

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF SCOTT COUNTY.
INDIANA.

BY

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[Advance Sheets—Field Operations of the Bureau of Soils, 1904.]



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[PUBLIC RESOLUTION—No. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the Congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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MAP.

Soil map, Scott County sheet, Indiana.

Scottsburg, the county seat, is situated on the main line of the Pennsylvania Railroad, which runs between Chicago and Louisville, and affords an excellent shipping point to some of the large cities. The population of Scottsburg is about 1,200. Prior to 1885 lumbering was the chief occupation, but since that date agriculture has become the leading pursuit of the people.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

Few events of any importance in the history of Scott County transpired before the war of 1812. Several attempts had been made prior to that time to establish settlements in this part of Indiana, but they were generally unsuccessful on account of trouble with the hostile Indians. The Pigeon Roost settlement, which was established in the southern part of the area in 1809, was probably the first settlement of any importance in the county, but this was attacked in 1812 by Indians, most of its inhabitants massacred, and the village completely destroyed. The Indians, however, were soon defeated and driven from this part of the State, and settlement then progressed more rapidly. A few foreigners, chiefly Irish, Scotch, and Germans, were among these early settlers, but the majority came from Kentucky, Tennessee, North Carolina, and Virginia. Scott County was organized in 1817. The county seat was at first located at Lexington, but was later transferred to Scottsburg.

Considering the length of time the county has been settled, its agricultural development has been very slow. The early settlers cultivated small tracts of land to corn, wheat, potatoes, and other general farm crops for home use, but they depended on the timber of the surrounding forests as their main source of income. Larger areas were put under cultivation and more interest was taken in tilling the soil as the land became cleared and the lumber industry declined. About 1850 a railroad, now a part of the Pennsylvania system, was built through the county, and fourteen years later the Baltimore and Ohio Southwestern was constructed. Later on these roads aided materially in the development of the county, as they afforded excellent facilities for transporting its products to eastern markets.

The eastern part of the area was the first to develop agriculturally. The timber in this part of the county was of much lighter growth than was found on the low, flat valleys farther west. The soil was productive and easily cultivated, and its topography rendered it better adapted to general farming purposes than the rough, broken country of the southwestern part of the area.

About 1880 the lumber industry began to fail, and by 1885 it had become of minor importance. This marked the beginning of the real agricultural progress of the county, and farming soon became the

leading occupation of the people. The agricultural wealth of the county is estimated to have increased fully 50 per cent during the last twelve years. Corn, wheat, oats, clover, timothy, and vegetables are now successfully grown on almost every type of soil in the county, and the rough and hilly sections seem well adapted to orchards and vineyards. Within the last few years tomato growing has developed into a very important industry, and a large acreage is annually devoted to the production of this crop. There have been established in the county a number of canning factories, which afford a ready market for all the tomatoes grown, and the specialization of this crop is proving very profitable.

Great interest is manifested in the county agricultural organizations and in the subject of good roads. Within the last twelve years considerable attention has been paid to road construction, and most of the streams are now spanned by durable iron bridges.

Although there was practically no increase in the population of Scott County during the twenty years from 1880 to 1900, the general progress during the last fifteen years has been very rapid. A telephone system connects the rural districts with the cities, and the rural free delivery of mail has been established. Tile drainage, more thorough cultivation of the soils, and more modern methods of farming are rapidly coming into use, and the county as a whole is in a very prosperous condition.

CLIMATE.

The following table, compiled from Weather Bureau records, shows the normal monthly and annual temperature and precipitation taken at Scottsburg, within the county; at Madison, in Jefferson County, just east of the area surveyed, and at Salem, in Washington County, just west of the area.

Normal monthly and annual temperature and precipitation.

Month.	Scottsburg.		Madison.		Salem.	
	Temperature.	Precipitation.	Temperature.	Precipitation.	Temperature.	Precipitation.
	°F.	Inches.	°F.	Inches.	°F.	Inches.
January	32.9	3.28	34.2	4.15	29.2	3.35
February	31.0	2.60	31.5	2.85	30.6	3.57
March	43.2	4.44	43.9	4.86	41.9	3.83
April	52.3	2.31	55.6	3.01	52.4	3.05
May	65.0	3.70	65.3	4.44	63.5	3.22
June	74.4	4.30	74.9	4.14	71.2	4.52
July	78.0	3.02	77.9	3.13	77.2	2.89
August	76.4	2.90	76.3	3.40	74.6	3.50
September	69.1	2.38	70.2	2.33	68.1	2.58
October	57.5	2.13	58.1	2.06	56.4	2.66
November	44.5	3.43	44.8	3.29	44.5	3.94
December	36.3	3.25	35.1	3.30	32.4	3.32
Year	55.1	37.74	55.7	40.96	53.5	40.43

These three places are practically in the same latitude, but it will be noticed from the above table that the precipitation is somewhat greater at Madison and Salem than it is at Scottsburg, while the annual temperature is about the same.

The average for these stations may be taken to represent conditions in the county. The rainfall is usually ample for all the crops grown.

