

UNIVERSITY OF ILLINOIS
Agricultural Experiment Station

SOIL REPORT No. 66

SHELBY COUNTY SOILS

BY HERMAN WASCHER, GUY D. SMITH, AND L. H. SMITH



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"It must be remembered that the productive power of the soil is the basic support of all prosperity."

C. G. HOPKINS

"It is the duty of every landowner to see that his land when he leaves it is as good or better than when he received it."

J. G. MOSIER

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INTRODUCTORY NOTE

IT IS A MATTER of common observation that soils vary tremendously in their productive power, depending upon their physical condition, their chemical composition, and their biological activities. For any comprehensive plan of soil improvement looking toward the permanent maintenance of our agricultural lands, a definite knowledge of the various existing kinds or types of soil is a first essential. It is the purpose of a soil survey to classify the various kinds of soil of a given area in such a manner as to permit definite characterization for description and for mapping. With the information that such a survey affords, every farmer or landowner of the surveyed area has at hand the basis for a rational system for the improvement of his land. At the same time the Experiment Station is furnished a scientific inventory of the soils of the state; and with such an inventory as a basis it can proceed intelligently to plan those fundamental investigations so necessary for the solution of problems of practical soil improvement.

This county soil report is one of a series reporting the results of the soil survey which, when completed, will cover the state of Illinois. Each county report is intended to be as nearly complete in itself as it is practicable to make it, even at the expense of some repetition.

While the authors must assume the responsibility for the presentation of this report, it should be understood that the material for it represents the contribution of a considerable number of the present and former members of the Agronomy Department working in their respective lines of soil mapping, soil analysis, and experiment field investigation.

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SHELBY COUNTY SOILS

By HERMAN WASCHER, GUY D. SMITH, and L. H. SMITH¹

GEOGRAPHICAL AND HISTORICAL FEATURES

SHELBY COUNTY lies in the south-central part of Illinois, the center of the county being approximately 50 miles southeast of Springfield. It is a medium-sized county, occupying a total of about 767 square miles.

The first permanent settlements were made in Cold Spring township by Charles Wakefield and his sons in 1818. They chose the site of Cold Spring (later known as Williamsburg) because of a plentiful supply of good pure spring water (from which the area derived its name) and because of the nearness to the forests which furnished fuel, building material, and game of many kinds.

Shelby county, named in honor of Isaac Shelby, governor of Kentucky and a general in the Revolutionary War, was established by legislative act in January,

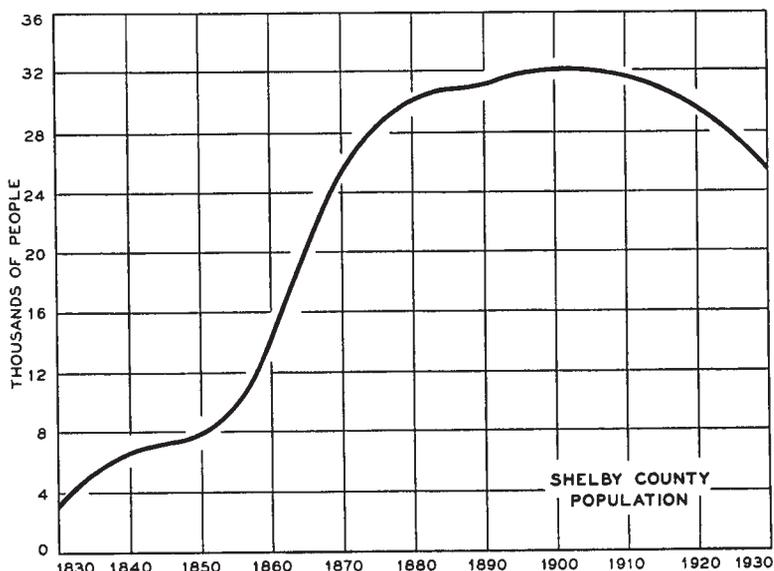


FIG. 1.—GROWTH OF POPULATION IN SHELBY COUNTY

The rapid increase in population between 1830, when there were about 3,000 inhabitants in Shelby county, and 1880, when there were about 30,000; then the marked decline from 1900 to 1930, when there were fewer than 25,500 inhabitants, are the outstanding facts shown in the above graph. (*Figures are from U. S. Census.*)

1827, from a part of Fayette county. Later in the same year a site for the county courthouse was chosen and Shelbyville, which is now the principal town as well as the county seat, was built around this location.

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After the Black Hawk war, when the last Indians in the region, a tribe of friendly Kickapoos, left this region, settlement by white people progressed rapidly (Fig. 1).

Facilities for marketing agricultural products are now well established. Railroads go direct to St. Louis, Chicago, and Indianapolis, and paved highways cross the county at fairly frequent intervals. Prior to 1935, however, no concerted effort was made toward surfacing the tributary country roads except for the application of some oil and a small amount of gravel. Since 1935 considerable use has been made of the gravel that is available along the Kaskaskia river and at other places.

Agricultural Production¹

Agriculture is the chief source of economic wealth in Shelby county. The principal crops grown and the principal livestock products marketed are those common to the corn belt. Corn has always been the major crop both in acreage

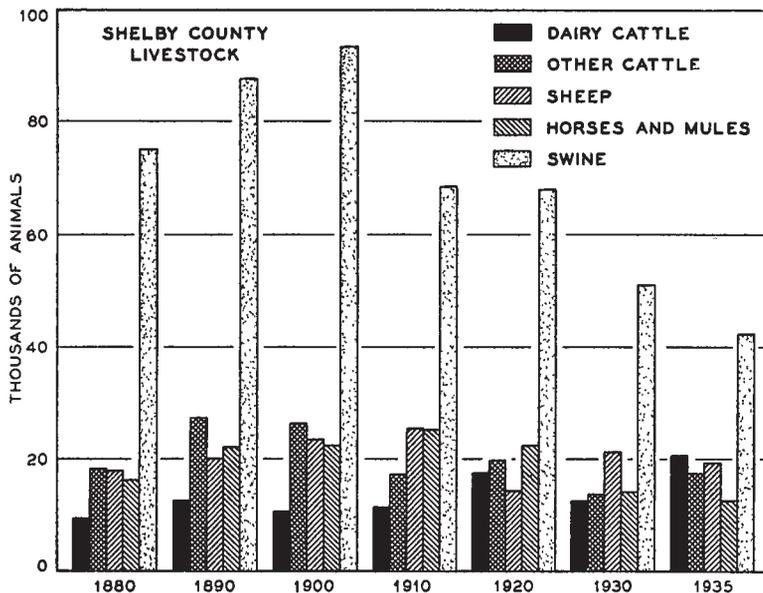


FIG. 2.—PRODUCTION OF PRINCIPAL CLASSES OF LIVESTOCK IN SHELBY COUNTY

The production of beef cattle and hogs reached a maximum between the years 1890 and 1900, while dairy cattle, sheep, horses and mules did not reach their high points until the decade 1910 to 1920. A slight increase is evident in 1935 in the number of dairy and beef cattle, but a decline is shown in the number of sheep, hogs, and horses and mules. (Figures are from U. S. Census and "Illinois Crop and Livestock Statistics.")

and in value. Wheat, oats, and hay have also been important, and the soybean acreage increased significantly during the decade 1926 to 1936. For the thirteen-year period 1924-1936 inclusive the average yearly acreage of the important

¹All crop and livestock statistics are from either the U. S. Census or "Illinois Crop and Live Stock Statistics," a joint publication of the Illinois State Department of Agriculture and the U. S. Department of Agriculture.

crops was as follows: corn 129,000 acres; hay 61,000 acres; oats 44,000 acres; soybeans 40,000 acres; wheat 11,000 acres; sweet clover 9,000 acres; broom-corn 3,000 acres; and alfalfa 2,000 acres. The acreages of all crops except oats and soybeans have remained relatively stable thruout this period, showing only moderate yearly fluctuations from the average. Oats, however, declined from more than 67,000 acres in 1928 to less than 20,000 acres in 1934 and 1935. Soybeans, on the other hand, increased rapidly from about 20,000 acres in 1927 and 1928 to approximately 90,000 acres in 1935 and 1936. According to the U. S. Census there were 466,284 acres of farm land in Shelby county in 1935, 361,300 acres of which were available for crops and 253,772 acres of which were harvested. In 1934, according to the Census record, 138,921 acres were in pasture and only 10,554 acres in unpastured woodland.

Livestock production has always been an important part of the agriculture of this county. Some idea of the trend in livestock production may be gained from Fig. 2, in which the numbers of cattle, sheep, horses and mules, and swine are shown at ten-year intervals from 1880 to 1930 and for 1934.

That poultry and eggs are an important source of farm income is indicated by the production of nearly $1\frac{3}{4}$ million dozen eggs in 1934. Beekeeping is an important sideline and should be encouraged, especially in those areas where considerable quantities of sweet clover are grown for seed.

Climate

The humid, temperate climate of Shelby county is characterized by a wide range in temperature between the extremes of winter and summer and a somewhat irregularly distributed rainfall. The mean summer temperature during the twenty-year period 1918 to 1937 inclusive, as taken from the records of the Effingham Weather Station, was 74.6° F., while that of winter was 33.4° F. The highest temperature recorded during this twenty-year period was 111° F. in July 1936; the lowest was -24° F. in January 1930, thus giving a maximum spread for this period of 135 degrees.

The average date of the last killing frost in the spring was April 23 during this twenty-year period, and the earliest in the fall was October 19, giving an average frost-free season of 180 days. The shortest growing season recorded was 138 days in 1925 and the longest, 207 days in 1929. The growing season in this region usually gives ample time for the maturing of the crops commonly grown, but occasionally, when the spring is wet and planting delayed, early frosts catch such crops as corn, broomcorn, and soybeans before they have fully matured.

The average annual rainfall recorded at the Effingham Station during the twenty-year period mentioned above was 41.3 inches. The yearly rainfall varied from a minimum of 30.4 inches in 1925 to a maximum of 65.2 inches in 1927. The rainfall during the growing season—15.1 to 37.1 inches, April thru September—would usually be more than adequate for the crops of the region if it were properly distributed. The weather records at Effingham show, however, that during this twenty-year period there were 49 periods 21 days or more in length during which no rain totalling as much as half an inch fell during any 24 hours. Of these 49 rainless periods, 22 exceeded 30 days and one in 1925 lasted 73 days.

When 30 days or more elapse without rain during a critical period of crop growth, such for example as the period during which corn pollinates, severe injury is likely to result. This is especially true on soils having heavy claypan subsoils. Rainless periods of less than 20 days probably do little permanent harm, especially on the more fertile soils, but summer crops on a number of the upland soils are damaged by rainless periods of as short duration as three weeks when they occur during critical periods of crop growth.

Topography and Drainage

The prevailing topography of the southern and western parts of Shelby county is essentially that of a flat plain which has been partially dissected by the headwater erosion of a few small streams. Differences in topography are generally very marked, the nearly level remnants of the tableland falling off abruptly into the steep-sided valleys, whose bottoms are usually from 50 to 60 feet below the level of the uplands. The drainage of these uplands, excluding the steep valley walls, is poor. The topography is such that the surface waters run off slowly if at all, and the subsoils are, for the most part, slowly permeable or nearly impermeable to water movement. A further factor contributing to the poor drainage of the nearly level uplands, in the southern and southeastern parts of the county especially, is the common presence, at a depth of from 4 to 5 feet, of a nearly impermeable highly weathered Illinoian gumbotil which restricts the underground outlets.

The topography of the central, northern, and northeastern parts of the county, on the other hand, is prevailingly undulating to rolling, and drainage, for the most part, is good. Those nearly level areas which have no natural surface runoff can be tile-drained since the subsoil and underlying material are permeable. A series of morainal hills, also having good drainage, extends from the vicinity of Dollville south thru Tower Hill and Cold Spring townships.

The drainage of the bottomlands, while varying locally with small differences in elevation, is fair. Overflows are frequent, but water seldom stands long on much of the land during the months when there are apt to be growing crops.

FORMATION OF SHELBY COUNTY SOILS

Origin of Soil Material

The nature of Shelby county soils can be more readily understood if one has some knowledge of the formation and composition of the material from which they have been derived. The upland and terrace soils have developed from material deposited during the Glacial Epoch. The bottomland sediments have been reworked, and more or less assorted material has been deposited by the streams during recent times.

During the Glacial Epoch the climate alternated between long intervals in which it was much like that of today and intervals when the average temperature was so low that the snow which fell in winter did not entirely melt the following summer. During these colder intervals snow and ice accumulated in the northern parts of the continent in such enormous amounts that the pressure

caused the masses to push outward from the centers of accumulation, forming glaciers.

The glaciers, aided by further accumulations of snow and ice at their margins, advanced chiefly southward until they reached a region where the climate was warm enough to melt the ice as rapidly as it advanced. In moving across the country, the ice sheets picked up great masses of rock, gravel, sand, silt and clay, ground them together and carried them sometimes hundreds of miles. The pressure of the moving ice leveled off hills and filled in old valleys, often completely obliterating the features of the surface over which the ice passed. The mixture of materials deposited by a glacier is known as glacial drift. The term "drift" includes all glacial deposits such as "till," which was deposited by the ice sheets, as well as outwash silts, sands, and gravels. The terms "till" and "outwash" will appear frequently in the discussion to follow and especially in the descriptions of the individual soil types.



