 to 80 inches.

Use and management. Oquawka sand is moderately productive under very good management and treatment. The Oquawka Experiment Field, located on this type, shows good response to limestone, to organic matter (particularly in the form of manure), and to potash (Table 3). Rock phosphate has given little or no increase. Soil tests on samples from uncultivated areas indicate the soil is naturally medium to high in phosphorus.

The soil is drouthy and so is best suited to special crops such as watermelons, deep-rooted crops such as alfalfa, or early-maturing crops such as rye. Fair yields of corn have been obtained on the Oquawka field where the fertility level is high. Corn yields from the untreated plots, however, indicate that Oquawka is not generally suited to this crop.

The soil is subject to severe wind erosion (Fig. 13). To lessen or prevent drifting, use shelter belts, reforest blowouts and unprotected knolls (Fig. 14), keep a thick cover of vegetation on the



Blowouts like the one shown above are often formed on sandy soils such as Oquawka, Plainfield, and Hagener, if the soils are not protected from the wind by a cover of vegetation. These blowouts have no productive value until the soil is stabilized by trees or some other vegetative cover (*see* Fig. 14). Fig. 13

A 25-year-old stand of red, white, and jack pine on Oquawka sand in Henderson county. Such a plantation not only protects sandy soils from erosion, but also provides a source of income. Fig. 14

soil as much of the time as possible, and leave crop residues on the surface. Plowing to leave the surface rough or to leave some of the organic crop residue on the surface helps to reduce soil movement when row crops are to be planted.

All fields should be strip-planted in strips no wider than 20 rods and at right angles to prevailing winds. Where the land is sloping the crop strips may be planted on the contour, although this practice is not generally recommended on the very permeable sandy soils. Where this soil is adequately fertilized and otherwise well managed, an R-G-M-M-M-M rotation is suggested. (R = row crop; G = small grain; M = rotation hay or pasture.)

Timula silt loam (271)

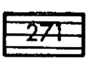
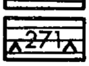
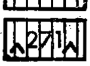
Timula silt loam is a light-colored soil having free carbonates (lime) at shallow depths. It was formed from recent deposits of loess, a wind-blown silt. Timula is found for the most part within a mile or two of the Mississippi river bluffs, on slopes ranging from 0 to 18 percent. This soil is a minor type in Henderson county, as there is a total of only 960 acres shown on the map.

Soil profile. In uncultivated areas the surface or upper 3 inches is dark grayish-brown friable silt loam. The subsurface, from 3 to about 15 inches, is brown friable silt loam. No subsoil is present. The parent material, lying below a depth of about 15 inches, is yellowish calcareous (limey) coarse silt loam, which becomes mottled with yellowish brown, reddish brown, and gray at about 4 feet. The depth to free lime ranges from about 15 inches to 30 inches.

Use and management. Since Timula frequently occurs on ridge tops with steep slopes on one or more sides, it may be badly cut into by side gullies. To keep this from happening, contour farming, terraces, and grass waterways are needed both on areas of Timula and on the adjacent slopes. You can't depend

Rotations and conservation practices recommended for different degrees of slope and erosion on Timula silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
	3–8	None to moderate	R-G-M-M-M	R-G-M-M	R-G-M	R-R-G-M-M
	3–8	Severe	G-M-M-M	R-G-M-M-M	R-G-M-M-M	R-G-M-M
	8–15	None to moderate	G-M-M-M	R-G-M-M-M	R-G-M-M-M	R-G-M-M
	8–15	Severe	Pasture	G-M-M-M	R-G-M-M-M-M	R-G-M-M-M
	15 plus	None to moderate	Pasture	Pasture	G-M-M-M-M	Terraces not recommended
	15 plus	Severe	Pasture	Pasture	Pasture	

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

on just a good rotation to control erosion.

This soil is better adapted to hay and pasture than to grain, although when supplied with adequate nitrogen, it will produce good yields of all the general corn-belt crops. Soil tests should be made before limestone, phosphate, or potash is applied. This light-colored soil needs frequent additions of organic matter and nitrogen. The most suitable rotations are those with large amounts of legumes. Rotations recommended for the various slope gradients and erosion conditions on slopes between 200 and 300 feet long are given on page 45.

Edgington silt loam (272)

Edgington silt soam is a grayish soil found in small shallow depressions in the upland of Henderson county. It usually occurs in association with Muscatine or Joy, often at the heads of drainageways. This type covers only about 710 acres, but it is important because it commonly represents untillable wet spots in otherwise good fields.

Soil profile. The surface is normally dark grayish-brown friable silt loam, 12 inches thick. Where this soil is associated with light-colored timbered soil types, however, the surface is somewhat lighter in color. At the other extreme, a few scattered spots have nearly black silty clay loam surfaces.

The subsurface is a coarse silt loam. Dark gray in the upper part, it shades into gray or light gray in the lower part, and is weakly mottled throughout with reddish brown. It averages about 2 feet in thickness. The subsoil usually extends from about 3 feet to about 4 feet. However, depth to subsoil may range from about 24 to over 40 inches. It is dark-gray compact plastic silty clay loam mottled with reddish brown and brownish yellow. Beneath it is gray friable silt loam heavily mottled with reddish brown. Calcareous (limey) loess occurs at a depth of 100 to 120 inches.

Use and management. Edgington is acid and low in available plant nutrients. Response to treatment is limited by the lack of good drainage. Tile draw fairly well except where the surface is a silty clay loam or where it has been compacted by excessive plowing. Since this soil receives runoff from higher land, open tile inlets or sodded surface waterways are desirable.

Because the areas of Edgington are small, they often have to be farmed in the same rotation and in the same manner as the surrounding soils. However, more limestone, more organic matter and nitrogen, and possibly more phosphorus and potassium, will be needed to produce good crops on these spots than on the darker, more fertile soils that are associated with Edgington.

Decorra silt loam (273)

Decorra silt loam is a light-colored, timbered upland soil normally occurring within about 3 miles of the Mississippi river bluffs. It was formed from deep deposits of loess, a wind-blown silt, on slopes ranging from 1 to 15 percent. It occupies about 9,735 acres in Henderson county.

Soil profile. The surface is grayish-brown friable silt loam about 6 or 7 inches thick. The subsurface is yellowish-brown silt loam. The upper subsoil, from 16 to about 24 inches, is yellowish-brown silt loam borderline to silty clay loam, with some faint mottles. Extending from about 24 to about 40 inches, the lower subsoil is silty clay loam borderline to silt loam. It is yellowish brown, strongly mottled with gray, reddish brown, and orange. Below 40 inches is friable silt loam of mixed or variegated colors with grays predominating. Calcareous (limey) loess occurs anywhere from 80 to 130 inches.