PHYSIOGRAPHY AND GEOLOGY.^a

There have been two controlling factors in the physiographic development of Scott County—the limestone, sandstone, and arenaceous shale of the Knobstone group and the black, slaty shale of the New Albany series. The upper strata of the Knobstone group, which cap the hills in the southwestern part of the county, have resisted the agencies of erosion better than the softer underlying shale, and the surface of this section is very broken and hilly. The shales belonging to the New Albany series, which underlie the soils of the eastern two-thirds of the county, have given rise to a rolling topography.

The Knobstone hills of the southwestern part of the area have an elevation of from 200 to 400 feet above the drainage level of the country north and east of them, and present the most prominent topographic features of the area. These hills have been cut by numerous northward-flowing streams, which have formed deep, narrow, V-shaped valleys, varying in length from 1 to 5 miles. As the streams approach the more rolling country the valleys become much broader and the slope of the hills is more gentle. The surface of these broader valleys was once much lower than it is now, as there has been a silting up of the stream beds since the formation of the valleys until the material deposited is estimated in many cases to exceed a depth of 20 feet.

The level upland parts of the county are best developed west of Scottsburg and in the vicinity of Austin. Here the surface is comparatively level, although it is traversed by many small streams and shallow valleys. The streams flow across these uplands in a general northern direction, and the shallow valleys vary in width from a few rods to about 1 mile.

As already pointed out, the topography of the eastern two-thirds of the area is of a gently rolling character. The summits of the rounded hills are comparatively level, and the hillsides slope gently toward the small streams which flow through the broad, intervening valleys. Along the lower stretches of the streams the valleys have

^a The statements in regard to the geological formations of the area are based upon data given in the Twenty-sixth Annual Report of the Indiana Geological Survey.

been gradually filled up with sediment, and the neighboring hills are lower and more gently undulating. This characteristic is especially well developed just east of Scottsburg and along Stuckers Fork and its larger tributaries, where material has been deposited to a depth of many feet.

In the extreme northern part of the county the topography retains its rolling or undulating character, but the general elevation is much less than it is farther south. The land bordering the Muscatatuck River, in the northwestern part of the area, is low and flat, but marked by many old stream channels, bayous, narrow sloughs, and low, sandy ridges. It has only a slight elevation above the level of the stream, and is subject to frequent overflow during the heavy spring rains. A narrow, sandy ridge, generally a few feet higher than the greater part of this flood plain, extends along the immediate banks of the river, and is not so much subject to overflow as the lower lands farther back from the stream.

However, most of the area has good natural drainage. The rough and hilly country in the southwestern part of the county is drained by the Big Ox Fork and its tributaries. This stream flows across the county in a general northward direction, and empties into the Muscatatuck River. Pigeon Roost Creek, which also has its source in the Knobstone hills, traverses the south central part of the area and empties into Stuckers Fork. The latter stream and its main tributaries, Kimberlins Creek and Big Hog Creek, drain the greater part of the rolling uplands in the eastern and central parts of the area.

The Muscatatuck River, which forms part of the northern and northwestern boundaries of the county, is the principal stream of the area, and receives the drainage waters of almost the entire county.

The approximate glacial boundary of southern Indiana takes in the northeastern two-thirds of Scott County. It is difficult to determine its exact limit, but the ice sheet is thought to have extended to the Knobstone hills. Although it is believed that a considerable proportion of the surface material covering the greater part of the county is of glacial origin, it is very probable that the material was mainly of local derivation, as no glacial boulders or fragments of igneous rocks are encountered in the soil.

The geological formations which underlie the area are frequently exposed on the steeper slopes and are seldom at any great depth below the surface. The shales weather rapidly on exposure, and have undoubtedly entered largely into the composition of the various types of soil. The eastern part of the area, including the territory covered by the Volusia silt loam, is underlain by the New Albany black shale, and small, partially decomposed fragments of this rock are frequently encountered in the lower part of the soil section and in

the subsoil. These shales, which here form the highest member of the Devonian age, are, in the extreme eastern part of the area, only a few feet thick. They have, however, a general dip to the southwest, and at Scottsburg, in the central part of the county, they attain an estimated thickness of over 120 feet.

A thin layer of limestone, known as the Rockford goniatite limestone, which forms the lowest member of the Lower Carboniferous, sometimes occurs overlying the New Albany black shales, but it has had little, if any, influence on the composition of the soils. Above this layer of limestone, or where the stratum is absent, lying upon the New Albany shales, is a series composed of argillaceous and arenaceous shales and thin layers of sandstone, which belongs to the Knobstone group of the Lower Carboniferous.

The New Providence shales, which occur at the bottom of this group, consist of a soft clay shale of greenish or bluish color. They are estimated to be about 50 feet thick at the southern boundary of the county, but gradually become thinner toward the north. In the northern part of the area it is difficult to distinguish these shales from those occurring just above them. They weather rapidly on exposure and have probably entered into the composition of the soil, though not to so great an extent as the series overlying them.

The Upper Knobstone shales occur just above the New Providence series. They are of a light-gray or greenish color, and grade from a soft argillaceous shale at the bottom to a sandy shale and impure, fine-grained sandstone at the top. Above these shales and forming the upper series of the Knobstone group are alternate layers of more or less pure sandstone and sandy shales. This series is known as the Knobstone sandstone and varies in thickness from about 75 to 100 feet. It occurs capping the higher elevations in the southwestern part of the county, and does not weather so rapidly as the softer shales of the lower series. Embedded in the strata are considerable quantities of iron concretions, which impart a reddish color to the derived soils.