FIG. 3.—LOESS IN THE MAKING

The upland soils of Shelby county owe their productivity largely to the silty wind-blown material, called loess, deposited near the close of the ice age by dust storms similar to the one pictured above. The American bottoms were the source of most of the dust. This picture was taken in Texas in the spring of 1935. (*Photo by courtesy of U. S. Soil Conservation Service.*)

The territory that is now Shelby county was probably covered by at least three of the four major advances of ice from the north, but only two of the glaciers, the Illinoian and the Wisconsin, have had much influence on the present topography or on the soils. The Illinoian, the earlier of the two ice sheets, covered the entire county, and on melting back left a broad gently undulating plain, large portions of which still persist in the southern and western parts of the county. The Wisconsin, the last glacier to enter this region, advanced from the northeast to cover approximately two-fifths of what is now Shelby county. The general level of the Wisconsin till plain varies from 25 to 75 feet above that of the Illinoian and its terminus is marked by the broad ridge of rolling topography

known as the Shelbyville moraine. This moraine, beginning at the east county line northeast of Sexon, can be traced in a general westerly direction to Shelbyville, thence northwest to near Moweaqua and on north into Macón county.

As the ice of the Wisconsin glacier melted, the waters spread out over the old Illinoian glacial plain and formed outwash plains in a number of places. In other places the glacial waters poured directly into the channels of such streams as Kaskaskia and Little Wabash rivers and their tributaries and in certain favorable locations deposited thick beds of sand and gravel. Remnants of these sand and gravel beds form our present-day terraces. The glacial waters also carried enormous quantities of fine silt and clay sediments. Much of the silt was deposited on the broad flats of the Illinois and upper Mississippi river bottoms, while the clay for the most part was carried to the lower Mississippi valley and into the Gulf of Mexico.

Presumably each winter when low temperatures checked the melting of the ice sheet, the flood waters receded, exposing the large mud flats of the bottomlands. As soon as these flats were dry, the wind picked up the silty sediment and carried it onto the upland, burying the previously deposited till and outwash and forming deposits of uniform texture called "loess." No doubt other sources have contributed smaller quantities toward these loess deposits, as the dust storms of 1934 suggested (Fig. 3).

Several advances and retreats of the Wisconsin ice sheet, only the first of which touched Shelby county, flooded the Illinois and Mississippi river valleys a number of times. Thus there was opportunity for thick deposits of loess to accumulate immediately adjacent to the broad river flats. Some of the loess bluffs along the Illinois river are more than 50 feet thick. The territory that is now Shelby county lies so far from these major sources of loess, however, that it received deposits only a fraction as thick as the above. In the northwestern part of the county, where the loess is the thickest, it measures approximately 75 inches on uneroded areas, whereas in the southeastern part it averages less than 40 inches. In addition to this general thinning of the loess material from west to east many local differences in deposition and erosion have caused variations in the thickness of the loess mantle, so that in some places none can be definitely identified now on the till or outwash. All these materials—loess, till, and outwash—in varying proportions in different parts of the county, make up the parent materials of the soils of Shelby county.

How the Soils Were Developed

As soon as the parent loess, till, or outwash materials were deposited, they were subjected to the action of weathering forces, and the processes of soil development began. When first deposited, the loess, till, and outwash were high in lime content and amply supplied with the mineral elements of plant food, but as time elapsed the rain water, the oxygen and carbon dioxide of the air, and products of the decaying plant remains attacked the primary minerals, leaching out the free lime and changing some of the minerals into clay. Since the weathering forces are most active near the surface and decrease in activity with increasing depth, various degrees or stages of weathering occur at different depths. Thus carbonates are leached first from the surface, for it is there that decomposition

of the minerals is most active. Most of the organic matter accumulates in the surface, as is indicated by the darker color of the surface soil. The clay particles formed at or near the surface are gradually carried downward by the percolating waters to a point where they accumulate, forming a clay subsoil. Thus horizons are gradually formed, and the parent material acquires characteristics that permit it to be called a soil.

During the period when clay is forming rapidly near the surface and before appreciable amounts have been carried down into the subsoil, the horizons of the soil are but faintly developed, and the soil is said to be young, or in a youthful

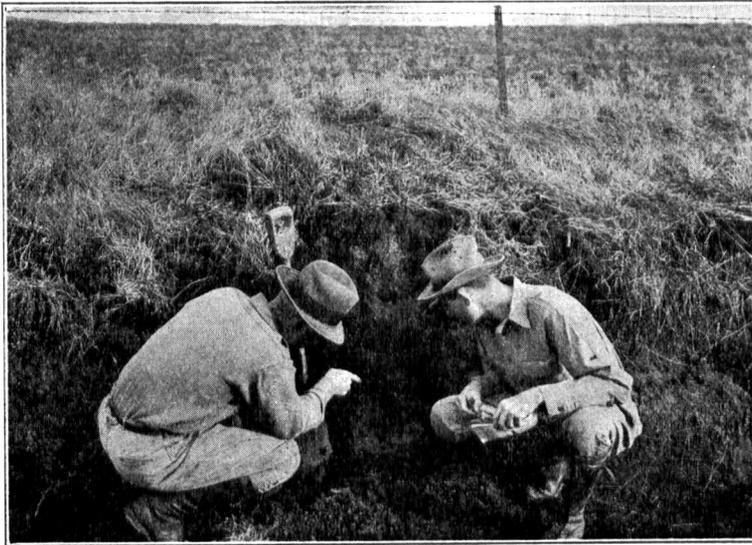


FIG. 4.—STUDYING THE SOIL PROFILE

One of the very pronounced characteristics observed in most soils is that they are composed of more or less distinct layers, or strata, often spoken of in soil literature as "horizons." The vertical section of the soil showing the arrangement of these horizons from the surface down is called the "soil profile."

stage of development. This stage is best exemplified in Shelby county by the dark heavy-textured soils, such as the type known as Drummer clay loam, found in the northern part of the county. As weathering continues, the soil characteristics become more clearly developed and the horizons more sharply defined, and the soil gradually enters what is considered a mature stage of development.

Prolonged weathering results in extensive decomposition of the primary soil minerals and the movement of a large amount of clay from the surface soil into the subsoil. As these processes continue, the soil becomes progressively older or more thoroly developed and finally an old soil is produced. This advanced stage of development is illustrated by the soil type called Cisne silt loam, found in the southern part of Shelby county. Thus it will be seen that the soils of this county differ widely in their stages of development.

The soils developed on the Wisconsin till plain north of Shelbyville under a grass vegetation have been leached of their free lime to a depth of about 50 to

60 inches and they vary in their stage of development from youthful to mature. In contrast, the soils developed on similar topography on the Illinoian till plain south and west of Shelbyville and under a similar vegetation vary in stage of development from mature to old and are usually leached of free lime to a depth of 10 feet or more.

Variations in natural drainage and native vegetation have been the chief causes of differences in the stages to which the soils on the Wisconsin till plain in the northeastern part of the county have developed; whereas variations in the thickness of the loess blanket, supplemented by variations in drainage and



FIG. 5.—A CONVERGENCE OF THREE SOIL TYPES

A narrow bottom of Huntsville loam is shown here, bordered by short badly eroded slopes of Westville silt loam, leading to the nearly level upland of Ward silt loam.

vegetation, have produced the differences in the stages to which the soils on the Illinoian till plain in the western and southern parts of the county have developed.

As soon as the physical and chemical agencies of weathering began acting on the parent materials—forming, among other things, available plant nutrients—vegetation spread over the land. Two types of vegetation—the grass type and the tree and brush type—have exerted important influences on these soils during the time they have been developing; for grass, thru its extensive fibrous root system, adds much organic matter to the soil, whereas under forest conditions little organic matter accumulates.

Drainage also influences soil development. Impeded drainage tends to retard the decomposition of organic matter but favors mineral decomposition and the formation of impervious claypan subsoils. Drainage has been very restricted in many places on the Illinoian till plain, and it is here that we find “scalds,” or slick spots, whose presence is supposed to be due to the accumulation of sodium salts as a result of slow underdrainage.

Thus it is seen that differences in drainage, topography, vegetation, and parent soil material bring about differences in the environment under which soils develop and consequently are responsible for the various kinds of soils that are found in a region.

Meanings of Some Special Terms

Since a number of the terms that are used thruout a report of this kind are necessarily unfamiliar to many readers, definitions of them will be useful:

1. **Claypan.** A heavy, plastic layer, or horizon, beneath the surface horizons, which is sticky when wet and hard when dry, and which has a serious impeding effect on moisture movement and root penetration.

2. **Concretions.** Concentrations of certain substances, such as lime or iron and manganese, into nodular-like forms of various sizes and composition.

3. **Drainage.** The words *excessive*, *rapid*, *moderate*, *slow*, and *very slow* are used to describe different degrees of drainage, either surface drainage or underdrainage. *Moderate* describes the most desirable degree.

4. **Horizon.** A layer, or stratum, of soil, usually paralleling the land surface.

5. **Loess.** In Illinois most of the soil material known by this term is rock flour which was produced in remote times by the grinding action of the glaciers. This material was deposited as sediment by the glacial streams and later blown out of the bottomlands and deposited on the uplands.

6. **Prismatic.** A block-like form, or arrangement, of the structural particles of a soil, in which the vertical axis is longer than the horizontal.

7. **Structure.** The way in which soil particles are combined or arranged into larger units known as *aggregates*.

8. **Subangular aggregates.** Structural particles having an angular form but with the edges slightly rounded.

9. **Texture.** The relative proportions in which individual soil grains of various sizes are combined.

SOIL CLASSIFICATION AND MAPPING

Each of the soil types shown on the accompanying map has a definite set of characteristics upon which its separation from other types is based. These characteristics are inherent in the strata, or horizons, of each type. Among them may be mentioned texture, structure, color, and chemical composition.

Failure to appreciate that soil types are differentiated on the basis of the character of the *entire* soil section, and not on the surface alone, often makes it difficult to understand exactly what is meant by the term "soil type." It frequently happens that the surface horizon of one type is no different from that of another type, yet the two types may be widely different in character as well as in agricultural value. It is of utmost importance, therefore, in studying soils, to get a clear mental picture of all the outstanding features of each soil type.

It is likewise important to understand that a given type must of necessity include a range in properties. The boundaries between soil types are seldom sharp, there frequently being a transitional band which includes some of the properties of each type. Also, many small isolated spots of one or more distinct types must, upon occasion, be included with the prevailing type in the area in order to avoid undue confusion and to simplify the printed map as much as possible.

Besides the natural range in properties that is found within a given soil type, there are other variations that have been brought about by differences in the management of the soil since it has been under cultivation.

For example, the productive capacity of soils developed on rolling topography may be permanently impaired by management practices which permit unchecked soil erosion. Other differences of a temporary nature may be induced by poor rotations which lower the present productivity without necessarily impairing potential or inherent productivity. Differences of this kind cannot be shown on a soil map.

Forty-two soil types are shown on the Shelby county soil map. Slightly less than half of them, or 20 of the 42 types, account for 90 percent of the total land area in the county. The accompanying soil map, shown in three sections, gives