This soil is in general weakly developed, but as it has been mapped it does vary in degree of development. On the bluffs, close to the source of loess, the subsoil is very weakly developed. But with increasing distance from the bluffs, Decorra grades gradually into the Stronghurst soils, which have well-developed subsoils.

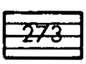
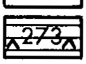
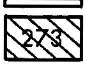
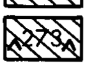
Use and management. Surface drainage and underdrainage of Decorra silt loam are fair to good. Though not naturally a "strong" soil, in the sense that high crop yields can be continuously produced under poor farming, this soil does produce high yields under good soil treatment. The physical properties of the soil permit deep root penetration.

On sloping areas, erosion may be a serious problem (*see* Table 2). Since a vigorous growth of vegetation is necessary to reduce erosion, the fertilizer and limestone needs of this soil must be given primary consideration. Soil tests should be made and limestone, potash, and phosphate applied as needed.

Rotations recommended for slopes between 200 and 300 feet long are given in the following table.

Rotations and conservation practices recommended for different degrees of slope and erosion on Decorra silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
273	0–3	None to moderate	R-R-G-M-M	(Conservation practices usually not recommended)		
	3–8	None to moderate	R-G-M-M	R-G-M	R-R-G-M-M	R-R-G-M
	3–8	Severe	R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-G-M
	8–15	None to moderate	G-M-M-M	R-G-M-M-M	R-G-M-M-M	R-G-M-M
	8–15	Severe	Pasture	G-M-M-M	R-G-M-M-M-M	R-G-M-M-M

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Seaton silt loam (274)

Seaton silt loam is a well-drained, light-colored upland soil occurring in association with Decorra and related soils within about 3 miles of the Mississippi river bluffs. It was formed from deep deposits of loess on slopes ranging from 1 to 15 percent. It occupies about 4,175 acres in Henderson county.

Soil profile. The surface is grayish-brown friable silt loam, 4 inches deep. The subsurface is yellowish-brown silt loam. The upper subsoil, from 15 to about 30 inches, is yellowish-brown friable silt loam with some thin gray coatings on the soil aggregates. The lower subsoil is yellowish-brown silt loam borderline to silty clay loam, sometimes with very faint mottles of brown. Below 42 inches the material is pale-brown to brownish-yellow coarse silt loam faintly mottled with gray and reddish brown.

The chief variation in Seaton is in the degree of profile development: The weakest development is found on the bluffs, and the strongest development is found farther east, where this soil grades into Fayette. Seaton differs from Decorra in having better internal drainage or oxidation.

Use and management. This soil should be treated on the basis of soil tests. It will respond to treatment, as the physical properties are good.

Under full treatment corn and alfalfa-brome yielded as well on severely eroded Seaton soil as on moderately eroded soil, in tests at the Upper Mississippi Valley Conservation Experiment Station, La Crosse, Wisconsin. During the 10-year period, 1944-1953, average corn yields in an R-G-M-M-M rotation were 80.7 bushels per acre on moderately eroded plots and 80.9 bushels on severely eroded plots. Alfalfa-brome yields were 3.20 tons on the severely eroded plots and 3.38 tons on the moderately eroded ones. However, average oat yields in the same rotation, but for the 9-year period, 1945-1953, were significantly lower on the severely eroded plots (59.0 bushels per acre) compared with the moderately eroded plots (75.2 bushels). According to other data, corn yields are also lower on severely eroded Seaton and similar soils before full treatment is given and a suitable rotation is adopted.

Recommended rotations are given in the following table.

Rotations and conservation practices recommended for different degrees of slope and erosion on Seaton silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with—			
			No conservation practices	Contouring	Strip cropping	Terracing
274	0–3	None to moderate	R-R-G-M-M	(Conservation practices usually not recommended)		
274	3–8	None to moderate	R-G-M-M-M	R-G-M	R-R-G-M-M	R-R-G-M-M
274	3–8	Severe	R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-G-M
274	8–15	None to moderate	G-M-M-M	R-G-M-M-M	R-G-M-M-M	R-G-M-M
274	8–15	Severe	Pasture	G-M-M-M	R-G-M-M-M-M	R-G-M-M-M

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Joy silt loam (275)

Joy silt loam is a dark prairie upland soil formed from loess, on slopes ranging from 1 to about 3 percent. It occurs in a belt within about 4 miles of the Mississippi river bluffs in association with Port Byron and Biggsville soils. Joy resembles Muscatine but differs from it in having a less well-developed subsoil. About 12,365 acres of Joy silt loam were mapped in Henderson county.

Soil profile. The surface is dark-brown to very dark-brown silt loam about 18 inches thick. The subsurface is brown to dark grayish-brown silt loam. The upper subsoil, extending from 24 to 30 inches, is a brown to yellowish-brown slightly compact silt loam. The lower subsoil, from 30 to about 40 inches, is a brown to yellowish-brown moderately compact heavy silt loam, faintly mottled with gray and reddish brown. Below 40 inches the material is a very pale-brown friable silt loam strongly mottled with gray and grayish brown. Calcareous (limey) loess usually occurs between about 60 and 80 inches.

Use and management. Joy silt loam is probably not so durable as Muscatine, but it works easier and drains better. It is a highly productive soil if it is treated according to the needs indicated by soil tests. After treatment it is well adapted to an R-R-G-M rotation or an R-R-G(le) rotation. (R = row crop; G = small grain; M = rotation hay or pasture; le = legume catch crop.)

According to experimental data, crop yields on Joy can be increased most economically by applications of manure and limestone. How much other treatment is needed will depend on how heavily the soil is cropped.

Biggsville silt loam (276)

Biggsville silt loam is similar to Joy except that it occurs on slopes ranging from 3 to about 12 percent and the soil horizons are slightly thinner. The mode of origin and the color and texture of the various horizons are essentially the same as those of Joy. There are about 7,150 acres of Biggsville in Henderson county.

Use and management. Biggsville should be limed and fertilized on the basis of soil tests. Applications of limestone and manure will probably give good crop response. Phosphate and potash, however, may not be needed on this young loessial soil for a long time to come. The soil is easy to work. Often a good seedbed can be prepared merely by dragging a section of a spike-tooth harrow behind the plow.

Rotations and conservation practices recommended for different degrees of slope and erosion on Biggsville silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with—			
			No conservation practices	Contouring	Strip cropping	Terracing
276	3-8	None to moderate	R-G-M-M	R-R-G-M-M	R-R-G-G-M	R-R-G-M
276	3-8	Severe	R-G-M-M-M	R-G-M-M	R-R-G-G-M-M	R-G-M
276	8-15	None to moderate	G-M-M-M	R-G-M-M-M	R-G-M-M	R-G-M
276	8-15	Severe	Pasture	G-M-M-M	R-G-M-M-M	R-G-M-M

R = row crop; G = small grain; M = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Erosion may be bad on the steep slopes (*see* Table 2). Recommended rotations for various combinations of slope gradients and erosion conditions are given on page 49. Recommendations are for slopes between 200 and 300 feet long. Less intensive rotations should be used on longer slopes.