The surface material of the area is, in the main, so similar to that formed by the disintegration of the underlying geological formations that it is difficult to determine what proportion of the soils is derived from material reworked by glacial agencies and what proportion has been derived directly from the decomposition of the rocks.

SOILS.

Four types of soil occur in Scott County. Of these, three are derived from the weathering of the underlying geological formations and glacial deposits. The fourth, occurring in the low, flat bottom lands, is derived from material deposited by the streams, together

with that which has been washed down from the surrounding uplands. The following table shows the extent of each of the four types:

Areas of different soils.

Soil.	Acres.	Per cent.
Volusia silt loam	46,912	37.1
Scottsburg silt loam	37,184	29.4
Dekalb silt loam	22,060	17.5
Waverly silt loam	20,160	16.0
Total	126,336	

SCOTTSBURG SILT LOAM.

The Scottsburg silt loam consists of a light to very light ash gray silt loam, having an average depth of 8 or 10 inches. Small iron concretions are scattered over the surface and through the soil. There is frequently a considerable amount of fine and very fine sand mixed with the silt, which causes the soil to have many of the characteristics of a fine sandy loam. At 10 or 12 inches the soil grades into a light-yellow or slightly mottled silt loam. This becomes gradually heavier and more compact as the depth increases, and at 30 to 36 inches consists of a heavy silt loam of a drab or gray color, slightly mottled with yellow iron stains and usually containing small iron concretions. This soil resembles the Miami silt loam, but the color is lighter.

This type of soil occurs in areas of greater or less extent in almost all parts of the county. A large area is found just west of the town of Scottsburg, occupying that part of the uplands lying between the hills of the southwestern section and the rolling uplands of the eastern part of the area. In the eastern and northeastern sections of the county the areas gradually become smaller, and finally occupy only the small level areas capping the summits of the rolling hills, many of which do not exceed a few acres in extent.

The entire area embraced by this type has the general appearance of having once been a level upland plateau, but it is now intersected by many small streams with wide, shallow valleys. The topography of the broad areas between these streams is flat or very gently rolling, and the slope toward the small watercourses is seldom steep enough to cause the lands to suffer to any great extent from erosion. The topography of the small areas occupying the summits of the rolling hills east and north of Scottsburg is also comparatively level, as the steeper slopes of the rounded hills are usually occupied by the Volusia silt loam.

The numerous small streams that traverse these sections of the area are adequate to carry off the excess water at times of heavy rains, and

the type, as a whole, is fairly well drained. Tile drains are seldom used, but a good system of underdrainage has proved of great benefit to this soil wherever it has been established, both in wet and dry seasons. The crops cultivated on this soil are often considerably damaged by droughts, and the better results are nearly always obtained during seasons when the rainfall is greatest.

The areas included in this soil type are underlain by the soft argillaceous and sandy shale of the Knobstone series. However, as this section of the area is thought to be within that part of Indiana which was at one time covered by glaciers, it is very probable that a considerable part of the material from which this soil has been formed was deposited through glacial action. As no boulders or igneous rocks occur in these areas, this glacial material would seem to be chiefly of local origin. The soft underlying shales disintegrate very rapidly wherever they have become exposed, and also have undoubtedly entered largely into the composition of the soil.

Very careful management is necessary to keep this soil in a productive state, and some system of crop rotation is very important, as the continued cultivation of any one crop soon decreases the yields. In order continually to obtain good results, the turning under at least once in every two or three years of clover or some other crop that adds considerable humus to the soil is very essential.

The Scottsburg silt loam is cultivated to corn, wheat, oats, clover, timothy, and tomatoes, and often produces yields equal to those obtained on any other soil type in the area; but when no rotation is practiced and the land has been poorly cultivated, small yields are secured. When properly cultivated corn yields about 30 bushels per acre. Wheat will average 12 to 15 bushels per acre. Oats, when sown in the spring, average about 25 to 30 bushels, but when put in during the fall months much larger yields are obtained, provided the crop escapes winter killing. Clover and timothy produce about $1\frac{1}{2}$ tons of hay per acre, while the yield of clover seed ranges from $1\frac{1}{2}$ to 3 bushels per acre.

This type of soil seems best adapted to tomatoes, small fruits, vegetables, and all early-maturing crops adapted to the climatic conditions of the area. The constant cultivation of the soil necessary in the growing of tomatoes seems to benefit these lands, but if cultivated when in a wet condition the soil dries out rapidly and bakes into clods, and it is difficult to reduce these again to a state of good tilth.

Alfalfa has been successfully grown on limited areas, and experiments have proved that a very fair grade of tobacco can also be produced on this type.

The table following gives the results of mechanical analyses of samples of this soil.

Mechanical analyses of Scottsburg silt loam.