TABLE 1.—SHELBY COUNTY SOILS: AREAS OF THE DIFFERENT TYPES

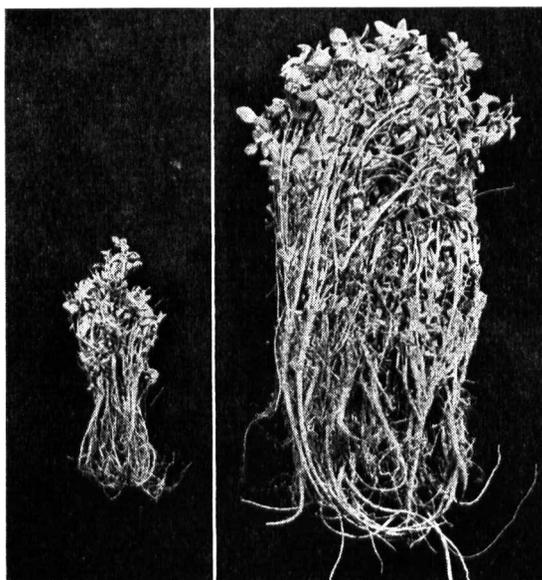
Type No.	Type name	Area in square miles	Area in acres	Percent of total area
2	Cisne silt loam.....	21.20	13 570	2.77
3	Hoyleton silt loam.....	17.65	11 300	2.30
4	Walton silt loam.....	.50	320	.06
8	Hickory gravelly loam, eroded.....	39.20	25 090	5.11
12	Wynoose silt loam.....	11.35	7 260	1.48
13	Bluford silt loam.....	26.75	17 120	3.49
14	Ava silt loam.....	.70	450	.09
22	Westville silt loam.....	35.90	22 970	4.68
25	Hennepin gravelly loam, eroded.....	13.45	8 610	1.75
33	Keyesport loam.....	1.05	670	.14
46	Edina silt loam.....	36.25	23 200	4.73
48	Ebbert silt loam.....	16.45	10 530	2.15
50	Edina clay loam.....	9.70	6 210	1.27
51	Kern silt loam, terrace.....	.20	130	.03
55	Sidell silt loam.....	59.65	38 180	7.78
67	Harpster clay loam.....	.65	420	.08
72	Sharon loam, bottom.....	24.10	15 420	3.14
73	Huntsville loam, bottom.....	34.15	21 860	4.45
81	Littleton silt loam, terrace.....	.65	420	.08
86	Keysport silt loam.....	1.50	960	.19
112	Putnam silt loam.....	75.40	48 260	9.83
113	Cox silt loam.....	53.80	34 430	7.02
114	O'Fallon silt loam.....	.05	30	.01
116	Whitson silt loam.....	7.45	4 770	.97
117	Bogota silt loam.....	44.60	28 540	5.82
118	Alma silt loam.....	8.10	5 180	1.06
119	Elco silt loam.....	2.75	1 760	.36
127	Harrison silt loam.....	27.10	17 340	3.54
128	Douglas silt loam.....	5.35	3 420	.70
134	Camden silt loam, terrace.....	4.45	2 850	.58
138	Shiloh clay loam.....	4.90	3 140	.64
143	Ava sandy loam.....	.05	30	.01
148	Proctor silt loam.....	4.20	2 690	.55
149	Brenton silt loam.....	6.85	4 380	.89
152	Drummer clay loam.....	60.45	38 690	7.88
154	Floyd silt loam.....	77.80	49 790	10.14
158	Vance silt loam.....	10.35	6 620	1.34
206	Thorp silt loam.....	8.85	5 660	1.15
207	Ward silt loam.....	7.15	4 580	.93
208	Sexton silt loam.....	3.95	2 530	.52
211	Tamms silt loam.....	.20	130	.03
212	Thebes silt loam.....	2.00	1 280	.26
	Total.....	766.85	490 790	100.00

the location and boundary of each soil type. The map also indicates the position of streams, roads, railroads, towns, rural dwellings, public buildings, and various other identifying features. For convenience in referring to the respective types and also in designating small soil areas on the map, a number as well as a color has been assigned to each type.

A list of the soil types mapped in Shelby county is given in Table 1, where also are shown the area of each in square miles and in acres and the percentage that each constitutes of the total area of the county.

GENERAL SUGGESTIONS FOR SOIL IMPROVEMENT

A full treatment of the subject of soil fertility is beyond the scope of this report, but a brief discussion of some of the more important principles is included at this point for the benefit of the landowner or tenant who wishes to increase the productivity of his land. The following discussion is based on the assumption that adequate drainage has been established.



No limestone

Limestone

FIG. 6.—SWEET CLOVER DEMANDS LIMESTONE

These plants are from a second-year spring growth of sweet clover on one of the experiment fields. Each bundle is the growth from 4 square feet, the small one at the left having grown on unlimed soil and the large one at the right on soil given a 2-ton application of limestone.

Liming.—The first step in soil improvement, assuming adequate drainage has been provided, is the application of sufficient limestone to grow the crops which it is desired to grow. This involves the testing of each field for acidity and the application of limestone as indicated by the tests. Detailed instructions for collecting samples and making tests are given in Circular 346, "Test Your Soil for Acidity."

Organic Matter and Nitrogen.—The correction of the soil acidity paves the way for the second step in a soil-improvement program, that is, provision for an adequate supply of organic matter and nitrogen. Under a livestock system, where the major portion of the grain and hay grown on the farm is fed to livestock and the manure returned to the fields, a satisfactory nitrogen level can be maintained without additional treatment provided crop residues are plowed under instead of being burned and a good rotation is used. Circular 465 "Pasture Improvement and Management," contains much information of value to the livestock farmer. When a grain system of farming is being followed, it is necessary to grow and plow under green-manure crops if the nitrate level is to be maintained. This problem is more completely outlined in Circular 326 "A Nitrogen Factory on Every Farm." Probably the most effective green-manure crop for this purpose is sweet clover. Bulletin 394, "Sweet Clover in Illinois,"¹ will prove helpful in understanding the requirements of this crop.

Phosphate and Potash.—Having taken care of any need for lime and nitrogen, the next step is to test for phosphate and potash deficiencies. Instructions for taking samples and making the phosphate tests will be found in Circular 421, "Testing Soil for Available Phosphorus." The results of this test are sometimes difficult to interpret properly, and it is therefore suggested that the county farm adviser be consulted for assistance in making this test. The test for available potash is more difficult to make than the available phosphorus test and consequently it is not recommended that anyone attempt to make his own potash tests unless he is willing to spend some time and money in acquiring the proper equipment and learning the proper operating technic. A method for making this test is explained in a mimeographed folder, which can be obtained on request.

When both phosphate and potash are low, the application of either one by itself usually gives disappointing results. This is especially true on the old gray soils in the southern part of Shelby county. However, as a rule it can reasonably be expected that wheat will show the most response to phosphate applications and corn to potash. For maximum yields of all crops, however, it is essential to maintain adequate supplies of available nitrogen, phosphorus, and potassium in the soil thruout the growing season. If any one of the elements is not present in sufficient amounts, crop yields will be reduced no matter how ample the supply of the other elements may be.

Systems of Farming.—In general, a farmer who keeps enough livestock to consume all his grain and roughage can maintain the producing capacity of his soil by the use of limestone, manure, and the growing of legumes for hay and pasture. Where the soil is deficient in phosphorus or potassium, these elements may need to be applied in order to bring the yielding power of the soil up to a satisfactory level. If a grain system of farming is followed, best yields are obtained by plowing under sweet clover at regular intervals and applying phosphate and potash fertilizers whenever these plant foods become deficient.

¹Any publication mentioned in this report may be obtained free of charge by addressing the Illinois Agricultural Experiment Station, Urbana, Illinois.

Erosion Control.—Finally, the long-time effects of soil erosion must be given serious consideration even on moderately sloping land. The best and most economical method of reducing erosion losses is to keep a good cover of vegetation on the land as many months of the year as possible but particularly during the winter and early spring. Since this cannot be done satisfactorily on poor soils, the application of lime, phosphate, and potash as needed must be part of any permanent program of erosion control. Suggestions for methods of controlling erosion on specific soil types are given in the "Use and Management" paragraph under each soil type needing such protection. If more information is desired on erosion control it is suggested that Farmers' Bulletin 1795, "Conserving Corn Belt Soil," be studied. This bulletin may be obtained from the U. S. Department of Agriculture, Washington, D. C.

SOIL TYPES OF SHELBY COUNTY, THEIR USE, CARE AND MANAGEMENT

A brief description of the outstanding characteristics of each soil type as mapped in Shelby county, together with some general recommendations as to its use, care, and management, is given on the following pages. Some of this information is summarized in Table 2, pages 46 and 47.

The recommendations made for the management of the respective types are based on their requirements for the efficient production of the crops common to the region. Such matters as the growing of special crops, the location of the land with respect to markets, and other economic considerations have not been taken into account here.

In order to outline a complete soil-improvement and management program for a single field or farm, it would be necessary to know not only what soil types are involved but also what cropping and management practices have been followed in the past and what type of farming is to be followed in the future. Obviously not all this information is available. The major purpose of this report, therefore, is to furnish such basic information about the various soil types as will enable a farmer to lay out his own program of soil management and improvement for the soils that occur on his farm.

Cisne silt loam (2)

Cisne silt loam is a light-colored soil found on nearly level topography in the southeastern part of Shelby county. It was developed under a grass vegetation from thin loess over Illinoian till. The total area covered by Cisne silt loam in the county is about 13,600 acres.

The surface horizon is 6 to 7 inches thick and is a gray-colored friable silt loam with many reddish-brown concretions commonly called buckshot. The subsurface is 8 to 12 inches thick and is light gray in its upper part and nearly white in its lower. It is an ash-like material, a silt loam in texture, without any discernible arrangement of soil particles, and contains numerous reddish-brown concretions. Immediately beneath the subsurface, at a depth of 18 to 20 inches,

the claypan subsoil occurs. It is heavy and plastic, mixed gray and pale yellow in color, contains reddish-brown concretions and is 8 to 12 inches thick. The movement of water thru the claypan subsoil, or "hardpan" as it is known locally, is very slow. Below 30 to 35 inches the material becomes somewhat more friable.

Slick spots, or "scalds," are commonly present in Cisne silt loam. For a discussion of these spots, see Putnam silt loam, Type 112, page 31.

Use and Management.—Cisne silt loam is acid, low in organic matter, nitrogen, phosphate, and potash. Natural drainage is poor. Surface water runs off slowly, if at all, and percolation to underground outlets is very slow. Tile will not draw and the only practical method of providing drainage is by means of furrows and open ditches.

When farmed under a good rotation but not given any kind of soil treatment, the productive capacity of Cisne silt loam is low. The average yield of corn, under these conditions, cannot be expected to exceed about 15 bushels an acre and the yield of wheat about 6 bushels. With good surface drainage and with soil treatment that includes limestone in addition to legumes or manure, or that includes limestone, legumes, potash, and probably phosphate, the average yield of corn should be about 30 to 35 bushels an acre and wheat 15 to 20 bushels. There are reasons for thinking that the best use of this soil may be for meadow or pasture; but even when used for these purposes, the need for limestone should be recognized.

The improvement of this soil should start with provision for adequate surface drainage and the use of sufficient limestone to grow sweet clover. The soil should be tested for degree of acidity, as directed in Circular 346, and limestone applied in accordance with the results of the test. After the limestone-legume program has become established, it will be necessary to use a potash fertilizer unless manure is available.

The presence of slick spots adds to the difficulties of farming this soil. The spots vary in size, abundance, and harmfulness, but where a slick spot is large enough to warrant separate treatment, or where the spots are abundant, it is suggested that a rotation of small grains and clover be adopted and that corn be omitted.

Hoyleton silt loam (3)

Hoyleton silt loam is a light-colored soil found on gently rolling topography in the southeastern part of Shelby county, where it covers nearly 11,300 acres. It was developed under grass or grass and scattered timber vegetation from thin loess on Illinoian till. Slick spots are commonly found in association with this type. A description of these spots will be found under Putnam silt loam, Type 112, page 32.

The surface horizon is a brownish-gray friable silt loam 6 to 7 inches thick. The upper subsurface is yellowish gray and the lower ashy gray with orange-colored mottlings. The subsoil, which begins at a depth of 15 to 18 inches, is an orange-mottled pale yellowish-gray compact and plastic clay. Below 33 to 35 inches it becomes more friable and is brighter in color.

Use and Management.—The productivity of this soil when untreated is some-



FIG. 7.—TIMOTHY MEADOW ON AN AREA OF HOYLETON SILT LOAM

This very fair meadow shows what can be done with Hoyleton silt loam when it is well farmed. A contrasting scene is shown in Fig. 8 below.

what less than that of the soils occurring on the nearly level topography in this region, but because it is developed on slight slopes there is a possibility of treating it so that it will produce reasonably satisfactory yields. Surface drainage may be easily obtained by means of furrows, altho on the more rolling topography care is sometimes needed to prevent erosion.

When drainage has been provided, each field should be tested for its lime requirement, as suggested in Circular 346, and lime applied as the test indicates. Sweet clover grown and turned under, plus regular additions of animal manure, should build up the land so that an average of 20 to 25 bushels of wheat and 35 to 40 bushels of corn an acre a year can be expected, according to tests on the Ewing experiment field, a part of which is located on this same soil type. The results from those plots on the Ewing field that are on this type of soil indicate clearly that unless manure is available it is necessary sooner or later to fertilize



FIG. 8.—SOME HOYLETON SILT LOAM AREAS LOOK LIKE THIS

Unless steps are taken to improve this soil, pastures are likely to consist mostly of weedy grass, with here and there a patch of wild blackberries or other shrubby plants. Compare with Fig. 7 above.

with potash in addition to using limestone and legumes; however, potash need not be used until the limestone-legume program has become well established.

Satisfactory corn yields should not be expected where slick spots are abundant or where erosion has removed most of the silty surface.

Walton silt loam (4)¹

Walton silt loam is found on rolling topography in the southeastern section of Shelby county, where it covers about 300 acres. Altho it is considered a grassland soil, most of the knolls on which it occurs were at one time covered with brush and a scattering of such trees as locust, elm, and wild cherry.

The thin surface horizon is a yellowish-gray silt loam. The subsurface is yellow with dull red splotches. The subsoil, beginning at 11 to 13 inches, is a reddish-yellow medium-compact and slightly plastic clay, becoming friable below 30 inches.

Use and Management.—In cultivating this soil precaution must be observed to prevent sheet erosion and gulying because of the rapid runoff of surface water. Cultivated land should be kept under a vegetative cover as much of the time as possible, particularly in winter and early spring, and all tillage should be on the contour. Because of its shallowness, this soil is not well adapted to terracing. The active organic-matter content should be increased by plowing under animal manure or green manuring crops. The soil is acid and if legumes, such as sweet clover, are to be seeded, it should be tested for degree of acidity and limestone should be applied according to the indication of the test. An application of phosphorus, if a test indicates the need, would probably be advisable if wheat and legumes are to be grown.