Port Byron silt loam (277)

Port Byron silt loam is a dark prairie upland soil formed from loess, a wind-blown silt. It occurs in association with Joy and Biggsville soils as part of a belt about 4 miles wide along the Mississippi river bluffs. Port Byron resembles Tama, but its subsoil is more friable and has a less well-developed structure. It occupies about 1,200 acres in Henderson county.

Soil profile. The surface is dark-brown friable silt loam 14 inches thick. The upper subsoil is a brown to yellowish-brown slightly compact silt loam. The lower subsoil, from 24 to 44 inches, is brown to yellowish-brown moderately compact silt loam. Below 44 inches the material is a light yellowish-brown to pale-brown friable silt loam, weakly mottled with gray and reddish brown. Calcareous (limey) loess is usually found between 60 and 100 inches.

Use and management. Port Byron is naturally well-drained and doesn't need tiling. It works easily, has good tilth, and permits deep root penetration. However, the subsoil does not retain moisture for crop growth as well as Tama does. The soil responds well to treatment and should be limed and fertilized according to the needs indicated by soil tests.

After treatment a good rotation should be followed. Recommended rotations are given in the table below.

Rotations and conservation practices recommended for different degrees of slope on Port Byron silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
277	0–3	None to moderate	R-R-G-M	(Conservation practices usually not recommended)		
277	3–8	None to moderate	R-G-M-M	R-G-M	R-R-G-M-M	R-R-G-M
277	8–15	None to moderate	G-M-M-M	R-G-M-M-M	R-G-M-M	R-G-M

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Stronghurst silt loam (278)

Stronghurst silt loam is a light-colored upland soil formed from loess, a wind-blown silt. It occurs on nearly level land or very gentle slopes of ½ to 3½ percent. About 5,235 acres are shown on the Henderson county soil map.

Soil profile. The surface is grayish-brown silt loam 3 to 5 inches thick. The subsurface is light brownish-gray silt loam. The upper subsoil, from 16 to about 30 inches, is light yellowish-brown to grayish-brown silty clay loam, mottled with brown, gray, and dark yellowish brown. The lower subsoil, from about 30 to about 45 inches, is silty clay loam borderline to silt loam. It is light yellowish brown strongly mottled with gray, orange, and reddish brown. Below 45 inches the material is a grayish silt loam mottled with yellowish brown, reddish brown, and orange. Calcareous (limey) loess is usually found at about 70 to 80 inches.

Use and management. Surface drainage is moderate to slow, and underdrainage is moderate. Tile will draw and are usually needed for maximum crop yields. Though not naturally a "strong" soil, Stronghurst responds to good soil treatment. Erosion is usually not a problem on this soil as the slopes are all less than about 3 percent.

Limestone, organic matter, and nitrogen are of primary importance on this soil. Phosphate may be needed, but potash usually is not required. Soil tests should be made to determine the exact needs for lime and fertilizer.

After the soil is treated, a good rotation should be used. This rotation should provide nitrogen as well as replenish organic matter. An R-G-M-M or possibly an R-R-G-M-M rotation is suggested for this soil after proper treatment. (R = row crop; G = small grain; M = rotation hay or pasture.)

Rozetta silt loam (279)

Rozetta silt loam is a light-colored upland soil formed from loess, a wind-deposited silt. It is found on slopes ranging from 3 to 15 percent in association with Stronghurst. About 14,440 acres are found in Henderson county.

Soil profile. The surface is grayish-brown silt loam, which in uncultivated

Erosion on this slope of Rozetta silt loam was caused by overgrazing. Controlled grazing, along with a well-planned fertility program, would have prevented the present sorry appearance of this hillside. Fig. 15

areas is 3 or 4 inches thick. The subsurface is yellowish-brown silt loam. In plowed fields the surface and subsurface vary considerably in depth because of erosion. The subsoil, from 15 to about 36 inches, is yellowish-brown silty clay loam. It is mottled to varying degrees with reddish brown and light brownish gray. Below 36 inches the material is a very pale-brown to yellowish-gray silt loam which is mottled with gray and reddish brown. Calcareous (limey) loess occurs at depths ranging between 80 and 120 inches.

Use and management. Erosion may be a serious problem, especially on the steeper slopes (Table 2 and Fig. 15). Contouring, grass waterways, and terraces may all be necessary under certain circumstances to keep erosion at a minimum. Since a vigorous growth of vegetation is necessary for the success of any erosion-control measure, the fertilizer needs of this soil must be given primary consideration. Lime, phosphorus, and potash should be applied on the basis of soil tests. Organic matter in the form of manure or leguminous crop residues should be returned regularly and additional nitrogen should be applied according to the needs of the growing crops.

A good rotation should be combined with adequate treatment and proper control measures. The following table suggests rotations and control practices for slopes betwen 200 and 300 feet long.

Rotations and conservation practices recommended for different degrees of slope and erosion on Rozetta silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with— No conservation practices	Contouring	Strip cropping	Terracing
279	3–8	None to moderate	R-G-M-M-M	R-G-M-M	R-G-M	R-R-G-M-M
279	3–8	Severe	R-G-M-M-M-M	R-G-M-M-M	R-G-M-M	R-G-M
279	8–15	None to moderate	G-M-M-M	R-G-M-M-M	R-G-M-M	R-G-M-M
279	8–15	Severe	Pasture	G-M-M-M	R-G-M-M-M-M	R-G-M-M-M

R = row crop; G = small grain; M = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Fayette silt loam (280)

Fayette silt loam is a light-colored, well-drained upland soil formed from loess and found on slopes ranging from 1 to 10 percent. It usually occurs on distinct knolls in the upland but is also found on nearly level, very narrow tabular divides. It occupies something over 1,000 acres in Henderson county.

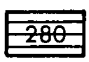
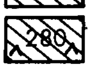
Soil profile. The surface is dark yellowish-brown silt loam, about 7 inches thick in cultivated fields. The subsurface is a yellowish-brown silt loam. The main part of the subsoil, from 16 to about 48 inches, is a bright yellowish-brown light silty clay loam. The lower subsoil, from 48 to about 60 inches, is a silt loam borderline to silty clay loam. It is yellowish brown with some gray streakings and faint mottlings. Calcareous silt loam is frequently found at 80 inches.

