

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF HENDERSON COUNTY,
TENNESSEE.

BY

M. EARL CARR AND FRANK BENNETT.

[Advance Sheets—Field Operations of the Bureau of Soils, 1905.]



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1906.

[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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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., March 22, 1906.

SIR: In response to the requests of numerous prominent citizens of Henderson County, Tenn., transmitted to this Bureau by the Hon. T. W. Sims, a soil survey of that county was made during the summer of 1905. The purpose of this survey was to determine the characteristics of the soils, their adaptation to various crops, and the possibility of improving the agricultural conditions of the community in various ways. I transmit herewith the report and map of this survey and recommend their publication as advance sheets of the Field Operations of the Bureau of Soils for 1905, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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MAP.

Soil map, Henderson County sheet, Tennessee.

SOIL SURVEY OF HENDERSON COUNTY, TENNESSEE.

By M. EARL CARR and FRANK BENNETT.

LOCATION AND BOUNDARIES OF THE AREA.

The State of Tennessee is divided geographically into three parts—West Tennessee, Middle Tennessee, and East Tennessee. Henderson County is situated in the eastern part of West Tennessee, only a short distance from the Tennessee River. It is bounded on the north by Carroll County, on the east by Decatur County, and on the south by Hardin County. Chester County lies to the southwest and Madison County to the west. All the boundaries are regular, except that on the Chester County side, which takes a circular direction to the southwest until it reaches the South Forked Deer River, about 3 miles east of the Madison County line.

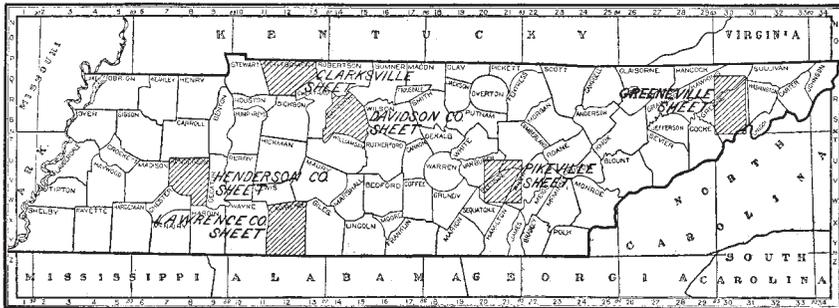


FIG. 1.—Sketch map showing location of the Henderson County area, Tennessee.

The base map used was traversed by the party in the field as the mapping of the soils progressed. No notes or maps of the county lines were available; therefore they were located in the field from information secured of the farmers living near them.

The greatest extent of the county north and south is 28 miles and east and west 25 miles. The area included is 319,232 acres, or about 499 square miles.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

The first permanent settlement in the area now included within Henderson County was made between 1810 and 1815, near the spot where the town of Lexington, the county seat, now stands. The county was organized in 1821, and as laid out was a square whose

dimension was 25 miles. It has since been modified in shape and made smaller by the formation of other counties.

At the time of the organization of the county the settlers were few and the means of transportation crude and slow, so that then, and for many years afterwards, the crops grown were mostly for home consumption and the exports from the county amounted to little. Prior to the civil war the inhabitants had to depend entirely on the soil for their support, except for the income from the sale of a few staves which were shipped by boat down the Tennessee and Mississippi rivers to New Orleans.

The larger number of the settlers came from North Carolina, though there were also many from Virginia, South Carolina, and Georgia. They usually built their cabins near some spring or stream and on the rolling upland instead of on the more fertile bottoms. There was never any "boom" in the county to cause rapid settlement of the country and the increase in the population was gradual, a few families moving in at a time.

Some of the land was reserved by the Government and disposed of by grants to the veterans of the war of 1812. Each of these grants called for 160 acres. If the settler wished more land it could be secured from the Government on the payment of a nominal price, which included the expense of surveying and recording, and many took advantage of this privilege.

The settlers in these early days secured the necessary supplies not produced at home from New York, Philadelphia, and Baltimore. The only means of transporting them was by wagon overland, and on account of the great distance and slowness of travel it took many weeks to make the trip.

The first soil to be cultivated was that on the uplands, and no attention was then given to the fertile lowlands along the stream bottoms. The first crops grown are still the principal crops of the county. The chief products were corn and cotton, with some wheat and oats, all of which were used for home consumption, except the cotton, which was then and still is the money crop. On account of the poor transportation facilities cotton was the only crop that could be shipped profitably. The only route was by way of the Tennessee and Mississippi rivers to New Orleans. Corn could be grown in much larger quantities than were needed for local use; consequently it was very cheap, at times selling as low as 75 cents a barrel.

In these early days many hogs were raised. They were fed and fattened on the mast of beechnuts, acorns, chestnuts, etc., the supply of which was very abundant and seldom failed. Cattle were raised, but only for home use, as there was no market for them. In recent years the production of cattle and mules has greatly increased.

Sorghum proved to be a successful crop as far back as 1858, but was not grown to any great extent until within the past twenty-five

years. The lands were more productive prior to 1860 than at present and considerable clover was grown. Within the last fifteen years cowpeas have been introduced, so that now both clover and cowpeas occupy a prominent place in the crops planted. Wheat was formerly grown extensively, but small yields and poor quality have served greatly to decrease the acreage.