After proper treatment, including phosphate as well as limestone, this soil will grow alfalfa successfully and it is also adapted to small grains, orchard crops, small fruits, and vegetables. The yield of corn is often cut by summer drouths.

Hickory gravelly loam, eroded (8)

Hickory gravelly loam, eroded, occupies a total of about 25,000 acres in Shelby county. It is found only on steep slopes within the Illinoian till region where erosion has removed the silty surface material and exposed the underlying glacial till. The removal of soil material by erosion has been so rapid that little or no profile development has taken place, and consequently areas of this type are rarely suited to anything but timber. A few of the strongly rolling slopes will produce some pasture if care is used to prevent overgrazing.

Wynoose silt loam (12)

Wynoose silt loam is found in the southeastern part of Shelby county, where it occupies a total of about 7,300 acres. It is a timber soil, occurring on nearly level areas, the slope being between .5 and 1.5 percent. It is low in organic mat-

¹Subsequent to the printing of the Shelby county soil map, the name Walton was changed to Jasper. All references to this type in future publications will be found under the latter name.



FIG. 9.—AN AREA OF HICKORY GRAVELLY LOAM COVERED
WITH BRUSHY PASTURE

Occurring on steep slopes, areas of this type should be given over mostly to timber. Some tracts, however, will make fair pasture if they are not overgrazed. (Sharon loam, bottom, occupies the foreground.)

ter, nitrogen, phosphorus, and potash, is strongly acid, and is underlain by a slowly pervious claypan subsoil.

The surface horizon is about 5 inches thick and is a yellowish-gray silt loam with a brownish cast. The subsurface is light yellowish gray in the upper part and light gray and ashy in the lower part. The subsoil, which begins at about 18 inches, is a mixed gray and pale yellow with dark reddish-brown spots and splotches. It is a compact and plastic clay. Below 35 inches it becomes somewhat friable, and between 45 and 60 inches weathered Illinoisian till is found.



FIG. 10.—BADLY ERODED HILLSIDE OF HICKORY GRAVELLY LOAM

Many areas of this type have become practically worthless. A good growth of timber would have prevented such destruction as this.

Small slick spots sometimes occur in association with this type. For a discussion of these spots, see Putnam silt loam, Type 112, page 31.

Use and Management.—The productivity of Wynoose silt loam when untreated is very low. Lack of sufficient slope to carry away surface water and the impervious nature of the claypan subsoil make the drainage problem very difficult.



FIG. 11.—A DEMONSTRATION OF POTASH DEFICIENCY ON WYNOOSE SILT LOAM

At the *right* limestone and phosphate have been applied and sweet clover plowed under, but no potash has been added. At the *left* potash has been applied in addition to lime and phosphate. On light-colored poorly drained soils such as Cisne, Hoyleton, and Wynoose silt loams, a serious potash deficiency is apt to develop after several crops of sweet clover have been plowed under. (*Erwing field, Franklin county.*)

Fortunately many of the areas of this type occur within a short distance of an established drainage channel, and open ditches and furrows are often effective in carrying away surplus water. All attempts to tile this land have been unsuccessful because of the slowly pervious subsoil. Not only does the subsoil impede the movement of moisture, but it also restricts the penetration of roots, thus causing shallow rooting.

After drainage has been properly established, each field should be tested for its lime requirement, as explained in Circular 346. Experiment fields located on this type have proved lime to be the basic treatment for soil improvement. Satisfying the lime requirement will make it possible to grow sweet clover, which when turned under will provide a supply of nitrogen and fresh organic matter. Heavy manure applications, if the soil has been limed, will also supply nitrogen and active organic matter and, in addition, will contribute small amounts of phosphorus and potash.

Tests should be made both for available phosphate and for potash, as explained on page 14, and trial applications of these materials made before investing heavily in them. It is possible that wheat will show response to a phosphate fertilizer, whereas potash will tend to increase corn yields. Because of its unfavorable physical condition this soil, at best, is not highly productive.

Bluford silt loam (13)

Bluford silt loam is found in the southeastern part of Shelby county on undulating to gently rolling topography along the stream courses. It is now or was formerly covered by a mixed stand of hardwood timber. It covers a total area of about 17,000 acres.

Surface drainage is moderately rapid; but owing to a compact subsoil under-drainage is slow, forcing a high percentage of the rainfall to run off. This high runoff has created a serious problem of sheet erosion on the more-rolling cultivated slopes. In many places much of the surface horizon has already been removed and small gullies are becoming established.

The surface is a brownish-gray friable silt loam 6 to 7 inches thick in the virgin condition. The subsurface is yellow in the upper part and pale yellow to almost gray in the lower part. The subsoil, beginning at 14 to 18 inches, is a grayish-yellow medium-compact and plastic clay. Below 40 inches the subsoil becomes less compact, and below 40 to 60 inches weathered Illinoian drift is present.

Use and Management.—An effective soil-management program for Bluford silt loam must take into consideration the checking of sheet erosion. As previously mentioned, underdrainage is slow, and a large part of the rainfall runs off, thus creating an opportunity for erosion.

The basic soil treatment includes the application of limestone, the use of stable manure or green-manure crops to supply nitrogen, and the application of phosphate and potash as needed.

Good soil treatment will make possible a vigorous growth of vegetation, including legumes, thereby aiding in erosion control. The control of sheet erosion, by keeping a vigorously growing crop on the land, should be supplemented as far as possible by contour farming. In some places diversion ditches may be desirable to direct runoff from other areas and permit the establishment of a good sod. Grass waterways will permit the surface waters from other parts of the farm to drain over areas of Bluford silt loam without erosion. However, these grass waterways must be maintained in good condition or erosion will start.

This soil, while relatively unproductive when untreated, responds well to good treatment and management. On the Enfield experiment field, on Series 100, where the soil is classified as Bluford silt loam, the following yields per acre have been secured as long-time averages from different soil treatments:

	<i>Corn</i> <i>bu.</i>	<i>Wheat</i> <i>bu.</i>
No treatment.....	11.2	7.9
Manure.....	21.4	10.2
Manure and lime.....	28.2	19.5
Manure, lime and rock phosphate.....	31.0	24.1
Residues.....	14.7	9.9
Residues and lime.....	22.7	20.8
Residues, lime and rock phosphate.....	24.9	23.9
Residues, lime, rock phosphate and potash.....	34.5	28.7

These data indicate the need for lime on this soil under either a livestock or grain system of farming. It is also apparent that both phosphate and potash are able to produce significant crop increases, and this is particularly true under a

grain system, where animal manure is absent. However, before either phosphate or potash is applied, the need for both should be determined, for if both are low and only one is applied, the results may be disappointing. In general, phosphate should be applied for wheat and potash for corn.

On areas where erosion has already removed the surface soil, exposing the clay subsoil, the treatments just discussed are of questionable value and should be made on a trial basis before being applied extensively. Perhaps the best use for the eroded areas of this type is pasture. In order to establish a pasture on such areas, both lime and phosphate will probably be needed.

Ava silt loam (14)

Ava silt loam is found on rolling topography in the southeastern part of Shelby county, where it occupies a total of about 450 acres.

The surface is a brownish-yellow friable silt loam varying from zero to 6 inches in thickness depending on the amount of material removed from the surface by erosion. The subsurface is friable and yellow. The subsoil begins at 6 to 12 inches and in its upper part is a reddish-yellow slightly compact non-plastic silty clay loam which breaks, upon rupture, into large nut-like granules. The lower subsoil is more compact and the particles have thin gray coatings. Below 36 to 50 inches weathered Illinoian drift is found.

Use and Management.—Ava silt loam, if used for cropping, must be protected against soil erosion. An erosion-control program for this soil, to be successful, must make use of various erosion-control devices. In such a program it is basic to so treat the soil that a vigorous vegetative growth is secured and to so plan the cropping that a protective vegetative cover is on the ground as much of the time as possible. These practices should be supplemented by the use of terraces and other mechanical structures where called for. Fall plowing should be avoided unless it is in preparation for a fall-seeded crop which will give effective protection. Unless a vigorous erosion-control program can be undertaken and carried thru, Ava silt loam should not be used for cultivated crops. Under any system of management not more than one cultivated crop in four years should be grown, and all cultivation should be practiced on the contour. Crops such as soybeans, which leave the soil in a loose condition, should probably be avoided altogether.

The basic soil treatment needed for vigorous vegetative growth includes the application of limestone, the use of stable manure or green-manure crops to supply nitrogen, and the application of phosphate and potash as needed. Applications of these materials should be based on tests for acidity and available phosphate and potash. If it is desirable to hold down the initial investment in phosphate, light applications of this element in a readily available form, such as superphosphate, should be made for the most responsive crops—wheat and alfalfa. This soil is well adapted to vegetable, small-fruit and orchard crops.

Westville silt loam (22)

Westville silt loam is a light-colored soil derived from thin loess on leached Wisconsin till and developed on rolling topography under deciduous forest vege-

tation. It occurs principally to the east and northeast of the town of Shelbyville along Kaskaskia river and its tributaries and along the front of the Shelbyville moraine. It occupies an area of about 22,970-acres or 4.68 percent of the total area of the county.

The surface horizon averages about 5 to 7 inches thick and is a yellowish-gray silt loam low in organic-matter content and medium acid in reaction. In undisturbed forested areas the upper 2 or 3 inches are brownish gray owing to the higher content of organic matter. The subsurface is 6 to 8 inches thick and is a grayish-yellow silt loam. The subsoil is 12 to 14 inches thick and is a yellow to reddish-yellow medium-plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular aggregates which have a faint brownish-gray coating. At a depth of 28 to 30 inches a few inches of yellowish clayey silt sometimes occurs but more often the subsoil grades directly into reddish-brown sandy gravelly leached till which may become calcareous at a depth of 45 to 70 inches. A scattering of pebbles is often noticeable on the surface and thruout the profile.

As this type occurs on slopes having a gradient of about 4 or 5 to 12 or 15 percent, surface drainage is rapid. Underdrainage is moderate.

Use and Management.—The small supply of organic matter in the surface horizon of Westville silt loam is quickly dissipated following cultivation. Also, the loss of surface material by erosion is a serious problem. This soil should not be fall-plowed but should always be protected by a cover of vegetation as much of the year as possible; this applies particularly to the winter and early spring months. Contour tillage should be practiced and strip cropping, where it can be used successfully, will prove valuable in reducing erosion losses.

Altho this is a relatively infertile soil, it will respond to good treatment and much of it can be made to produce satisfactory crop returns. Erosion can be reduced to a minimum by improving the general productivity level, which is accomplished by applying limestone and manure and by introducing a good system of crop rotation. If large amounts of barnyard manure are not available for frequent and regular application, some provision should be made for plowing under a leguminous green-manure crop once each rotation period.

This land is well adapted to the growing of alfalfa after the acidity of the soil has been corrected, but a phosphatic fertilizer will be needed before maximum yields of this legume can be secured. If the land is used for permanent pasture, close grazing should be avoided and a good growth of grass encouraged by proper fertilizer treatment.

Hennepin gravelly loam, eroded (25)

Hennepin gravelly loam, eroded, occurs as a more or less continuous belt of steep bluff and gullied land along both sides of that portion of Kaskaskia river and its tributaries which lies within the Wisconsin glaciation. It is similar to Hickory gravelly loam, eroded, Type 8, but differs chiefly in that the till material is calcareous within 2 or 3 feet of the surface. It occupies an area of about 8,610 acres.

Destructive erosion always follows the removal of the natural forest cover from this soil; consequently a part or all of the soil horizons may be absent wherever the tree and brush vegetation has been cut. In badly eroded areas, such

as freshly cutting gullies, the calcareous, pebbly till is often exposed. However, in an uncleared virgin area the yellowish-gray surface is usually 3 to 5 inches thick and includes 1 or 2 inches of dark, decaying leaf mold. The subsurface is yellow or reddish yellow and is usually 2 to 4 inches thick. The subsoil is 8 to 10 inches thick and is a yellow to reddish-yellow pebbly clay loam.



FIG. 12.—HENNEPIN GRAVELLY LOAM WITH CAMDEN SILT LOAM, TERRACE, IN FOREGROUND

Hennepin gravelly loam forms the bluffland along that part of Kaskaskia river and its tributaries flowing within the Wisconsin till region. To avoid destructive erosion, it should be kept in timber, for slopes of 25 percent or greater are common. The Camden type, in the foreground, produces fairly good crops when properly handled.

Use and Management.—Because this type occurs on slopes of usually 25 percent or greater, and is so easily damaged by erosion, its best use is in timber. On areas already cleared and therefore injured, the problem is to get some sort of protective vegetative growth started. Bluegrass and young locust trees are probably two of the most satisfactory plant species that can be used for this purpose, tho the hazard of getting either started is considerable, especially if gully headcutting is not at least partially stopped. A diversion terrace along the brow of the slope may sometimes be used to advantage to prevent this kind of damage, or temporary check dams are sometimes advisable. After erosion has been checked, permanent plantings of desirable forest trees can be made.