Use and management. Surface drainage of Fayette is moderate to rapid and internal drainage is moderate. It is not as "strong" or durable a soil as Tama, its dark-colored prairie equivalent. Fayette has desirable physical properties, however, and responds to good treatment.

Under cultivation the steeper slopes are subject to serious sheet and gully erosion (*see* Table 2). Since a good vegetative cover is a primary requirement for erosion control, limestone and fertilizer needs take first priority. The soil should be tested and the necessary limestone, phosphate, and potash applied. Limestone will probably be needed, since most untreated areas of Fayette are moderately acid. If phosphate and potash are not needed immediately, they may be needed in the near future, as heavy cropping reduces fertility. Once the soil has been properly fertilized, a good rotation should be followed. Since each slope and erosion condition presents a different problem, the following table has been prepared showing recommended rotations for each condition on slopes 200 to 300 feet long.

Rotations and conservation practices recommended for different degrees of slope and erosion on Fayette silt loam

(Slopes between 200 and 300 feet long)

Map symbol[a]	Slope percent	Degree of erosion	Most intensive cropping system with—			
			No conservation practices	Contouring	Strip cropping	Terracing
280	0–3	None to moderate	R-R-G-M-M	(Conservation practices usually not recommended)		
	3–8	None to moderate	R-G-M-M-M	R-G-M-M	R-G-M	R-R-G-M-M
	8–15	None to moderate	G-M-M-M	R-G-M-M-M	R-G-M-M	R-G-M
	8–15	Severe	Pasture	G-M-M-M	R-G-M-M-M	R-G-M-M

R = row crop; **G** = small grain; **M** = rotation hay or pasture

[a] The horizontal, diagonal, and vertical lines which indicate slope are in red on soil map.

Hopper silt loam and Hickory loam, undifferentiated (281-8)

Hopper silt loam and Hickory loam are shown as one unit on the Henderson county soil map. Both are found on slopes greater than 15 percent — either on the bluffs along streams or the banks of deep gullies. Hopper is formed from loess and occurs as the upper portion of the steep slopes, while Hickory is formed from the underlying weathered Illinoian till material. This soil complex occupies about 27,435 acres or 11.04 percent of Henderson county.

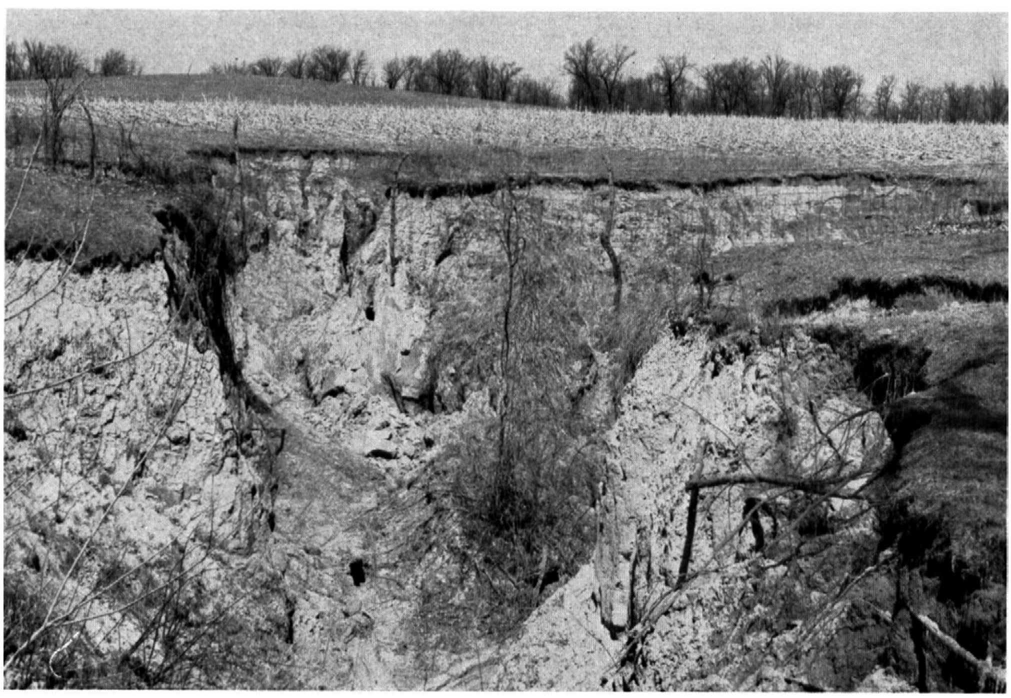
Soil profile. Hopper silt loam has a thin surface and little or no subsurface or textural subsoil, as erosion has tended to keep pace with soil formation on steep slopes. Where undisturbed the surface is dark yellowish-brown silt loam. Beneath the surface to about 40 inches the material is usually mottled gray, orange, and rusty-brown silt loam or light silty clay loam. Below 40 inches the material is calcareous silt loam. Considerable variation occurs in the thickness of the surface, mottling of the underlying material, and depth to free carbonates.

Hickory loam is derived from strongly weathered Illinoian glacial till which is mostly compact, plastic, nearly intractable clay loam or clay.

The proportion of Hopper to Hickory varies considerably throughout the county. In some areas where the gullies are not deep, Hopper makes up most or all of the slopes and Hickory is found only in the bottoms of the gullies. In other areas, especially on some of the high bluffs, Hopper makes up only the upper one-fourth or less of the exposure. In some places bedrock exposures are included in the delineation. Also, in some places slumping of the overlying loess has covered the till and bedrock beneath so that neither shows.

Use and management. Hopper-Hickory soils should be kept in pasture or woodland. For one thing, it is hazardous to use general farm implements on slopes greater than 20 percent. Moreover, since these soils occur on steep slopes, they erode rapidly when cultivated. Shallow gullies often develop from a single rain. Though this in itself is serious, an even more serious problem occurs where deep gullies are permitted to cut back into the tillable ridge tops (Fig. 16). By protecting the steep Hopper-Hickory slopes from eroding, therefore, you protect the level land above as well as the slopes themselves.

Pastures will produce more forage if occasionally disked, fertilized, and reseeded to adapted legume-grass mixtures. In general Hickory is less productive than Hopper, and a good grass cover will be harder to maintain on it.



Gullies such as this one in Henderson county not only destroy sloping areas but also cut back into the good level land. The fence suspended in the air shows how fast this gully is cutting. Once such gullies get started they are very hard to control. Fig. 16

Chute fine sand (282)

Chute fine sand is a light-colored sandy wind-deposited bluff knoll soil. It is found on steep slopes or knolls next to or on the Mississippi river bluffs. It has been formed so recently that no leaching has taken place, and the soil is calcareous (limey) to the surface. Only 178 acres of this type were mapped in Henderson county.

Soil profile. Chute is a pale-brown calcareous fine sand. Its color and texture change little or none from the surface to a depth of 5 or 6 feet.