No.	Locality.	Description	Fine gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.06 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
11003	3½ miles NE. of Scottsburg.	Silty loam, 0 to 12 inches.	0.9	3.3	4.1	9.3	9.7	61.8	10.8
11011	2 miles W. of Scottsburg.	Silty loam, 0 to 12 inches.	1.5	2.2	1.7	3.3	6.2	72.7	11.9
11009	1 mile W. of Austin.	Silty loam, 0 to 14 inches.	1.9	4.9	3.8	6.7	8.8	57.6	16.4
11010	Subsoil of 11009.....	Silty loam, 14 to 36 inches.	1.6	3.6	3.1	5.6	8.3	59.6	17.9
11012	Subsoil of 11011.....	Silty loam, 12 to 36 inches.	.3	1.0	.9	2.2	8.4	69.4	18.0
11004	Subsoil of 11003.....	Gray silty loam, 12 to 36 inches.	.8	2.1	2.5	5.9	7.4	59.4	21.8

DEKALB SILT LOAM.

The Dekalb silt loam, to a depth of 10 inches, is a silty loam of a gray to light-brown color, becoming light red or yellow at greater depths. The soil is easily eroded and the texture varies slightly according to the steepness of the slopes and the consequent degree of erosion that has taken place. On the steeper hillsides much of the finer material has been washed down to the lower levels and the underlying yellow or red heavy silty loam has become mixed with the coarser material, forming a soil of a more pronounced red to brown color, containing less fine sand.

The subsoil is a heavy reddish to yellow silt loam containing a small proportion of fine sand. It rapidly becomes heavier as the depth increases, and at 30 to 36 inches is a very heavy silt or clay loam, still containing some fine sand, but of a stiff, tenacious character.

Small fragments of chert, limestone, and sandstone are frequently encountered, both on the surface and in the soil. These are the remains of the upper strata of the Knobstone group, which once extended over this part of the area.

The Dekalb silt loam occurs in one large, unbroken area, embracing the whole of the extreme southwestern portion of the county, and extending for some distance along its southern boundary. The topography of the country occupied by this soil is rough and broken. The small streams have cut rapidly through the soft shale, forming deep, narrow valleys. The upper strata of the Knobstone shale and sandstone have not weathered so rapidly as the softer shale beds, and still cap the higher elevations, making the general topographic features consist of a series of isolated knobs and irregular ridges, separated by deep, narrow ravines. The stream valleys widen out as they approach the more level country to the north and east, and

the steep, precipitous banks disappear as the adjoining hills become low and more rounded.

Pigeon Creek and Ox Fork have their sources in this part of the area, and these, together with their many small tributaries, furnish the natural drainage system for the surrounding uplands. The land is often excessively drained, and in order to obtain the best results methods for conserving the soil moisture and for protecting the lands against erosion must be used.

Glaciation is thought to have extended to the foothills of the rough and broken country occupied by the greater part of this soil type, and it is very probable that there was a deposition of the finer glacial material over a considerable part of this section of the county. A large percentage of the material from which this soil is formed is derived, however, from the disintegration of the Knobstone shale. As already stated, small fragments of limestone, chert, and sandy shale are often encountered, scattered on the surface and mixed with the soil; and the soft blue argillaceous shale, containing numerous layers of impure chert and flat, oblong, cherty concretions, is frequently found at a very slight depth below the surface. Thin layers of hard brown ferruginous shale, such as form the outer layers of the embedded geodes and ironstone concretions, frequently occur associated with the softer shale or scattered in small fragments on the surface. The characteristic red or yellow color of the soil is due to the oxidation of the large amount of iron contained in the material from which it is formed.

Many of the hillsides, where the topography is most broken, are too steep to be profitably cultivated, and as a whole less of this type of soil has been developed agriculturally than any other soil in the area; but the greater part of these cultivated lands produces very fair yields of corn, oats, wheat, rye, timothy, clover, and tomatoes.

Crops maturing in the late summer often suffer from drought, but under careful cultivation the average yields per acre will compare favorably with those obtained from any of the upland soils. Corn produces, on an average, 25 bushels; wheat, 10 to 15 bushels; and oats, about 20 bushels per acre. Clover and timothy yield from $1\frac{1}{2}$ to 3 tons per acre, and a large quantity of clover seed is thrashed each season, the crop averaging about 2 bushels per acre. Tomatoes are extensively cultivated and yield an average of 6 tons per acre. The less hilly areas occupied by this type of soil are well adapted to wheat, clover, oats, tomatoes, and timothy, while the rough and hilly sections are well suited to fruit. Large yields of peaches and apples have been continually realized from the small orchards situated on these lands, but many of the trees have recently been injured by disease—a form of leaf blight—which has lessened the crop yields considerably. The thriving condition of a few small vineyards indicates that this soil is excellently adapted to grapes and

might be profitably employed for their production on a commercial scale.

The following table gives the results of mechanical analyses of the fine earth of samples of this soil :

Mechanical analyses of Dekalb silt loam.

No.	Locality.	Description.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
10983	2 miles SW. of Leota.	Silty loam, 0 to 12 inches.	0.9	2.9	3.7	13.0	12.1	54.2	13.1
10981	Sec. 13, T. 2 N., R. 6 E.	Silty loam, 0 to 18 inches.	.7	2.8	3.6	7.6	7.2	63.4	14.7
10985	1 mile W. of Leota ..	Silty loam, 0 to 14 inches.	.3	1.1	1.3	3.0	4.2	66.5	23.5
10984	Subsoil of 10983	Loam, 12 to 36 inches.....	1.5	3.8	4.8	16.1	12.3	37.9	23.6
10982	Subsoil of 10981	Heavy silty loam, 18 to 36 inches.	1.2	2.3	7.3	9.9	7.7	47.3	24.2
10986	Subsoil of 10985	Silty loam, 14 to 36 inches.	.2	1.6	1.4	3.2	5.2	62.8	24.8

WAVERLY SILT LOAM.