Keyesport loam (33)

Keyesport loam is a minor type in Shelby county, occupying only about 670 acres in two areas southwest of Lakewood. The soil material is composed of recently deposited sediments eroded from the adjacent hills.

The surface is a yellowish-gray to yellow loam, sometimes containing appreciable amounts of sand and even gravel. It varies in thickness from one to several feet and immediately below it lies the dark-colored surface stratum of a buried soil.

Use and Management.—This soil is, in general, moderately productive without special treatment provided that there is not too much gravel in the profile.

Because it varies widely within a distance of a few rods, no specific recommendations for management can be given. It is suggested that each area be tested for acidity and phosphorus, and that the management be based on the results of these tests. Where rapid deposition of new material is going on, the application of fertilizers should be made on a year-to-year basis, as any residue from the fertilizer would soon be buried beneath the reach of crops. A diversion ditch may prove of value by preventing the deposit of a cover of coarse worthless gravelly material from the adjacent hills in future years.

Edina silt loam (46)¹

Edina silt loam is a dark soil found on nearly level topography in the western part of Shelby county, where it occupies about 23,000 acres. It was originally poorly drained, but almost all areas have been artificially drained by tile since they have come under cultivation.

The surface horizon is dark brown when moist but has a grayish cast when dry. It is about 8 inches thick, friable, and cultivates easily. The upper sub-surface is darker and slightly heavier than the surface. There is a thin brownish-gray silty layer at the base of this zone. The subsoil, beginning at a depth of 16 to 18 inches, is a dark grayish-yellow moderately compact and plastic clay. The subsoil becomes friable below 32 to 36 inches and is grayish yellow in color. Concretions of lime are present in the subsoil in some places. At about 80 inches weathered Illinoian till is found.

Edina silt loam varies from slightly acid to medium acid in the surface and from sweet to slightly acid in the subsoil. The available phosphorus and potassium supplies vary between low and medium. Organic matter is present in moderate amounts, but the nitrogen content of the cultivated soil is low.

Slick spots are sometimes found associated with Edina silt loam. For a discussion of these spots see Putnam silt loam, Type 112, page 32.

Use and Management.—To increase or maintain the productivity of Edina silt loam regular additions of organic matter should be made either by applying liberal amounts of manure or by growing and plowing under legumes at least once in the rotation. In either case the soil should be tested for acidity, as explained in Circular 346, and limestone applied as indicated by the test, for if the soil is acid, clovers are apt to fail and the full benefit of the manure is apt not to be realized.

Edina silt loam should produce satisfactory crops when properly treated. If it does not, then in all probability better drainage should be provided. Tile should be placed not more than 4 rods apart, and a good outlet must be obtained if the excess water is to be carried away promptly.

Results from the Lebanon experiment field, which is located on this soil type are of interest. Here the untreated soil has given a long-time average of 21.7 bushels of wheat, 29.7 bushels of corn, and 33.7 bushels of oats. The limestone-manure treatment has brought these yields up to 30.2 bushels of wheat, 46.6

¹Subsequent to the publication of the Shelby county soil map the name Edina was changed to Herrick. All references to this type in future publications will be found under the latter name.

bushels of corn, and 45.5 bushels of oats. Neither phosphorus nor potash has given profitable response on this field. It is believed, however, that there may be portions of this type which would respond to these two fertilizing materials, and it is therefore recommended that both phosphorus and potash tests be made and applications of these elements be added as needed.

Ebbert silt loam (48)

Ebbert silt loam is found in depressional areas in the southern part of Shelby county, where the loess blanket is relatively thin. Its total area is about 10,500 acres.



FIG. 13.—EBBERT SILT LOAM CAN BE MADE MODERATELY PRODUCTIVE

Surface drainage must be provided if this type is to produce fairly satisfactory crops. The open ditch at the side of this wheat field, leading into the highway, carries off the excess water.

The surface horizon is a dark-gray friable silt loam varying from 7 to 10 inches in thickness. The subsurface is a gray silt loam splotted with pale yellow. The subsoil, which begins at a depth of 18 to 24 inches, is a medium-compact and plastic clay loam, gray in color and faintly mottled with pale yellow. Below 36 to 40 inches the material becomes more friable, and at 50 or 60 inches the weathered Illinoian till is found.

Use and Management.—Ebbert silt loam can be made moderately productive by proper treatment. Drainage must be provided, first by establishing an outlet for the water and then thoroly surface-ditching the area. Tile can be used, but because of the compact nature of the subsoil they will not draw water very far, and to be effective they must be placed not more than 4 rods apart. The soil is sour but does not need so much lime to grow sweet clover as do many of the adjacent soils. It is suggested that each field be tested for acidity, as explained in Circular 346. After the soil has been limed, sweet clover should be grown and turned under. Further treatments, other than adding all available animal manure and drilling superphosphate with wheat, should be made on a trial basis.

This soil when treated is adapted to the growing of the grain crops common to the region.

Edina clay loam (50)¹

Edina clay loam is a dark soil found on level or depressional topography in the western part of Shelby county. Its total area is about 6,200 acres.

The surface varies from a dark-brown faintly granular silty clay loam to a clay loam and extends to a depth of 7 to 9 inches. When dry, the surface has a distinct grayish cast. The subsurface is a grayish-brown silty clay loam. The subsoil, which begins at a depth of 15 to 18 inches, is a brownish-gray clay loam with dark coatings. The structure is weakly prismatic. Below 30 inches the material becomes light gray mottled with yellow and is quite friable. Weathered Illinoian till is usually found below 80 inches.

Use and Management.—The first requirement of Edina clay loam is adequate drainage, and this is sometimes difficult to provide as tile laid in it drain somewhat slowly and good outlets are not always available.

When drained, Edina clay loam is productive but tends to puddle easily if worked under the wrong moisture conditions. Treatment to improve the physical condition of the soil includes the frequent addition of fresh organic matter in the form of animal manure or green-manure crops. To get the best effect from applications of organic matter, the soil should be tested for acidity and limestone applied if needed. Tests should also be made for available phosphorus and potash at intervals of several years and applications made when deficiencies are found.

Kern silt loam, terrace (51)

Kern silt loam, terrace, is a light-colored soil derived from a thin covering of silty wash over coarse stratified sandy and gravelly material and developed on nearly level topography under deciduous forest vegetation. It is a very minor type in this county, occupying a total area of only 130 acres.

The surface horizon is 6 to 8 inches thick and is a gray to dark-gray silt loam low in organic matter and nitrogen and medium acid in reaction. In undisturbed forested areas the upper 2 or 3 inches are brownish gray owing to a higher organic-matter content. The subsurface is a gray or pale yellowish-gray silt loam that is about 7 to 9 inches thick. The subsoil varies from 12 to 20 inches in thickness and is a yellowish-gray to grayish-yellow medium-plastic clay loam that below 35 or 40 inches becomes coarse, sandy, and pebbly, more yellowish or reddish, and more friable.

Use and Management.—Both surface drainage and underdrainage are relatively slow in this type of soil, and erosion is not a problem; otherwise the treatment for it may be much the same as that recommended for Camden silt loam, terrace, Type 134, page 37.

Sidell silt loam (55)

Sidell silt loam is a dark soil derived from thin loess on leached Wisconsin glacial till and developed on rolling topography under prairie vegetation. It occurs principally along the front of the Shelbyville moraine and occupies an area of

¹Subsequent to the publication of the Shelby county soil map the name Edina was changed to Herrick. All references to this type in future publications will be found under the latter name.

slightly more than 38,000 acres, which is about 8 percent of the total area of the county.

The surface is 6 to 8 inches thick and is a brown to light-brown silt loam medium in organic-matter content and medium acid in reaction. The subsurface is 6 to 8 inches thick and is a light-brown to yellowish-brown silt loam. The subsoil is 12 to 18 inches thick and is a brownish-yellow to reddish-yellow slightly plastic silty clay loam which breaks into $\frac{1}{8}$ - to $\frac{1}{2}$ -inch weakly subangular aggregates. Infrequently dark-gray or brownish-gray coatings are noticeable on the natural cleavage faces. The aggregates tend to enlarge gradually and disappear, until at a depth of 28 to 34 inches the material becomes a brownish-yellow to yellow (sometimes lightly mixed with gray) slightly plastic sandy, silty, or pebbly leached till which usually becomes calcareous at or below a depth of 45 inches. In badly eroded areas much of the surface horizon may be gone and till pebbles are often found scattered over the surface and thruout the profile.

Use and Management.—The slopes on which Sidell silt loam has developed range from 4 or 5 to 12 or 15 percent. Surface drainage is rapid and under-drainage is moderate.

Loss of surface material by erosion is a serious problem on many areas of this type. The soil should not be fall-plowed but should be protected by a cover of vegetation as much of the year as possible, particularly in the winter and early spring months. Contour tillage should be practiced, and strip cropping, where it can be used successfully, will prove valuable in reducing erosion losses. Proper rotation of crops and other general improvement practices must also be given consideration when a system of erosion control is being planned.

This is a medium-productive soil that responds readily to good treatment. It requires an application of limestone for sweet clover and alfalfa to grow well. All barnyard manure should be saved and applied. In addition provision should be made for plowing under a leguminous green-manure crop once each rotation period. Sweet clover is probably one of the best crops for this purpose.

After its acidity has been corrected, this soil is well adapted for alfalfa, tho a phosphatic fertilizer is likely to be needed before maximum yields can be secured. If used for permanent pasture, close grazing should be avoided and a good growth of grass should be encouraged by proper fertilizer treatment.

Harpster clay loam (67)

Harpster clay loam is a dark soil which has developed on nearly level to depressional topography under a swamp-grass or slough-grass vegetation. A shallow covering of water thruout much of the year, along with a tall and dense growth of swamp vegetation, has provided an excellent home for the innumerable snails and other small Mollusca, the shell remnants of which are so prevalent in this soil type.

As a rule this soil type occurs as small $\frac{1}{4}$ - to $\frac{1}{2}$ -acre spots which may be so numerous in certain places as to dominate an area many acres in size. As shown on the map, the total combined area of this type amounts to only 420 acres, but it is actually somewhat more extensive than this, for many of the single spots smaller than an acre could not be drawn to scale on the map and consequently are included with Drummer clay loam.

This soil is youthful and has no well-defined horizons. The surface is a black, grayish-black, or grayish-brown silty clay loam varying to a clay loam. It is high in organic matter and nitrogen and very high in lime. The subsurface is a dark-gray clay loam, and it also is usually high in lime. The subsoil is a grayish clay loam that is generally, tho not necessarily, high in lime.

The extremely high free-lime content of the surface and other portions of the profile is due to the presence of the great number of disintegrating highly calcareous shells. In some areas a few unbroken shells are present; in other areas some secondary lime concretions have formed. Surface drainage is slow but underdrainage is moderate and tile will draw when an outlet with sufficient fall is obtained.

Use and Management.—Good drainage is the first essential in a successful management plan for Harpster clay loam. Because of its abnormally high lime content this soil requires special fertilizer treatment for maximum grain yields. Results from some cooperative studies show that ordinarily a high phosphate fertilizer will produce good returns on the wheat crop, whereas a high potash fertilizer is usually essential for a good corn crop. Applications of straw or coarse manure have been known in certain instances to satisfy the potassium requirements of fairly large yields of corn. To apply limestone to these areas is a direct waste of time and money since too much lime is already present.

Sharon loam, bottom (72)

Sharon loam, bottom, is found in the bottoms of the small streams in the southern part of Shelby county. The sediments which are deposited on these areas are derived from leached loessial and Illinoian till material combined with some unleached or partially leached loess and till. Areas of this soil type are subject to frequent overflow following heavy rains, and almost every such overflow brings a deposit of new material. The soil is therefore young and has little or no profile development. It is a mixture of sand, silt, and clay, and is usually light in color.

About 15,400 acres of Sharon loam have been mapped in Shelby county.

Use and Management.—In view of the frequent overflow to which this type is subjected, no treatment is suggested. The new soil material being constantly brought in and deposited serves to keep up the productive level of these areas.

Unless the land can be protected from overflow, corn, soybeans, and other short-season summer crops should be grown.

Huntsville loam, bottom (73)

Huntsville loam, bottom, is a dark bottomland type made up of mixed sandy and silty sediment derived from the soil material of the calcareous Wisconsin till region. It occupies about 21,860 acres in Shelby county.

Since this type is made up of rather recently deposited sediments, it shows little profile development. For the most part the surface is a brown or grayish-brown silty or sandy loam. The underlying material is usually brownish yellow or brownish gray and is made up of strata of clay, silt, sand, or gravel or a mixture of these various textures. Sand and gravel bars occur frequently along

the small side streams, while deposits of silt and clay predominate in the larger bottoms.

Use and Management.—Many of the small bottoms occupied by this Huntsville type are crooked and narrow, often being not more than 40 rods or even less in width; and frequently they are flooded. These conditions, together with the



FIG. 14.—HUNTSVILLE LOAM, BOTTOM, IS MAIN TYPE IN KASKASKIA VALLEY

Occupying more than 20,000 acres in Shelby county and subject to occasional overflow, Huntsville loam, bottom, usually produces good summer crops such as corn and soybeans. (Hickory gravelly loam is shown in the, background.)

fact that streams tend to cross and recross these bottom areas, make for very unsatisfactory cultivation. Consequently many of these bottoms are left in timber or used for pasture.