Use and management. Chute is not suited to cropping, nor is it of much value for either trees or grass. It is hard to establish a good pasture on this soil because of its loose, drouthy, drifting nature. If trees are grown, they must be drouth-resistant, as the soil occupies high areas where the water table is deep.

Wind erosion is often severe. If pastures on this soil are overgrazed, or if areas are cleared and plowed, a serious "blowout" type of wind erosion occurs quickly.

RELATIONSHIPS AND ORIGIN OF HENDERSON COUNTY SOILS

Grouping of the Soils

The relationships of the different soils in Henderson county are indicated in Figs. 17 and 18 and in Table 8. In Fig. 17 are shown the effects of topography and native vegetation on soil-profile development, as well as the changes that take place through weathering. The map in Fig. 18 shows the five general groups into which Henderson county soils can be divided: (1) bottomland soils, (2) sandy terrace soils, (3) silty terrace soils, (4) upland soils with slight subsoil development, and (5) upland soils with moderate subsoil development. In Table 8 all the soil types mapped in Henderson county are arranged in a key form to show their relationships to one another.

How the Soils Were Formed

Both the relationships and the differences between the various soils go back to the way in which they were formed. While you don't have to know how the soils were formed to do a good job of farming, the knowledge may be helpful in solving some of your soil problems.

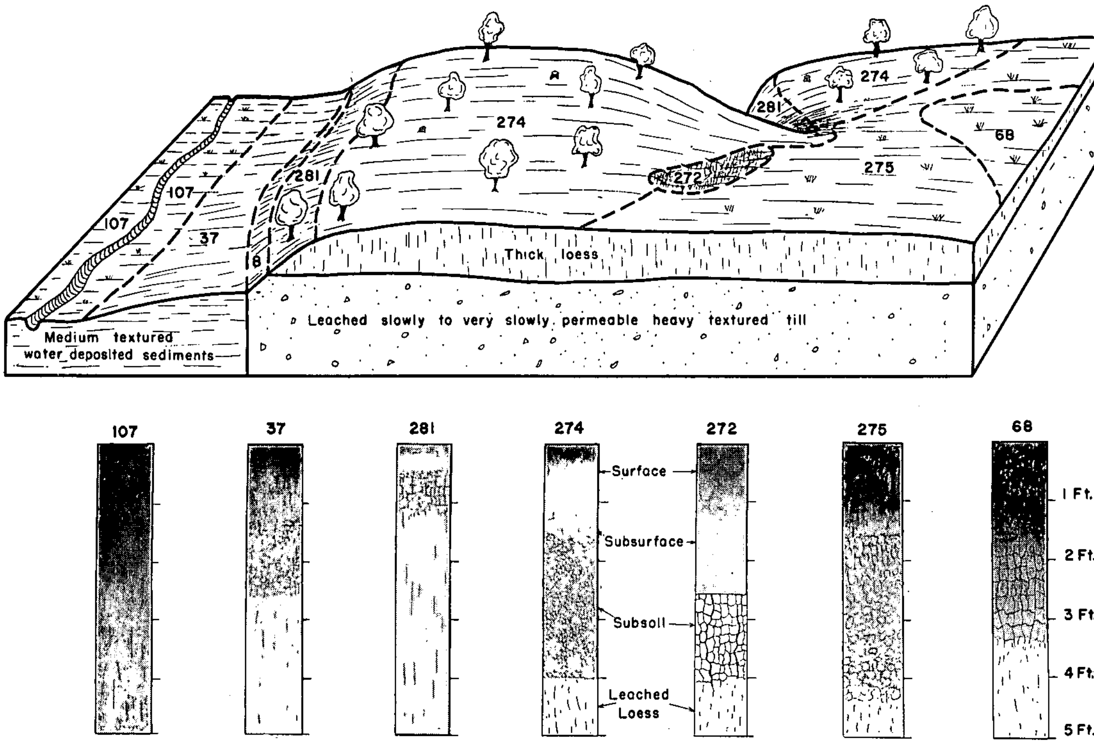
Factors responsible for the soil types as they now exist in Henderson county are discussed in the following paragraphs.

Glaciers. Many thousands of years ago, a large ice sheet, known as the Illinoian glacier, formed near Hudson Bay and pushed southward until it covered much of Illinois. In its movement it picked up masses of rock, gravel, sand, silt, and clay; ground them together; and carried them for many miles. The moving ice leveled off hills and filled old valleys, often changing completely the features of the landscape. These changes have been responsible for the present basic relief and main drainageways of Henderson county.

Several thousand years later a second ice sheet, known as the Wisconsin glacier, pushed out over parts of north-

Table 8. — HENDERSON COUNTY SOILS Grouped According to Physiography, Native Vegetation, Subsoil Development, and Natural Internal Drainage

Physiography	Native vegetation	Subsoil development	Natural internal drainage					
			Very poor	Poor	Moderately poor (imperfect)	Moderately good	Very good	Excessive
Bottom	Prairie or none	None		107 Sawmill	77 Huntsville 28 Jules	73 Huntsville		
Bluff wash	Prairie	Slight				81 Littleton	37 Worthen	
Terrace	Prairie	None						88 Hagener
		Slight		125 Selma		265 Lomax		266 Disco
		Moderate	269 Muskrat	261 Niota	262 Denrock		80 Alexis	
		Strong	136 Brooklyn 187 Milroy	206 Thorp	188 Beardstown			
	Transition	None						270 Oquawka
	Timber	None						54 Plainfield
		Moderate			267 Curran			
Upland	Prairie	None				34 Tallula		
		Slight				275 Joy 276 Biggsville	277 Port Byron	
		Moderate		68 Sable 272 Edgington	41 Muscatine		36 Tama	
	Transition	Slight			263 Fall	268 Mt. Carroll		
		Moderate			61 Atterberry			
	Timber	None				271 Timula	30 Hamburg	282 Chute
		Slight				273 Decorra	274 Seaton	
		Moderate			278 Stronghurst	279 Rozetta 281-8 Hopper-Hickory	280 Fayette	
Organic soil	Bog	None	103 Muck					



EFFECT OF TOPOGRAPHY AND NATIVE VEGETATION ON SOIL

The upper part of the above diagram shows the normal sequence of eight representative soil types as one travels from the Mississippi river valley to the upland. The lower part of the diagram gives the profiles of seven of these soils, showing the color and thickness of the surface horizons as well as the structure of the subsoil. By comparing the two sections of the diagram, we see how the native vegetation that once covered these soils has influenced the surface color (trees and stumps indicate areas where timber once grew; clumps of grass, where grasses grew). We also see how topographic position and distance from the bluff influenced subsoil development.