The soil of the Waverly silt loam has an average depth of 8 to 10 inches and consists of a gray to light-brown silty loam, which becomes slightly heavier as the depth increases. It contains varying amounts of medium to fine sand and a large quantity of small iron concretions mixed with the soil and scattered over the surface. The soil grades into a heavy silty subsoil of a drab color, usually mottled with yellow iron stains. The sand content of the subsoil decreases with depth and at 36 inches the material is a heavy mottled silty or clay loam, containing a small amount of sand and a large quantity of small rounded iron concretions.

While a typical section of this soil as it occurs over the greater part of the low bottom lands will show a gray to light-brown silty loam containing varying amounts of sand, the texture of the soil is often modified to a considerable extent by local conditions. The areas extending along the smaller streams are influenced by the different geological formations through which the streams have cut their channels and by material washed from the surrounding uplands. Areas of this phase of the soil, such as the one found at the junction of Stuckers Fork and Hog Creek, are usually better drained than much of the type and are not so subject to overflow as the greater part of the bottom lands. The sand content often varies considerably, the texture of the surface soil frequently ranging from sandy to silty within areas less than an acre in extent. These local variations, occurring along the smaller streams in the more rolling parts of the county, are not of

sufficient extent to permit the classification of each modification as a separate soil type.

The largest areas of the Waverly silt loam form what is known locally as "The Flats"—an area bordering the Muscatatuck River. The type also extends in strips of varied width up the shallow valleys of the other principal streams and their tributaries.

These low flat areas have a very gently rolling or level topography. Occasionally a narrow ridge extends along the immediate banks of the river, and this has an elevation a few feet higher than that of the greater portion of the flat bottoms, while small sandy areas, usually less than an acre in extent, are frequently encountered along the stream. Numerous sloughs, narrow ponds or bayous, old stream beds, and swampy depressions are found scattered over this part of the county. The soil found in these depressions forms the heavier phase of the Waverly silt loam. On drying the surface becomes baked and sun-cracked, causing the soil to be more difficult to cultivate properly than the higher and more sandy areas.

The low-lying position which the Waverly silt loam occupies and the many basinlike depressions lying between the streams and the rolling uplands make the natural drainage very poor. The streams which traverse this type have a very slight fall, and during the heavy spring rains they leave their channels and spread out over the adjoining bottoms. These streams have cut their channels to a sufficient depth below the level of the lands bordering them to admit of ditching and tile draining, and where this is done the lands are in a condition to cultivate soon after the spring floods have subsided. Many of the lower depressions and narrow sloughs would be difficult to drain, but a good system of tile drainage would greatly enhance the agricultural value of the greater portion of this type.

The Waverly silt loam has been formed from material deposited by the streams at times of overflow, mingled in places with material washed down from the surrounding uplands. The coarser material held in suspension by the streams is deposited during overflows near the banks of the main channels, while the silt, clay, and finer sand particles are laid down where the current is more sluggish. The sandy texture of the low ridges that occur near the streams is due to the sorting of the material by currents of varying velocities; but those areas lying nearer the rolling uplands owe their sandy character to material washed down from the neighboring hills. The areas of this type occupying the narrow valleys nearer the sources of the small streams are not as frequently overflowed as the broad, flat valleys near the river, and the soil here owes its origin more to the erosion of the steeper hillsides than to material laid down by the streams during times of overflow.

The agricultural value of these bottom lands depends to a marked degree on the thoroughness of the drainage. The better drained areas

along the river and those occupying the valleys in the rolling uplands produce excellent yields of all crops cultivated, while the poorly drained areas in the low depressions, when cultivated at all, are devoted to the production of timothy and other grasses. Where the soil is well drained and properly cultivated, corn produces an average yield of 45 bushels per acre, and 50 to 60 bushels is not an uncommon yield during a favorable season. Wheat produces from 18 to 20 bushels per acre, but is not extensively sown, owing to the liability of the crop to destruction during the spring floods. Twenty-five bushels per acre is the estimated average yield of oats, but owing to the usually wet condition of these lands during the early spring months oats are seldom grown. Tomatoes on the better-drained areas yield about 6 tons per acre. Timothy produces $2\frac{1}{2}$ to 3 tons of hay per acre, and clover also does well, especially on the low ridges.

The soil is well adapted to corn and timothy. The corn crop is usually planted after the annual spring floods have subsided and is seldom a failure. Timothy always produces a profitable yield of hay, and is successfully grown on the poorly drained areas. A comparatively large proportion of these flat bottom lands is still covered with a heavy growth of hardwood timber—oak, hickory, and beech.

The straightening of the channels of many of the small streams, a more extensive use of tile drains, and the removal of driftwood and other obstructions from the channels of the larger streams would greatly improve the conditions over much of this soil and increase its value for general agricultural purposes.