The larger bottoms, on the other hand, are more easily tilled and usually produce good crops of corn, oats, and soybeans when growth is not damaged by flood. Wheat is sometimes grown very satisfactorily, but danger of damage from overflow is greater for this crop than for the summer annuals.

Littleton silt loam, terrace (81)

Littleton silt loam, terrace, is a medium-dark to dark soil occurring along portions of Robinson creek and Kaskaskia river. It is of very minor importance, occupying a combined area of only 420 acres.

The surface is normally 6 to 8 inches thick and varies from a brown silt loam to a brown sandy silt loam. The subsurface is usually lighter brown in color but sometimes is rather grayish. It is 6 to 8 inches thick also. The subsoil varies from a yellowish-gray to a yellowish-brown medium-plastic silty clay loam that may be somewhat gravelly in the lower part. Below 35 or 40 inches the material becomes brownish yellow to grayish yellow in color and is ordinarily a friable silt or a loose, incoherent, stratified silt, sand, or gravel.

Use and Management.—Both surface drainage and underdrainage of Littleton silt loam, terrace, are moderate. Erosion is not serious, and the soil ordinarily is not drouthy. Except that portions of it may be subject to overflow in extremely high floods, this type is similar to Floyd silt loam, Type 154, page 41, and its treatment requirements are much the same as recommended for that type.

Keyesport silt loam (86)

Keyesport silt loam is a light-colored soil found in the southern part of Shelby county in locations where the eroded materials from adjacent hills have accumulated. About 950 acres of it have been mapped.

The surface is a yellow or yellowish-gray friable silt loam, sometimes containing appreciable amounts of very fine sand. It varies in thickness from one to several feet, and immediately below it is the dark-colored surface of a buried soil.

Use and Management.—This soil is, in general, moderately productive without special treatment. Because it varies widely in some of its characteristics even within a few rods, no specific recommendations for management can be made. Where rapid deposition of material is going on, it is questionable whether the use of fertilizers is advisable. If limestone is applied under these conditions, the applications should be heavier than necessary to accomplish the immediate result desired.

Putnam silt loam (112)¹

Putnam silt loam is a medium-dark soil found on nearly level topography in the southern part of Shelby county. It covers a total area of about 48,000 acres,



FIG. 15.—PASTURE ON PUTNAM SILT LOAM, AN EXTENSIVE TYPE IN SHELBY COUNTY

This soil type, which occupies 48,000 acres in Shelby county, is interspersed with slick spots. The kinds of crops to be grown in any area of it are determined largely by the number of such spots present. While this field happens to be in pasture, many areas, where slick spots are not too numerous, can be made to produce fair yields of corn in a rotation.

or almost 10 percent of the county, and is characterized by a nearly impervious subsoil, which makes underdrainage very slow, and by the presence of numerous "scalds," or slick spots.

¹Subsequent to the publication of the Shelby county soil map the name Putnam was changed to Cowden. All references to this type in future publications will be found under the latter name.

The surface is a brownish-gray friable silt loam 6 to 7 inches thick. The subsurface is gray in the upper part and light gray or ashy in the lower part. Hard rounded black pellets of iron and manganese are present thruout both the surface and the subsurface. The subsoil, which begins at a depth of 17 to 21 inches, is a very compact and plastic clay of a dark-gray color mottled with pale yellow. Below 34 to 38 inches the material is less compact and is pale yellowish gray. Weathered Illinoian till is usually found at a depth of about 50 or 60 inches.

Use and Management.—The first need of Putnam silt loam is drainage. Tile will not draw in this soil, but the water can usually be carried off by the use of open ditches and furrows.

Putnam silt loam is acid and requires limestone to produce satisfactory yields of most crops. Heavy applications of limestone are not needed on slick spots and should not be applied on them. If, in addition to a small amount of limestone, heavy applications of animal manure can be made, no further treatment is likely to prove advisable unless wheat is grown, in which case superphosphate should probably be used. If only a small amount of manure is available, sweet clover can be plowed under to furnish nitrogen, and phosphate and potash can be applied as needed by drilling or broadcasting them on wheat.

The type of crops to be grown on Putnam silt loam should be largely determined by the number of slick spots present. Where they are abundant, corn and soybeans should be held to a minimum in the rotation, and such crops as wheat, winter barley, lespedeza, and sweet clover should be grown. Where the slick spots are infrequent, corn can be made to produce fair yields in the rotation.

Slick spots. These spots, commonly known as “scalds” or alkali spots, can be recognized by their lighter colored surface, the shallowness of the claypan subsoil (sometimes called “hardpan”), and a relatively poor plant growth or the complete absence of growth. Slick spots are very common in Putnam silt loam, but are not confined to that type. The surface horizon of these spots is a light brownish-gray to gray silt loam 2 to 6 inches thick. The subsurface is a light-gray ashy silt. The subsoil, which begins at a depth of 6 to 15 inches, is a pale yellowish-gray clay loam, very tough when dry but rather friable when wet. Rounded gray pellets, or concretions of calcium carbonate (lime), are present in the subsoil in many of these spots. The subsoil is extremely resistant to water penetration. If worked when dry, the subsoil tends to throw the plow out of the ground, particularly if there has been any erosion of the surface.

The surface of slick spots is acid, but in correcting this condition a minimum amount of lime should be used, for the lower strata have a highly alkaline reaction.

Slick spots will produce satisfactory yields of small grains in most years if given proper treatment, but in those spots where the subsoil is shallow—from 6 to 10 or 12 inches thick—summer crops such as corn and soybeans rarely produce any grain. When the subsoil is deeper than 10 or 12 inches, fair yields of corn can be produced in favorable years if sweet clover or manure has been plowed under. Crops growing on these spots are, however, very sensitive to either an excess or a deficiency of moisture.

Cox silt loam (113)¹

Cox silt loam is mapped on the gently sloping prairie land in the southern part of Shelby county, where it covers a total area of about 34,400 acres. The surface drainage is moderately rapid but underdrainage is slow. Sheet erosion is serious on some areas of this type.

The surface is a brownish-gray friable silt loam 5 to 7 inches thick. The subsurface is yellowish gray; the lower part is ashy and splotched with orange or dull red. The subsoil is a compact plastic brownish-yellow clay often splotched with dull red. Below 30 to 32 inches the material becomes more friable.



FIG. 16.—EROSION ON A BREAK BETWEEN PUTNAM SLIT LOAM AND COX SILT LOAM

This condition often occurs where these two types join, and may be associated with the presence of slick spots, which are common in these two types.

Slick spots occur in association with this soil and, in some areas, materially lower its agricultural value. For a discussion of these spots see Putnam silt loam, Type 112, page 32.

Use and Management.—On Cox silt loam drainage should be provided by means of a system of surface ditching that will remove the excess surface water with as little erosion as possible. Where the slope is very gentle, the furrows may run down the slope; but where the slope is steep enough to erode, the furrows should be plowed across it in a way that will give sufficient fall to carry the water and at the same time cause as little washing as possible.

The soil-treatment problems of Cox silt loam are the same as those of Putnam silt loam, Type 112, page 32, tho it is more difficult to manage because of its tendency to erode. This is particularly true of the slick-spots, which erode badly even on very slight slopes. Contour farming, together with good soil treatment and cropping practices, will take care of the erosion problem on most areas of this type. In some places the diversion-ditch type of terrace may be effective.

¹Subsequent to the publication of the Shelby county soil map the name Cox was changed to Oconee. All references to this type in future publications will be found under the latter name.

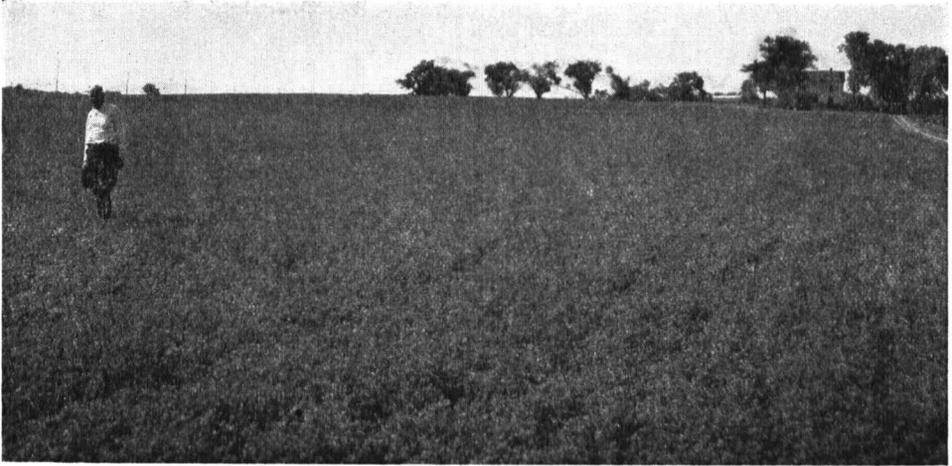


FIG. 17.—THRIFTY FIELD OF ALFALFA ON COX SILT LOAM

Cox silt loam is an extensive type in the southern part of Shelby county. It presents the same soil-treatment problems as Putnam silt loam, but more care has to be taken to control erosion.

This soil is not suitable for any other type of terracing, and fortunately effective erosion control is possible without resorting to it.

O'Fallon silt loam (114)

O'Fallon silt loam is a very minor type, found on rolling topography and occupies only about 30 acres in Shelby county. It differs from Walton silt loam, Type 4, in having a somewhat darker surface, verging on a light-brown silt loam, and also in having a somewhat more permeable subsoil.

Use and Management.—The suggestions made for Walton silt loam, Type 4, page 18, apply equally well to O'Fallon silt loam.

Whitson silt loam (116)

Whitson silt loam is a light-colored soil found on nearly level topography in the southwestern part of Shelby county, where about 4,800 acres have been mapped. This type is very similar to Wynoose silt loam, Type 12, and differs from it chiefly in that the surface horizon is slightly darker and the subsoil is somewhat less heavy. This soil was formed under a forest vegetation from loess which varies from 50 to 65 inches in thickness.

Use and Management.—The suggestions made for the handling of Wynoose silt loam, Type 12, page 18, apply to Whitson silt loam also.

Bogota silt loam (117)

Bogota silt loam is a light-colored soil found on gently undulating to gently rolling topography. About 28,500 acres are mapped in the western and southwestern parts of Shelby county. It has been developed under a forest vegetation from loess which varies from 50 to 65 inches in thickness.

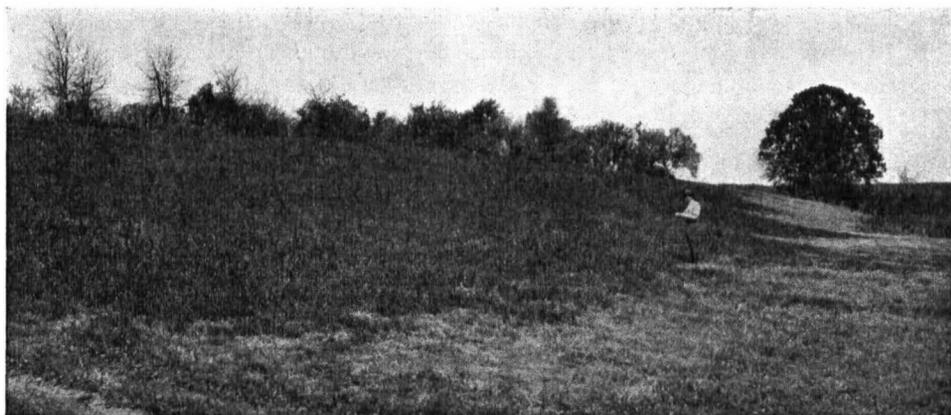


FIG. 18.—ALFALFA ON BOGOTA SILT LOAM

Proper treatment and management have resulted in this growth of alfalfa on a 6-percent slope. About 28,000 acres of this type are mapped in the western and southwestern parts of Shelby county.

Bogota silt loam resembles Bluford silt loam, Type 13, very closely, differing chiefly in that the surface is commonly slightly darker and the subsoil is less compact and plastic.

Use and Management.—The suggestions made for the use and management of Bluford silt loam, Type 13, page 21, apply equally well to Bogota silt loam.

Alma silt loam (118)

Alma silt loam is a light-colored soil found in the western part of Shelby county on rolling topography. It covers about 5,200 acres. The appearance of Alma silt loam is very similar to that of Ava silt loam, Type 14. Alma silt loam is, however, formed on somewhat deeper loess and is not so highly weathered as is Ava silt loam.

Use and Management.—The suggestions made for the handling of Ava silt loam, Type 14, page 22, apply equally well to Alma silt loam.

Elco silt loam (119)

Elco silt loam is found on strongly rolling topography in the southwestern part of Shelby county. It is a light-colored soil, developed under a forest vegetation from loess which varies from 50 to 65 inches in thickness. It occupies approximately 1,750 acres in the county.