Note the uniformity in the profile of Type 107, which is a bottomland soil formed from recent sediments and has not been subjected to much weathering. Type 37, on the footslope, also developed from recent water-deposited material and consequently shows little structure in the profile.

The occurrence of the 281-8 complex is illustrated on the slope break. Type 281 developed from the thick loess on top of the leached till, while Type 8, at the bottom of the slope, developed directly from the till.

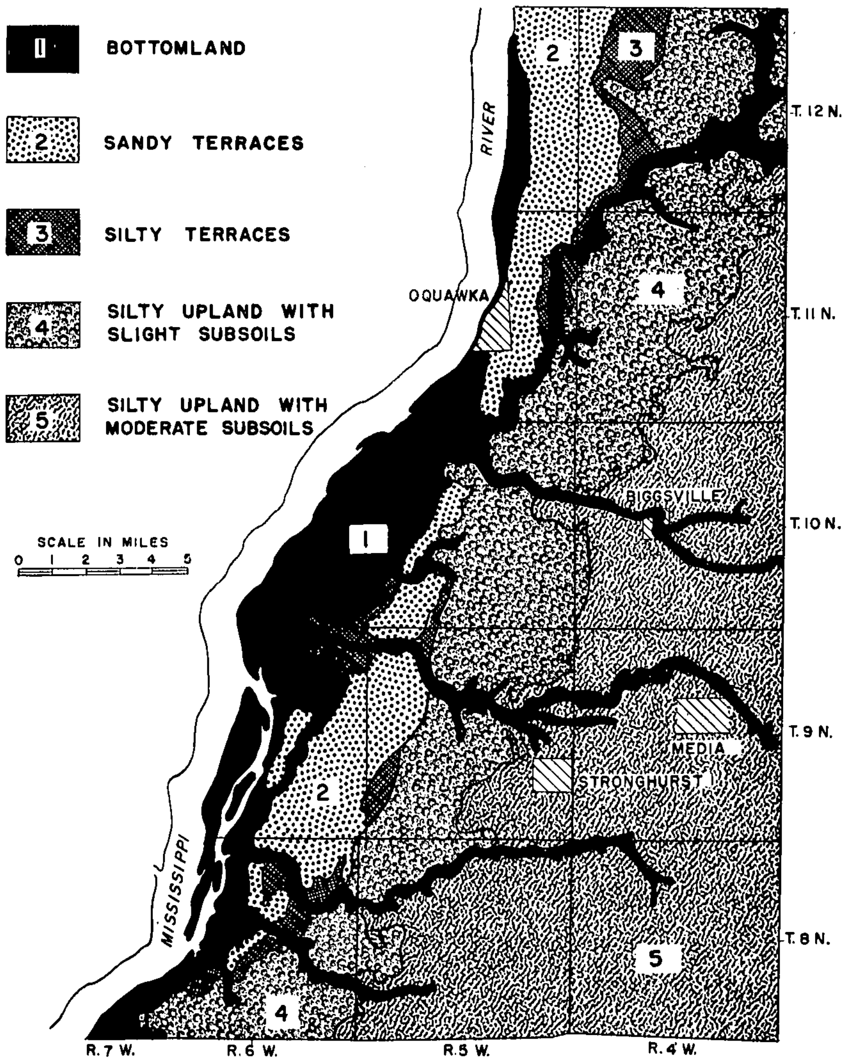
Note the light surface color and lack of structure of Type 274, an upland soil which was formerly timbered. Loess was deposited rapidly during early soil formation, keeping the effects of soil weathering at a minimum.

The 272 area represents the depressional wet spot. Note light-colored (grayish) surface and subsurface and the blocky-structured subsoil. These features, when found together, indicate a strongly developed soil. In this instance, extra water flowing from adjacent fields into the area increased the rate of weathering. The depth to subsoil indicates that considerable sediment has been washed in from the surrounding area.

Type 275 represents an upland soil developed under grass vegetation. Note dark surface and lack of structure in the profile. Loess was deposited rapidly during the early period of soil formation, thus minimizing the weathering effect. Type 68 represents a depressional upland prairie soil. Note deep dark surface and coarse blocky structure. Abundant grass growth has produced the dark color. Fig. 17

ern and central Illinois. This glacier did not pass over Henderson county, but melting water from it carried tremendous amounts of sediments into the Mississippi and Illinois river valleys. Upon drying, the silty portion of this river sediment was picked up by the wind and deposited as *loess* on the adjacent uplands. It is from this loess that most of the upland soils of the county have developed.

The loess is about 25 feet thick at the Mississippi river bluffs, thinning to about 10 feet in the southeastern part



Soil group map of Henderson county. The main sources of loess in this county were the bottomlands and terraces near the Mississippi river (Areas 1, 2, and 3). This very desirable soil material may be found in deposits as thick as 25 feet or more on the bluffs (Area 4). In Area 5, the loess deposits are thinner, ranging from about 15 feet along the border of Area 4 to about 10 feet in the extreme southeastern corner of the county.
Fig. 18

of the county. As would be expected, the coarser and heavier particles of this wind-borne silty material were dropped first and the lighter and finer particles were carried farther eastward. This resulted in two recognizable belts of upland soils in Henderson county. Area No. 4 (Fig. 18), which includes the bluff area along with the territory up to about 4 miles away from the bluffs, is characterized by soils with weakly developed subsoils. The soil material here is composed of the coarser silt particles including also, in some places, some very fine sand. In Area No. 5, lying east of Area 4, the uplands are composed of the finer-textured silt particles, and here the soils are characterized by moderately well-developed subsoils.

Soils in other areas, numbered 1, 2, and 3 (Fig. 18), developed from water-deposited soil material. The bottomland soils in Area 1 have been formed from recent sediments and the effects of weathering are not yet observable.

The sandy terraces of Area 2 developed from sediments laid down by rather fast-moving water, probably of Wisconsin glacial age. Originally these terrace areas were probably fairly level but wind action has piled up the sand into knolls and ridges in some places and left depressions in others, resulting in the present variable slopes. The sediments from which the soils in Area 3 developed were laid down by moderate- to slow-moving water. They also probably date to the Wisconsin glacial age. The silty terrace soils of this area are very similar in some ways to the silty upland soils. Subsoil development ranges from slight to moderate, with moderate predominating.

How the present soils developed from the original material was determined by the topography, native vegetation, degree of weathering, and climate.

Topography or slope. As we have already seen, deposits from the Illinoian glacier, together with the erosion which followed, pretty well determined the present topography in Henderson county. This topography has in turn influenced the rate of soil development and the color of the soil horizons.

Soils on the very steep slopes, particularly near the bluffs, have little profile development. Here slow but continuous erosion over a long period has almost kept pace with soil weathering. These soils have good internal drainage, and bright-brown and yellowish-brown colors predominate.