The following table gives the results of mechanical analyses of typical samples of the soil and subsoil of the Waverly silt loam.

Mechanical analyses of Waverly silt loam.

No.	Locality.	Description.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.001 mm.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
10999	Sec. 13, T. 4 N., R. 6 E.	Silt loam, 0 to 8 inches...	1.2	2.2	1.1	3.4	5.6	67.6	18.5
10997	Sec. 7, T. 4 N., R. 7 E.	Silt loam, 0 to 10 inches..	.2	.6	.4	3.2	7.0	70.0	18.7
10995	2 miles E. of Scottsburg.	Heavy clay loam, 0 to 8 inches.	.4	1.3	1.0	3.2	5.2	51.5	37.4
10998	Subsoil of 10997.....	Heavy silty loam, 10 to 36 inches.	.4	.8	.5	2.2	11.2	66.8	17.9
11000	Subsoil of 10999.....	Heavy silty loam, 8 to 36 inches.	1.1	2.6	1.3	3.0	4.3	66.9	20.7
10996	Subsoil of 10995.....	Gray clay loam, 8 to 36 inches.	.5	1.0	.7	2.5	6.9	54.1	34.1

VOLUSIA SILT LOAM.

The Volusia silt loam is the most important upland soil in the area. It covers the greatest extent of territory and is recognized as well adapted to general farming purposes. The best developed and most profitable farms in the area are situated on this type.

The soil is a light-brown silty loam, often containing considerable fine sand. When dry the surface has a gray appearance, but the color changes to light brown or red as the subsoil is approached. The soil has an average depth of 8 to 10 inches, and the texture becomes slightly heavier with increased depth. Small iron concretions occur both on the surface and throughout the soil. The soil grades into a subsoil of light-red to yellow heavy silt loam, containing a small percentage of sand and rapidly becoming heavier and stiffer as the depth increases, until in the lower 10 or 12 inches of the profile is found a heavy silt loam, stiff and compact, but seldom containing a sufficient amount of clay to give it a sticky or tenacious character. As the underlying shale is approached the material becomes yet more stiff and compact, and at from 4 to 5 feet below the surface it is a very heavy silt or clay loam, with a very low sand content.

The Volusia silt loam covers the greater proportion of the eastern part of the county. Approached from the west, it first appears as narrow areas extending along the steeper slopes of the rounded hills, but these areas rapidly broaden out and finally cover the entire rolling upland, except where the Scottsburg silt loam occurs capping the higher elevations.

The topography of this type of soil is quite rolling. The hills are low and rounded and slope gently to the broad, shallow stream valleys. In the extreme eastern and northeastern sections the surface is slightly more broken, the hillsides are steeper, and the intervening valleys become narrow and V-shaped. These steeper slopes suffer greatly from erosion, and the red or yellow silt loam of the upper subsoil is frequently exposed on the surface, or has been washed down and mixed with the soils occupying the lower levels, giving the latter a red to brown tinge.

These lands are very well drained by the natural drainage system furnished by the rolling topography and numerous small streams—are frequently too well drained, in fact, for the successful cultivation of many crops.

It is generally believed by geologists who have made a study of this area that the glacier once covered the section of Scott County occupied by the Volusia silt loam, and that a deposit of glacial drift was laid down over the older geological formations. The material composing this soil contains no glacial boulders or other evidence of having been transported from other localities by glacial agencies, and the

drift seems to be mainly of local origin. The black shale, which is encountered at a depth of from 3 to 30 feet below the surface, forms by disintegration a light-brown to red silty material similar to that found in the overlying soil. This shale is frequently exposed in cuts and along the steeper hillsides, and has entered largely into the composition of the soil. The shale has embedded in it a large quantity of rounded iron concretions, and it is probably to the weathering of these that the derived material owes its red or yellow color.

In the central part of the county the Volusia silt loam is found along the steeper hillsides, where the erosion has been greatest and where outcrops of the underlying shale are frequently encountered.

During a season of average rainfall and where the soil has not suffered from the effects of erosion profitable yields of corn, wheat, oats, clover, timothy, and tomatoes are produced. Corn yields from 30 to 35 bushels; wheat, 15 to 20 bushels; oats, about 25 bushels, and clover, 1 to 2 tons of hay and about 2½ bushels of seed per acre. Timothy is not as extensively grown on this soil as on some of the other upland types, but will yield about 1½ tons of hay per acre. The yield of tomatoes is about 6 tons per acre.

There are a few farms on this soil which give larger yields than the above year after year. The difference is due to more thorough cultivation, a rotation of crops, and more careful soil management generally. Potatoes and other vegetables are grown on this soil to a limited extent for the local markets, and excellent yields are obtained. In general, the soil of this type is well adapted to general farming, and all crops cultivated in the area can be successfully grown upon it.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Volusia silt loam.