The surface is a light brownish-yellow friable silt loam 4 to 6 inches thick where not changed by erosion. The subsurface is a yellow or reddish-yellow friable silt loam. The subsoil, which begins at a depth of 8 or 10 inches, is a reddish-yellow silty clay loam which breaks upon rupture into nut-like fragments.

Use and Management.—Elco silt loam is acid and low in organic matter. If cultivated, it is subject to destructive erosion. It is well adapted, however, for permanent pasture. In order to reestablish grass on eroded fields, it may be

necessary to apply lime and build small terraces to control runoff until a sod has formed. Information concerning methods of controlling gulleys may be secured by writing to the Agricultural Experiment Station, Urbana, Illinois.



FIG. 19.—PASTURE ON ALMA SILT LOAM

Alma silt loam is an erodable type and must be handled with this fact in mind. A vegetative cover should be on the ground as much of the time as possible. In fact, unless vigorous erosion-control practices can be carried out, cultivated crops should not be grown. (At right of fence is an area of Huntsville loam, bottom.)

Harrison silt loam (127)

Harrison silt loam is a dark soil found on gently undulating topography in the western part of Shelby county, where it occupies a total area of about 17,340 acres. It has developed under a grass vegetation from loess which varies in thickness from 65 to 80 inches.

The surface is a brown friable silt loam 7 to 9 inches thick, which has a grayish cast when dry. The subsurface is yellowish brown with a distinctly gray cast, the lower 2 or 3 inches sometimes being quite gray. The subsoil begins at a depth of about 18 inches and is a brownish-yellow moderately compact and slightly plastic clay loam. The lower subsoil, below 30 inches, becomes friable.

Small slick spots are sometimes seen in association with this type, particularly near Tower Hill. For a discussion of these spots see Putnam silt loam, Type 112, page 32.

Use and Management.—Harrison silt loam, when well managed, is a productive soil. Drainage, if inadequate, can be established by tiling, for tile draw fairly well in this soil. When drainage is established, attention should be given to providing a continuous supply of fresh organic matter. The soil should be tested for acidity and limestone applied as needed in order to grow legumes. If manure is not available, the soil should be tested for phosphorus and potassium and applications made as needed. However, under a grain system of farming, where sweet clover is used at frequent intervals, a potash deficiency need not

be expected until a number of crops of clover have been turned under. If liberal quantities of animal manure are used, phosphate and potash probably will not bring about much response except on such crops as wheat and alfalfa.

Douglas silt loam (128)

Douglas silt loam occurs on the rolling well-drained prairie knolls and ridges in the western and southwestern parts of Shelby county, where it covers a total area of about 3,400 acres.

In uncultivated areas the surface is a light-brown silt loam 4 to 6 inches thick; on many cultivated areas it is very thin or entirely absent. The subsurface is friable and brownish yellow in color. The subsoil, which begins at a depth of 9 to 13 inches, is a brownish or reddish-yellow slightly compacted silty clay loam. Below 21 to 24 inches the material becomes more friable and is bright yellow in color. On many of the areas of this type geologic erosion, or erosion which occurred prior to tillage by the white man, has removed most of the loess blanket and weathered Illinoian drift may be found at a depth of about 2 feet. Thick gravel deposits frequently underlie this type, but they are not close enough to the surface to make the soil drouthy.

Use and Management.—Practically the same treatment is recommended for Douglas silt loam as for Ava silt loam, Type 14, page 22. However, under the same management higher yields may be expected from this soil than from Ava silt loam. Like Ava silt loam, this soil is well adapted to vegetable, small-fruit, and orchard crops.

Because of its rolling topography, Douglas silt loam is subject to serious erosion when cultivated and its productive capacity is rapidly lowered by loss of soil material. For this reason it is essential to guard against erosion, particularly if this soil is used for tilled crops.

For a brief discussion of methods of erosion control applicable to this soil, see the discussion of Ava silt loam, Type 14, page 22.

Douglas silt loam, when well handled, is a fairly productive soil. When limed, it is particularly well adapted to alfalfa and, moreover, when used for this crop, erosion is easily controlled. All tillage should be on the contour, and whatever fertilizer treatment is necessary to insure vigorous growth should be applied. If wheat is grown it is good practice to drill superphosphate at the time the wheat is seeded. While available potash is not likely to be deficient, any indication of nutrient deficiency suggests the advisability of testing for potash.

Camden silt loam, terrace (134)

Camden silt loam, terrace, is a light-colored soil developed on undulating to gently rolling topography under forest vegetation. It occupies a total area of 2,850 acres in Shelby county and is an important type along portions of Robinson creek and Kaskaskia and Little Wabash rivers.

The surface is a yellowish-gray silt loam varying to a sandy silt loam. It is low in organic matter and medium acid in reaction. It varies from 6 to 14 inches in thickness, depending upon the amount of slope wash deposited from the adjacent bluffs. In undisturbed forested areas the upper 2 or 3 inches of the

surface horizon is brown owing to the accumulation of leaf litter and the consequent higher content of organic matter. The subsurface is 6 to 10 inches thick and is a pale grayish-yellow silt loam to sandy silt loam. The subsoil is 10 to 14 inches thick and is a yellow to reddish-yellow medium-plastic silty to sandy clay loam that breaks into $\frac{1}{4}$ - to $\frac{1}{2}$ -inch subangular aggregates. At a depth of 30 to 35 inches the material is usually a brownish-yellow leached clayey sand or clayey gravel which changes to loose, incoherent, stratified sand and gravel below 40 or 50 inches and which may be calcareous at a depth of 5 or 6 feet. The stratified sand and gravel may vary in thickness from a few feet to as many as 40 or 50 feet.

Use and Management.—If properly handled, Camden silt loam should produce fairly good crops. The surface slope ordinarily is such that erosion is negligible but underdrainage is good, thus giving to the type a well-drained profile. When this type is cultivated, the natural supply of organic matter is rapidly depleted, and the first item, therefore, in raising its productive level is frequent and regular applications of barnyard or green manure. Sweet clover is one of the best sources of green manure, but usually some limestone must be applied before a satisfactory growth of this crop can be secured.

When sufficiently thick, the coarse underlying material of this and other terrace types has considerable value as a source of commercial sand and gravel.

Shiloh clay loam (138)

Shiloh clay loam is a dark soil found in depressional areas thruout the western and southern parts of Shelby county, where it occupies a total area of about 3,100 acres.

The surface, which is 8 or 10 inches thick, is a black silty clay loam when moist but has a grayish cast when dry. The subsurface is a dark brown silty clay or clay loam. The subsoil, which begins at a depth of 16 to 20 inches, is a dark-gray plastic clay loam or clay faintly mottled with pale yellow and showing a weak prismatic structure.

Use and Management.—Shiloh clay loam is neutral or only slightly acid and is relatively well supplied with nitrogen, phosphorus, and potash. It will puddle easily, however, if worked under certain moisture conditions, and this tendency toward poor physical condition is its most serious defect. Frequent addition of fresh organic matter in the form of barnyard manure or green-manure crops, such as sweet clover, will help keep the soil in good physical condition. Some limestone may occasionally be needed for sweet clover.

If satisfactory crops are not secured following the use of manure or sweet clover, it is probable that the drainage is inadequate. Tile laterals should be not much more than 4 rods apart if they are to drain Shiloh clay loam, and a good outlet must be secured. Because this type is found in depressional areas, outlets are sometimes difficult to obtain.

Heavy applications of phosphate and potash should not be made until tests reveal the need for these fertilizers.

Ava sandy loam (143)

Ava sandy loam is a light-colored soil found on rolling topography in the upland on the east side of Kaskaskia and Little Wabash rivers. It is a very minor type, covering only about 30 acres in Shelby county.

The profile resembles that of Ava silt loam, Type 14, except that it is sandy thruout instead of silty. While somewhat drouthy, there is enough clay in the subsoil to give it a fair water-holding capacity.

Use and Management.—The suggestions made for the handling of Ava silt loam, Type 14, page 22, apply to Ava sandy loam. This soil is well adapted to alfalfa if limestone and phosphate are applied.

Proctor silt loam (148)

Proctor silt loam is a medium-dark soil derived from a silty covering on sandy glacial wash and developed on gently rolling to rolling topography under prairie vegetation. It occupies a total area of 2,690 acres and occurs in more or less localized areas along the foot of the Shelbyville moraine.

The surface horizon normally is 6 to 8 inches thick and is a brown to light-brown silt loam that has a medium organic-matter content and is medium acid in reaction. The subsurface is 6 to 10 inches thick and is a light-brown or brownish-yellow silt loam. The subsoil is a brownish-yellow medium-plastic silty clay loam that breaks into irregular $\frac{1}{8}$ - to $\frac{1}{2}$ -inch subangular aggregates. Below 35 to 40 inches the material changes to coarse, loose sand or sandy, pebbly silt which is sometimes calcareous, especially below a depth of 5 or 6 feet.

Use and Management.—When well managed, Proctor silt loam is a good soil for general farming but it will not stand abuse. Underdrainage is good; and while there is some sheet erosion on the more pronounced slopes, reasonably good farming will usually take care of this problem. Fertilizer treatments and general crop-adaptation practices are similar to those recommended for Sidell silt loam, Type 55, page 27.

Brenton silt loam (149)

Brenton silt loam is a dark soil derived from a silty covering over glacial wash material and developed on undulating to gently rolling topography under prairie vegetation. It occurs on the outwash plain along the foot of the Shelbyville moraine in association with Proctor silt loam but it is somewhat more widespread than Proctor, occupying a total area of 4,380 acres.

The surface horizon is 8 to 10 inches thick and is a brown to dark-brown silt loam high in organic matter and nitrogen and slightly acid to neutral in reaction. The subsurface also is 8 to 10 inches thick but varies in color from dark brown to light brown, depending upon drainage conditions. The subsoil is 12 to 16 inches thick and is a yellowish-brown to yellowish-gray medium-plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch dark-coated subangular aggregates. Several inches of yellow-spotted silty material commonly lie beneath the subsoil at a depth of 40 or 45 inches. Below the silty layer, or directly beneath the subsoil if the silty layer is absent, lies coarse, sandy, gravelly, outwash material.

Surface slope varies between $\frac{1}{2}$ and 2 percent, so that surface drainage is moderate to moderately slow and erosion is not a serious problem. Under-drainage is moderate.

Use and Management.—Brenton silt loam is a good general agricultural soil following the introduction of good drainage. In agricultural value and producing capacity it is comparable to Floyd silt loam. Fertilizer and management requirements are also similar to those recommended for Floyd silt loam, Type 154, page 41.

Drummer clay loam (152)

Drummer clay loam is a dark soil derived from a heavy silty or clayey covering over glacial wash or till material and developed on nearly level to basin-like topography under coarse slough-grass vegetation. It occurs extensively on the broad flats and other poorly drained areas of the Wisconsin glaciation and out-wash and is the third most extensive type in Shelby county, occupying a total of 38,690 acres, or 7.88 percent of the area of the county.

The surface horizon is a well-granulated black clay loam varying from 8 to 10 inches in thickness. It is very high in organic matter and in plant nutrients and is usually neutral in reaction. Other soil horizons are not well developed, the material changing gradually from black to grayish black to dark gray, often showing some pale-yellow spotting. Beneath about 30 to 35 inches the material becomes more friable and silty and usually is calcareous and more brightly colored with yellow. Layers of coarser, sandy wash often occur at varying depths.

Surface slope is less than $\frac{1}{2}$ percent except possibly along some of the small and more recently established drainage ways. Surface runoff is slow and under-drainage is moderate thruout the type.

Use and Management.—Drummer clay loam is a highly productive soil following the introduction of good drainage. It is high in organic matter and, being nonacid, it needs only good farming, including a good rotation, to maintain a high productive level for many years.

Corn may be grown as the principal crop on this type provided a leguminous green-manure crop appears once each rotation period. Barnyard manure may replace the green-manure crop if regular applications are made. This soil is better adapted to corn than to small grains as there is a tendency for the small grains to lodge.

Fall plowing is a practice not often advisable on the more-rolling silt loam soils, but Drummer clay loam is a soil that may be fall-plowed to advantage. If plowed when too wet or too dry, this soil tends to clod badly. However, if plowed in the fall, the freezing and thawing of the winter and spring will melt or loosen the clods so that a good seedbed can be prepared. If a crop of sweet clover is to be plowed under, it is best to do it in the spring after the young sweet-clover shoots are several inches high, thus more easily preventing the regrowth of the clover plants in the crop that follows.

Spots of Harpster clay loam, Type 67, too small to be shown on the map are present in many places in Drummer clay loam. These spots should be identified and given treatment as recommended for Harpster clay loam (see page 28).

Floyd silt loam (154)¹

Floyd silt loam is a dark soil derived from a silty loess and wash covering deposited over permeable calcareous glacial till and developed on undulating to gently rolling topography under prairie vegetation. It occurs only within the Wisconsin till region but is the most extensively developed type in Shelby county, occupying a total of 49,790 acres, which is 10.14 percent of the area of the county.