Soils on the level areas, particularly those several miles from the bluffs, usually have well-developed profiles with distinct surface and subsoil layers. Here the water table was close to the surface throughout soil development and the colors, particularly subsoil colors, are predominantly gray, mottled or spotted with yellowish brown.

Native vegetation. The kind of vegetation which grew during soil development was primarily responsible for the amount of organic matter in the soil and thus for the darkness of the surface layer. Soils that developed under forest vegetation, as along the bluffs of many of the streams, generally have thin and slightly darkened surfaces. Where prairie grasses flourished, the surface layer is thick and dark.

Moderately dark surface colors occur where a scattering of trees and brush grew together with a ground cover of grass or where forest encroached onto the prairie in relatively recent times. The surface layers of these soils are thicker and darker than those of the timber soils and, in general, thinner and lighter than the surfaces of the prairie soils.

Vegetation also influenced subsoil development. Timber soils tend to have more pronounced subsoils than prairie soils in the same area, indicating more rapid weathering. Thus prairie soils with slight subsoil development are often found next to timber soils with moderately developed subsoils. Examples of this may easily be found where the Stronghurst-Rozetta-Fayette soil belt overlaps into the Joy-Biggsville-Port Byron soil belt.

Degree of weathering. The intensity of soil weathering in Henderson county was affected primarily by the rate and duration of loess deposition, the size of the silt particles, and the amount of material deposited. Slow but continuous erosion was important in some areas, and, as just mentioned, the kind of native vegetation also influenced degree of weathering. Climate is another important influence in the weathering process.

Where loess was deposited rapidly and more or less constantly until rather recent times, the effects of weathering are much less than where deposition was slower and stopped earlier. Thus on the bluffs where loess deposition was most rapid and ended latest, the soil profiles are only weakly developed — that is, the surface, subsurface, and subsoil horizons are difficult to distinguish from one another or from the underlying parent material. These same horizons are much more pronounced several miles to the east and southeast where the loess is thinner. Actual weathering per cubic inch of soil material is much greater in the southeastern part of the county than along the bluffs because the rate of loess deposition was slower, deposition ended sooner, less material was deposited, and the silt particles averaged somewhat finer.

Climate. Rainfall and temperature are essentially the same throughout Henderson county. Soil differences are not, therefore, attributable to climatic differences. The processes of glaciation, flooding, water deposition, loess deposition, and weathering are all dependent upon climatic forces, however; so climate is a factor of the utmost importance in soil development.

WEATHER DATA

There is no weather station in Henderson county. The Monmouth, Illinois, and Burlington, Iowa, stations are close, however, and their data should apply.

Average annual precipitation (rainfall and melted snowfall) at Burlington from 1876 to 1946 was 36.56 inches. The least, 23.24 inches, occurred in 1901. The greatest, 51.55 inches, was recorded in 1902.

Average annual precipitation at Monmouth from 1894 to 1946 was 35.11 inches. The lowest was 21.96 inches in 1910 and the highest was 49.92 inches in 1929.

Average inches of rainfall per month during the growing season at the Burlington station, 1876 through 1946, were 3.23 in April, 4.38 in May, 5.24 in June, 3.39 in July, 3.53 in August, and 4.17 in September for a total of 23.94 inches. At Monmouth, the average monthly inches of rainfall, 1894 through 1946, were 3.12 in April, 4.03 in May, 4.56 in June, 3.68 in July, 3.25 in August, and 4.29 in September for a total of 22.93 inches.

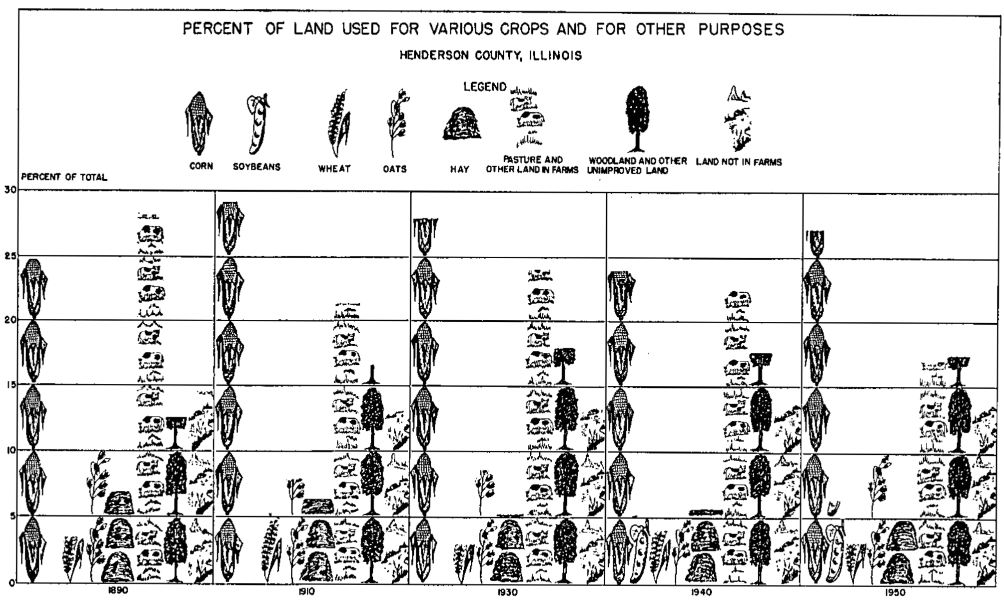
The mean summer temperature at Monmouth, May through September, 1922-1950 inclusive, was 68.8° F. with a mean maximum of 81.1° and a mean minimum of 58.9°. The highest temperature recorded during this period was 110° F. in July, 1936, while the lowest was –22° F. in both January and December, 1924. The mean temperature at Burlington, Iowa, May through September, 1925-1950 inclusive, was 71.1° with a mean maximum of 80.6° and a mean minimum of 58.9°.

The average frost-free period at Monmouth (1922-1950) was 172 days. Average date of the last killing frost in spring was April 25; of the first killing frost in autumn, October 14. The latest date of a recorded killing frost in spring was May 25, 1925. The earliest recorded date of the first killing frost in autumn was September 26, 1928.

AGRICULTURAL PRODUCTION

Henderson county is mainly agricultural. According to census data, 85 to 86 percent of the total area has been in farms since 1890.