No.	Locality.	Description.	Gravel, 2 to 1 mm.		Coarse sand, 1 to 0.5 mm.		Medium sand, 0.5 to 0.25 mm.		Fine sand, 0.25 to 0.1 mm.		Very fine sand, 0.1 to 0.05 mm.		Silt, 0.05 to 0.005 mm.		Clay, 0.005 to 0.0001 mm.	
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.			
10993	2½ miles S. of Lexington.	Brown silty loam, 0 to 12 inches.	0.5	2.8	7.0	6.3	4.2	67.5	11.6							
10989	4½ miles E. of Scottsburg.	Brown silty loam, 0 to 18 inches.	1.9	3.5	3.4	7.3	8.2	60.2	14.9							
10991	2 miles NE. of Lexington.	Silty loam, 0 to 10 inches.	.5	2.1	3.0	7.4	6.7	62.6	17.7							
10990	Subsoil of 10989	Heavy silty loam, 18 to 36 inches.	1.7	3.4	2.6	5.3	6.4	60.5	20.1							
10994	Subsoil of 10993	Heavy silty loam, 12 to 36 inches.	.3	1.8	2.8	3.3	4.3	63.5	23.8							
10992	Subsoil of 10991	Clay loam, 10 to 36 inches.	.6	2.3	3.0	7.1	8.5	50.9	27.5							

AGRICULTURAL METHODS.

A large amount of commercial fertilizer is applied annually to the soils of Scott County, but where modern and improved methods of farming are in use the soils retain their productivity and profitable yields are continuously obtained with the application of a minimum amount of fertilizer.

Some system of crop rotation is necessary on all the soils of the area in order to obtain good results, and rotation, which has been practiced for some time by the more successful farmers, is now coming into general use. The wheat lands are usually plowed in the late summer or early fall and are rolled and harrowed from three to four times before the wheat is drilled in. The crop is sown during September or October and is harvested about July 1. Oats are often cultivated in much the same manner, but when drilled in during the fall months a profitable yield is very uncertain. If the winter is unusually mild, larger yields are often obtained from the winter oats than from those drilled in during the spring months, but the uncertainty involved in this method causes it to be seldom practiced. The oats crop is put in as early in the spring as the usual wet condition of the soil permits. The lands are given a rather shallow plowing, and then harrowed and dragged. After the seed is put in the fields are again harrowed.

In growing corn and tomatoes level cultivation is not generally practiced, but where this method has been used on the upland the best results have been obtained, as the soils retain a larger amount of moisture and the crops suffer less from the effects of the summer drought. The lands cultivated to corn are plowed as early as the season permits. The fields are then harrowed and dragged till the clods are broken up and the soil is in a thoroughly pulverized condition. The fields are usually "checked off" by shallow furrows crossing each other at right angles, so that the crop may be cultivated both ways. Corn is planted from the latter part of April to the first of June and is harvested in September. The soil is prepared for the tomato crop in much the same way as for corn. The tomato seed is first sown in beds about the last of March, and the young plants are taken up and set out by hand during the latter part of May or early in June. Level cultivation for this crop, especially where grown on the Scottsburg silt loam, has been very successfully practiced.

The agricultural value of the poorly drained areas occupying the flat lowlands along the more important streams has in many places been greatly increased by the establishment of a good system of tile drainage. The greater part of these lands has a sufficient elevation above the level of the streams to permit tile to be laid from

3 to 4 feet below the surface and still have a sufficient fall to the stream to insure good drainage. The average cost per acre for tiling these lowlands is estimated at about \$18.

Clover is extensively cultivated on the steeper hillsides of the rolling uplands as a means of checking the excessive erosion to which these soils are subject. Where the greater part of the upper soil has been washed down to the lower levels, leaving the subsoil exposed on the surface, an application of barnyard manure is often necessary in order to get a stand.

AGRICULTURAL CONDITIONS.

As pointed out in the paragraphs devoted to the history of the county, its agricultural development has progressed very slowly, and it is only in recent years that the cultivation of the land has received the whole attention of the farming class. The area was originally covered by a heavy growth of timber, and the principal occupation of the rural population was the cutting of timber for crossties and staves. As the lands were cleared and the timber became less plentiful more interest was taken in farming, and within the last fifteen or twenty years the condition of the farming class has steadily improved and the value of cleared lands has greatly increased. Few of the farmers in the area are wealthy, but the majority are practically free from debt, and as a whole are in a very prosperous condition. The introduction of crop rotation and other improved methods of farming, together with a demand for the general farm products at good prices, have been the principal causes of the present favorable status of the agricultural class, which is most marked in the eastern part of the county, where the lands have been longer under cultivation and the people have depended for a longer period on the products of the farm rather than on those of the forest as their principal source of income.

About 64 per cent of the farms in Scott County are operated by the owners. The remainder are rented, either for a share of the products or for cash. The owners of the farms on the low river flats also own and cultivate small areas in the neighboring uplands, where they make their homes. The swampy condition of the lowlands and the fact that they are subject to annual overflow make it undesirable to live in this section of the area.

There are a few large landholders in the county who cultivate farms of several hundred acres, but the average size of the farms is approximately 89 acres. The total area in farms is about 113,578 acres, over half of which is at present improved.

Aside from those owning land, the farmers of Scott County are either renters or "tenants" on the farms of the larger landholders.