The surface horizon is 6 to 8 inches thick and is a brown silt loam medium high to high in organic matter and medium to slightly acid in reaction. When dry a gray specking is noticeable which gives to the surface a distinct grayish cast. The subsurface is 6 to 8 inches thick and is a brown to yellowish-brown silt loam. The subsoil is 16 to 20 inches thick and is a brownish-yellow to grayish-yellow medium-plastic silty clay loam which breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular dark-coated aggregates. Below 30 to 35 inches there are usually several inches to 2 or 3 feet of yellowish friable silt that becomes calcareous at a depth of 50 to 55 inches. Calcareous Wisconsin till lies beneath the silt, tho in many places several inches of sandy wash fills the till depressions or pockets, forming a sandy-pebbly layer. In a few places, particularly close to the face of the Shelbyville moraine, the loess is absent and the soil profile has apparently developed directly on the Wisconsin till, which in these instances is leached to a depth of 4 or 5 feet. The slope varies from $\frac{1}{2}$ to about 3 or 4 percent, and surface drainage ranges from moderately slow to moderately rapid. Underdrainage is moderate.

Use and Management.—Floyd silt loam is a naturally productive general-farming soil which can be maintained in a highly productive condition with a small expenditure for limestone and fertilizers. Sufficient limestone should be applied to satisfy sweet-clover or alfalfa requirements even tho neither of these crops is to be grown, for even the more acid-tolerant legumes, such as red clover, will make better growth on a soil adequately supplied with lime.

Adequate underdrainage is essential for the best results, and attention should be given to reducing erosion on the more sloping portions of the type. Both of these objects are easily accomplished since this soil tiles well and a good cropping and soil-management system will control erosion.

After the necessary amount of limestone has been applied and one or more legume crops grown, tests for available phosphorus should be made. If this element is deficient, applications of a phosphatic fertilizer will increase yields, particularly those of wheat and clover.

Vance silt loam (158)

Vance silt loam is a light-colored soil derived from a thin silty covering over glacial outwash and developed on undulating to rolling topography under a deciduous hardwood forest. It occupies a total of about 6,620 acres in Shelby county and occurs most extensively along Flat Branch and West Fork of Little Wabash river.

¹Subsequent to the publication of the Shelby county soil map the name Floyd was changed to Flanagan. All references to this type in future publications will be found under the latter name.

The surface horizon is 5 to 7 inches thick and is a yellowish-gray silt loam low in organic matter and medium acid in reaction. In undisturbed forested areas the upper 2 or 3 inches is more brownish in color owing to the accumulation of forest litter. The subsurface is 6 to 8 inches thick and is a grayish-yellow to yellow silt loam. The subsoil is 12 to 16 inches thick and is a brownish-yellow to reddish-yellow medium-plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular aggregates with dark-grayish coatings. At 30 to 35 inches the lower subsoil usually grades into a thin layer of yellowish silt, below which brownish-yellow leached sandy-gravelly material occurs. Sometimes, especially on slopes of 4 to 6 percent, the silty layer is absent and the upper soil horizons appear to have been developed directly on the coarse sandy-gravelly material.

The slopes on which this soil occurs vary from 1 percent or less to 5 or 6 percent. Surface drainage is moderately slow to moderately rapid and underdrainage is moderate.

Use and Management.—If well farmed, this soil produces satisfactory yields. Particular attention must be given to providing a supply of fresh organic matter because of the deficiency of this material and of nitrogen. To accomplish this object, sufficient limestone must be applied to grow sweet clover. After one or two crops of sweet clover, tests should be made for available phosphorus and potash. Erosion control should be given attention on the more sloping portions of the type, and underdrainage may be needed on the nearly level areas.

Thorp silt loam (206)

Thorp silt loam is a medium dark soil derived from a silty covering over sandy outwash and developed on nearly level to gently rolling topography under prairie vegetation. It occupies an area of 5,660 acres in Shelby county, occurring thruout the outwash region, but it is particularly well developed about half a mile north of Strasburg and also two to three miles to the northeast of that town.

The surface horizon is 6 to 8 inches thick and is a grayish-brown silt loam medium in organic matter and medium acid in reaction. The subsurface is normally 8 to 10 inches thick and is a pale brownish-gray to yellowish-gray silt loam that is commonly gray and ashy in the lower part. Small brown gritty iron-manganese pellets are abundant and very noticeable. The subsoil is 12 to 18 inches thick and is a pale yellowish-gray compact and rather plastic silty clay to clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch gray-coated subangular aggregates. At a depth of 35 to 40 inches the material usually becomes sandy, and below 45 or 50 inches it is generally a loose and incoherent sand. Sometimes, however, the outwash material is made up of stratified silt, sand, and gravel. The slopes on which this soil occurs vary from $\frac{1}{2}$ to about 3 percent, and surface drainage is slow to moderate. Underdrainage is moderately slow.

Use and Management.—The treatment and management suggestions recommended for Edina silt loam, Type 46, page 25, also apply to this type.

Ward silt loam (207)

Ward silt loam is a light-colored soil derived from a silty covering over permeable calcareous Wisconsin till and developed on nearly level to undulating

topography under deciduous hardwood-forest vegetation. It occupies an area of 4,580 acres and occurs principally as narrow upland divides along Kaskaskia river northeast of Shelbyville.

The surface is 6 to 8 inches thick and is a yellowish-gray silt loam low in organic matter and medium acid in reaction. In undisturbed forested areas the



FIG. 20.—A LARGE FLAT OF WARD SILT LOAM

Poor pasture such as that shown in the foreground is characteristic of this type. The field in the background has been tilled. Unless well farmed, Ward silt loam is not a very productive type, but it responds well to good soil-treatment and cropping practices after underdrainage has been provided.

upper 2 or 3 inches of soil is brownish in color owing to an accumulation of forest litter. The subsurface is 6 to 8 inches thick and is a yellowish-gray to gray almost ashy silt loam. The subsoil is 12 to 16 inches thick and is a yellowish-gray medium-plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular gray-coated aggregates. A few inches of yellowish silt usually occurs beneath the subsoil but this is absent in some places and the subsoil grades directly into yellowish leached pebbly till that becomes calcareous at a depth of 4 to 5 feet. Small gritty brownish-black iron-manganese pellets occur on the surface and thruout the soil profile, being particularly noticeable in the subsurface.

The slopes on which this soil occurs vary from about $\frac{1}{2}$ to 1 percent. Both surface and underdrainage are moderately slow to slow.

Use and Management.—Ward silt loam is not a very productive soil unless well farmed. It responds well to good soil treatment and cropping practices after underdrainage has been provided by tiling. Limestone should be applied in amounts indicated by the test and sweet clover grown in a short rotation. After two or three crops of clover have been grown, tests should be made for available phosphorus and potash.

Sexton silt loam (208)

Sexton silt loam is a light-colored soil derived from glacial outwash material and developed on nearly level to gently undulating topography under deciduous forest vegetation. It occupies an area of 2,530 acres and occurs particularly along Flat Branch and West Fork of Little Wabash river.

The surface is a pale brownish-gray to yellowish-gray silt loam low in organic matter and medium to strongly acid in reaction. In undisturbed forested areas the upper 2 or 3 inches of soil is brownish gray or dark gray owing to an accumulation of forest litter. The subsurface is a yellowish-gray silt loam. The subsoil is a yellowish-gray plastic clay loam, 12 to 16 inches thick, that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch almost angular aggregates arranged in fairly good prismatic form. Below 35 to 40 inches lies a mixture of clayey, silty, sandy, and gravelly leached wash material. Brownish-black iron-manganese concretions are scattered on the surface and are noticeable thruout the profile.

The slopes on which this soil occurs have gradients of no more than 1 percent. Both surface and underdrainage are slow.

Use and Management.—The suggestions given for the treatment of Ward silt loam apply to this soil type also (see page 42).

Tamms silt loam (211)

Tamms silt loam is a light-colored soil found on nearly level topography on the east bluffs of Little Wabash and Kaskaskia rivers. It is a minor type, covering only about 130 acres in Shelby county.

The profile to a depth of 40 inches resembles that of Wynoose silt loam, Type 12, altho the subsoil is less compact and plastic. Below 40 inches a stratum of sand is found which furnishes a good underground outlet for such water as passes thru the subsoil.

Use and Management.—The suggestions made for the management of Wynoose silt loam, Type 12, page 18, apply equally well to Tamms silt loam.

Thebes silt loam (212)

Thebes silt loam is found on undulating to rolling topography in association with Tamms silt loam, Type 211. The total area of the type in Shelby county is about 1,250 acres.

The profile of Thebes silt loam, to a depth of about 40 inches, is very similar to that of Ava silt loam, Type 14, but below 40 inches it has a bed of sand several feet thick. Both surface and underdrainage of this type are good.

Use and Management.—The suggestions made for the handling of Ava silt loam, Type 14, page 22, apply equally well to Thebes silt loam.

SUMMARY OF IMPORTANT CHARACTERISTICS OF SHELBY COUNTY SOILS

A summarized statement of some of the agriculturally more significant characteristics of the soil types shown on the soil map of Shelby county is presented in Table 2. Topography, drainage, acidity, the contents of organic matter and of available phosphorus are all indicated, together with an index of the productivity of each soil type, in untreated condition, for crops, pasture, and forest.

The information in this table is necessarily generalized and should not be taken to mean that every farm or field of a given soil type will necessarily exhibit exactly the same characteristics as indicated here. As already pointed out, acidity and productivity may vary markedly within areas of the same soil type; and for that reason every field should be tested as recommended in the more detailed discussion of the types, and treatments should be based on the results of the tests.

It must also be remembered that soils differ in their response to soil treatment, and that these differences are not brought out by the productivity index in Table 2. For instance, Alma silt loam, which has an index of 7 to 10, responds well to good treatment, whereas Wynoose silt loam, with an index of 9, does not make as satisfactory response as Alma. Since sufficient factual data are not available to permit the presentation of this type of information in terms of simple index numbers for all types, the reader is referred to the management paragraph under each soil type for detailed discussion.

TABLE 2.—CONCLUDED

Type No.	Type name	See page ¹	Topography ²	Drainage ³		Reaction	Available phosphorus	Organic matter	Productivity indexes ⁴		
				Surface	Under				Field crops	Pasture	Forest
118	Alma silt loam	35	Rolling	Moderately rapid	Moderately slow	Medium acid	Low	Low	7-10 ⁵	B	A
119	Elco silt loam	35	Strongly rolling	Rapid	Moderate	Medium acid	Low	Low	9-10 ⁵	C	A
127	Harrison silt loam	36	Gently rolling	Moderately slow	Moderately slow	Medium acid	Medium to low	Medium	3-6 ⁶	A	A
128	Douglas silt loam	37	Rolling	Moderately rapid	Moderate	Medium acid	Medium to low	Medium low	4-7 ⁶	A	A
134	Camden silt loam, terrace	37	Gently rolling	Moderate	Moderate	Medium acid	Low	Low	5-6	B	A
138	Shiloh clay loam	38	Nearly level	Slow	Slow to moderate	Slightly acid to neutral	Medium	High	2-3	..	..
143	Ava sandy loam	39	Rolling	Rapid	Rapid	Acid	Low	Low	8	C	B
148	Proctor silt loam	39	Gently rolling	Moderate	Moderate	Medium acid	Low	Medium	3-4	..	..
149	Brenton silt loam	39	Undulating	Moderate	Moderate	Slightly acid	Medium	Medium high	2	..	..
152	Drummer clay loam	40	Nearly level	Slow	Moderate	Neutral	High	High	1	..	..
154	Floyd silt loam	41	Undulating	Moderate	Moderate	Medium acid	Medium	Medium high	2	..	..
158	Vance silt loam	41	Gently rolling	Moderate	Moderate	Medium acid	Low	Low	5-7 ⁶	B	A
206	Thorp silt loam	42	Nearly level	Slow	Moderately slow	Medium acid	Low	Medium	4	..	..
207	Ward silt loam	42	Undulating	Moderately slow	Moderately slow	Medium acid	Low	Low	5-6	B	A
208	Sexton silt loam	43	Nearly level	Slow	Slow	Strongly acid	Low	Low	8	C	B
211	Tamms silt loam	44	Nearly level	Slow	Slow	Acid	Low	Low	8	C	B
212	Thebes silt loam	44	Undulating to rolling	Moderate	Moderate	Acid	Low	Low	7	C	A

¹For description of soil type turn to page indicated.

²Topography is expressed by the following terms based on the respective slopes: *nearly level*, less than .5 percent slope; *undulating*, .5 to 1.5 percent; *gently rolling*, 1.5 to 3.5 percent; *rolling*, 3.5 to 7 percent; *strongly rolling*, 7 to 15 percent; *steep*, greater than 15 percent.

³Of the terms used to express drainage, *moderate* expresses the most desirable drainage.

⁴The index number assigned to a soil type for production of field crops is based on the ability of the type to produce the major crops grown in the region, without soil treatment but with the soil in a cleared and drained condition. The scale used is 1 to 10, the *most productive soil* in the state being rated as 1 and the *least productive* as 10. The indexes for pasture and forest are indicated by A, B, and C, A signifying the best and C the poorest.

⁵Given variable rating because of differences in degree of erosion.

⁶Given variable rating because of differences in depth of loess.

⁷Given variable rating because of differences in amount of alkali.

⁸Given variable rating because of character of sediment.

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