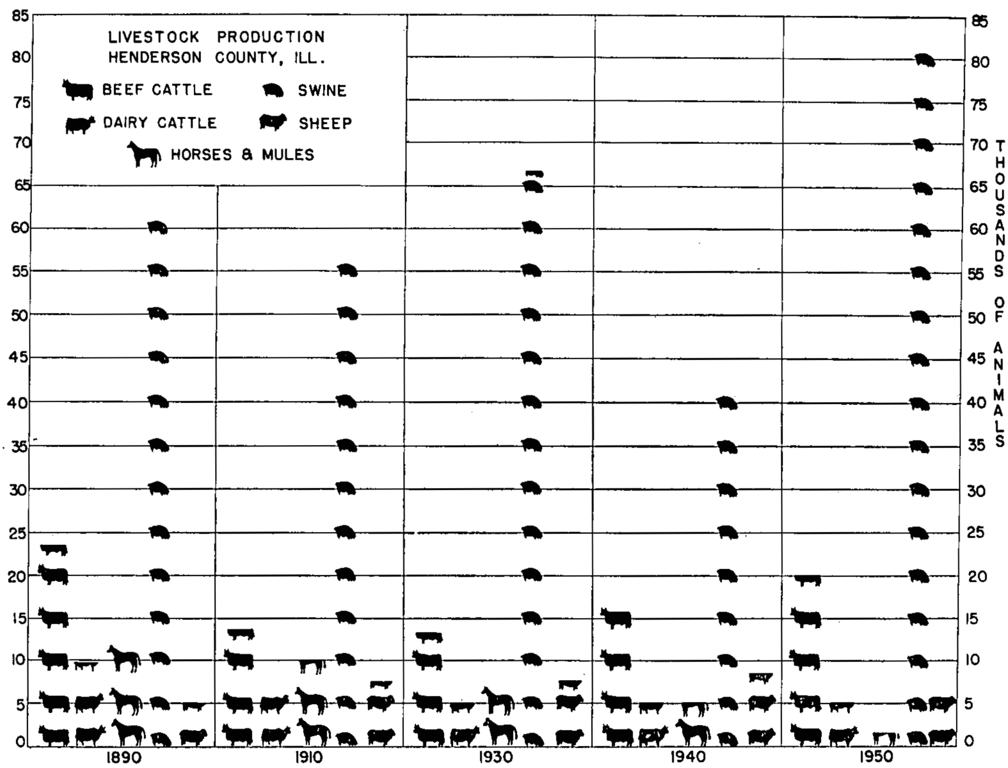
The level to gently rolling upland areas are used mainly for corn, wheat, oats, soybeans, and hay. The more sloping areas along the drainageways and on the knobs along the Mississippi river bluffs are used primarily for hay and pasture, while the steepest areas remain in woodland. Corn was the principal crop on the bottomlands and silty terraces before about 1935; since then soybeans have become a major crop along with the corn. The sandy terraces are used primarily for special crops such as melons and Christmas trees, for early-maturing crops such as rye, wheat, and hay, and in a few cases for corn. A fair portion of the sandy terrace north of Oquawka is in woodland.



The proportion of land in cultivated crops in Henderson county did not greatly change from 1890 to 1950. The individual crops — corn, oats, wheat, and hay — fluctuated somewhat, and soybeans became important shortly after 1930. Permanent pasture tended to decline while woodland tended to increase. Fig. 19

The percentages of land in Henderson county used for various cultivated crops, pasture, woodland, and other purposes are given in Fig. 19. The acreage in corn and oats together has increased some since 1890, except during the period represented by 1940, whereas wheat has remained fairly constant. The percentage of pasture and hayland has declined slightly. Soybeans seem to be taking their place in some areas.

Livestock production is a major part of farming in Henderson county. Livestock numbers are given in Fig. 20. Beef cattle have declined slightly since 1890. Dairy cattle remained almost constant until recently, when there was a slight decline. Horses and mules have declined greatly. Swine production has been variable but the over-all trend is upward with the highest number showing in the 1950 census period. Sheep numbers increased from about 2,300 in 1890 to 6,300 in 1910, then remained almost constant until 1950, when there was a slight decline.



Of all classes of livestock on Henderson county farms, hogs showed the widest fluctuation in numbers from 1890 to 1950. Numbers of horses and mules declined steadily until fewer than 2,000 remained in 1950. Fig. 20

MEANINGS OF SOME TECHNICAL TERMS

Alluvial sediment — soil materials of various sizes carried by running water and left on the flood plains.

Calcareous — said of soils in which enough free particles of limestone are present to effervesce, or bubble, when dilute hydrochloric (muriatic) acid is poured on the soil material.

Clay — the very fine soil particles less than 1/12,500 (.00008) inch or 1/500 (.002) millimeter in size. They give cohesion or stickiness to the soil.

Claypan — a layer of soil that is sticky and plastic when wet but hard when dry, and that is very high in clay particles.

Compact — said of soils that are firm or difficult to penetrate. The particles are very closely packed and sometimes weakly cemented together.

Drouthy — said of soils that lack water-holding capacity or are adversely susceptible to dry weather.

Glacial till — mixed materials deposited by glacial ice without being reworked by water or wind.

Loess — medium-sized dust or silty material transported and deposited by the wind.

Massive — said of soils that lack structure, the soil material clinging together in a large uniform mass.

Mineral soil — any soil that is composed chiefly of mineral matter.

Mottled — irregularly marked with spots or splotches of different colors.

Neutral — a neutral or "sweet" soil is one that has neither an acid nor an alkaline reaction.

Parent material — earth material such as gravel, sand, silt, or clay from which soils develop.

Plastic — said of soils that, when moist, are capable of being molded or modeled without breaking up.

Soil complex — two or more soil types that occur together in a more or less regular pattern and are so intimately associated geographically that they cannot be separated by boundaries on the soil map at the scale used.

Soil horizon — a term used for a natural structural division or layer of soil lying approximately parallel to the land surface and different in appearance and characteristics from the layers above and below it.

Soil profile — a vertical section of soil through and including all of its horizons.

Soil texture — coarseness or fineness of the soil material. It depends upon the proportion of the various sizes of particles.

Structure aggregates — natural clumps of soil particles resembling clods, lumps, or granules.

Tilth — the physical condition of a soil in respect to its fitness for growing general field crops.

Topography — the lay of the land surface, as rolling topography, nearly level topography, etc.

Weathered — disintegrated and decomposed by the action of natural elements, such as air, rain, sunlight, freezing, thawing, etc. Weathered soils have been leached and changed physically and chemically.

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Much new information about soils has been obtained since the older soil maps and reports in the above list were printed, especially Nos. 1 to 53, which were issued before 1933. For many areas this newer information is necessary if the maps and other soil information in the reports are to be correctly interpreted. Help in making these interpretations can be obtained by writing to the Department of Agronomy, University of Illinois, Urbana.

WHAT KINDS OF SOIL OCCUR ON MY FARM?

WHAT TREATMENTS DO MY SOILS NEED TO MAKE THEM YIELD THEIR BEST?

WHAT CROP YIELDS CAN I EXPECT?

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

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