The "tenant" receives a fixed sum, usually about \$25 a month, and is entitled to no part of the crop produced. The landowner furnishes the land, farm buildings, work animals, farming machinery, seed, and fertilizers, and receives the entire crop yield. Lands are seldom rented on a cash basis except in small tracts for the production of tomatoes, in which case the rate varies from \$3 to \$10 an acre. When rented on shares the owner furnishes only the land and farm buildings and receives one-third to one-half of the corn, wheat, and oats, and three-fifths of the clover and timothy produced.

An excellent class of white labor was once abundant throughout the county, but in recent years, as the agricultural interests of the county have rapidly developed, the demand for intelligent farm hands has greatly increased, and efficient labor is often scarce during harvest. The wages paid during the harvest season range from \$1 to \$1.50 a day, but when employed by the month or for longer periods the average farm laborer receives about \$20 a month and board.

The principal products of Scott County are corn, wheat, oats, timothy, clover, and tomatoes. A small acreage is also cultivated to potatoes and other vegetables. In 1900 the total corn crop was estimated at 407,920 bushels, being an average yield of about 23 bushels per acre for the entire acreage in that crop. The corn crop is seldom a failure, either on the uplands or river flats, and where a good system of rotation is practiced a very profitable yield is always obtained on any of the soil types of the area. Wheat is extensively cultivated over the entire upland section of the county, and, although the acreage devoted to this crop has decreased in the last three years, it is still more widely cultivated than any other crop produced in the area, with the exception of corn. In many localities the wheat crop during the past two or three seasons has been almost a total failure. This has been due to the damage done by the Hessian fly and rust. The result has been a decrease in the acreage devoted to wheat and an increase in the acreage of oats and rye.

Both clover and timothy are successfully grown in all sections of the county, each yielding annually from 5,000 to 7,000 tons of hay. Clover is always included in the crop rotation practiced on the rolling uplands, as it aids materially in checking the excessive erosion common to this portion of the area, and in restoring the lands to their former state of productiveness.

The growing of tomatoes has become one of the most important special industries of the county, and the number of acres cultivated to this crop is yearly increasing. In the county there are six canning factories, which are supplied by the surrounding country. The annual output of each factory is estimated at about 400,000 cans.

A large number of hogs are raised in the county, and a few farmers own a sufficient number to enable them to ship carload lots to the

more distant markets. Very few cattle, however, are raised for shipment, and the small shipments sent to the larger markets are usually gathered from all parts of the county. The raising of poultry for shipment to the eastern cities is at present a very profitable industry throughout the county, and large quantities of both chickens and eggs are annually sent out.

The Waverly silt loam is the principal corn soil of the county, as, owing to its annual flooded condition, a profitable yield of any of the other staple crops is very uncertain. The corn crop is planted late in the spring and is less liable to damage by floods than wheat or oats. The annual deposition of new material over these lands during periods of inundation, together with that washed from the surrounding hills, causes them to suffer very little if any from the continuous cultivation of one crop.

Wheat, oats, rye, and clover are well adapted to the Volusia silt loam, and if properly cultivated produce large and profitable yields. These crops are also successfully grown on the more rolling sections of the Dekalb silt loam, and in a wet season or on small areas where the drainage is not excessive they will produce yields equal to those obtained on any other soil type of the area. The rougher and more broken section of the Dekalb silt loam is best suited to apples, peaches, and grapes. There are at present a few small vineyards in this part of the county, and there has been a ready market for their products. The small orchards have received very little attention, and although large yields are annually obtained, no attempts have been made to raise fruit for other than the local market.

Timothy is extensively grown on the poorly drained areas of the Waverly silt loam and produces larger yields than are obtained on the uplands.

The tomato seems best suited to the Scottsburg silt loam. While the growth of the plant is not as vigorous as on some of the lowland soils, a larger yield per acre is always realized.

Alfalfa has been successfully grown, both on the level uplands and stream bottoms, but no attempts have been made to cultivate more than a few small isolated areas to this crop. Sorghum cane has also been grown as a forage crop on some of the soils and excellent results have been realized.

A small amount of tobacco, chiefly of the heavy export type, has been raised in the county, and the yield and price obtained for the crop indicate that its production could be made a very profitable industry in the area.

Two railroads enter the county, one traversing the west-central and the other the eastern part. These furnish a means of rapidly transporting the products of the county to markets situated at a distance.

No section of the county is more than 6 to 8 miles distant from a local shipping point on one or the other of these railroads.

A well-kept system of public roads extends over the county, connecting Scottsburg, Austin, and Lexington, the most important shipping points, with all sections of the surrounding country. Many of these roads are constructed from the hard black shale and limestone which underlie the eastern part of the county, and traffic over them is seldom impeded even during the worst seasons of the year. Iron bridges have also been constructed over the small streams on every important county road.

Scottsburg and Lexington are the local markets for most of the products of the county. The corn not consumed by the local hominy factories is marketed at Cincinnati or Indianapolis, while the wheat and other products exported are shipped to Cincinnati, Chicago, Louisville, and Indianapolis. The entire crop of tomatoes is taken by the local canning factories.

The situation of the area near many of the largest markets and the shipping facilities afforded by the railroads permit those products of the area that are not consumed at home to be placed on the markets in the larger cities in a short time and at a very small cost, and this fact favors the extension of other special crops, such, for instance, as the fruits already indicated as suited to certain soil conditions, but at present produced only on a small scale.

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