In 1858 Jackson and Huntington became railroad towns, and for many years much of the produce of the county, especially from the western part, was hauled to these two points for shipment. They are about 25 miles distant from Lexington. Perryville, 25 miles east of Lexington, was and still is the most accessible and important shipping point on the Tennessee River for the farmers of the county. In 1888 the Tennessee Midland Railroad, now a part of the Nashville, Chattanooga, and St. Louis Railway, was completed across Henderson County, extending westward to Memphis and eastward to the Tennessee River at Perryville. A few years later the road from Lexington to Hollow Rock Junction was built, making connections with the main line of the same system. With the building of these railroads shipping became less difficult and the timber, before almost worthless, became valuable and a source of considerable income to the land owners and to the county at large through the expenditure for labor in cutting and manufacturing it. A large part of the merchantable timber was removed within the ten to twelve years following the opening of the railroads, though staves and railroad ties are still cut and shipped at a profit.

The agricultural conditions were greatly influenced by the change induced by the civil war. Labor became difficult to secure, costly, and not very satisfactory, and the once fertile fields were left idle and subject to erosion, which transformed some of them into gullied hillsides worthless for agriculture. Apparently no effort was made to prevent this serious damage. In recent years more attention has been given to the bottom land, much of it having been cleared and put under cultivation, yielding fine crops. Land is still cheap, and on that account but little care is given it, for when one field is exhausted or seriously eroded another is cleared and cropped in the same way.

CLIMATE.

There is only one station of the Weather Bureau situated within Henderson County, that being at Wildersville, in the northern part of the county. Jackson, from which figures are given in the appended table, is in Madison County, 25 miles west of Lexington. The normals given in the table for Wildersville are deduced from records covering the past eight years. The highest temperature recorded in that time was 100° F., occurring twice the same year, July 12 and July 23, 1901; the lowest, -18° F., occurred February 13, 1899. The

greatest precipitation for any one month occurred during June, 1900, being more than one-half inch a day or 15.85 inches for the month; the least, 0.30 inch, occurred during September, 1903.

The average length of the growing season, as shown by the same records, is 210 days, the average date of the last killing frost in spring being April 4, and of the first in fall November 1. The date of the latest killing frost in spring is April 17, 1905, and of the earliest in fall October 23, 1898, and on the same date in 1904, thus shortening the growing season only 21 days.

The following table shows the normals for both temperature and precipitation for each month and for the year:

Normal monthly and annual temperature and precipitation.

Month.	Wildersville.		Jackson.		Month.	Wildersville.		Jackson.	
	Temperature.	Precipitation.	Temperature.	Precipitation.		Temperature.	Precipitation.	Temperature.	Precipitation.
	° F.	Inches.	° F.	Inches.		° F.	Inches.	° F.	Inches.
January.....	38.6	5.44	39.4	4.57	August.....	77.5	5.11	77.8	2.58
February.....	37.9	3.86	40.4	3.14	September...	71.1	2.45	72.3	2.30
March.....	52.4	5.13	50.1	4.87	October.....	60.4	2.52	58.8	2.27
April.....	58.1	3.84	60.8	4.95	November...	49.6	3.67	49.5	4.16
May.....	69.0	4.86	68.8	3.82	December...	40.0	5.29	41.6	5.01
June.....	74.6	5.19	76.9	4.44	Year.....	58.9	51.48	59.6	46.70
July.....	77.8	4.12	79.0	4.59					

PHYSIOGRAPHY AND GEOLOGY.

Henderson County lies in both the Mississippi and Tennessee river basins. The watershed between these two river systems passes in a northerly and southerly direction through the western part of the county, dividing it so that the larger part is in the Tennessee basin.

Being the highest part of the State between the two rivers, the topography of a large part of the county is extremely rough and broken. There are two very distinct topographic features—the stream bottoms and the rolling, broken uplands. The bottoms are found in more or less narrow strips along most of the streams, their width usually depending upon the size of the stream. The smaller streams of the county are only slightly higher than the river and have shallow, tortuous channels. The low, level bottoms lying along them are therefore often overflowed. In extent these lands form only a small part of the county, but agriculturally they are of extreme importance. The largest areas of bottom land are found along Beech River, the two branches of Forked Deer River, Big, Browns, Sulphur Fork, and Hurricane creeks, and several other smaller streams.

The uplands occur in all parts of the county and vary in topography from moderately rolling to rough and hilly, the hills usually forming irregular ridges. The roughest parts of the county are east of Wil-

dersville, the northwestern part of the county, and in the vicinity of Shadyhill and Reagan. These rough, hilly sections are mostly wooded with white, red, black-jack, and post oak, with a few chestnut, hickory, and other miscellaneous hardwoods. In a section of the eastern part of the county beech is also found on the uplands. Numerous erosions occur in all parts of the uplands, some of them being 30 to 40 feet in depth, exposing the substratum of varicolored sands. The moderately rolling portions have been cleared and are quite extensively cultivated.

The elevation of the county varies from about 400 to about 750 feet above sea level. The highest point, 547 feet, for which reliable data could be secured, is at Timberlake; the lowest, 393 feet, at Luray and 394 feet at Chesterfield. The maximum and minimum figures will depart somewhat from those given, which are railroad elevations, the greatest variation being in the direction of the maximum.

As before stated, the county lies in both the Tennessee and Mississippi basins. The watershed enters the county on the north about 6 miles west of Wildersville and passes in an irregular line southward, crossing the railroad near Life. The main streams draining that part of the county lying in the Mississippi basin are the two branches of Forked Deer River and their tributaries. The Tennessee basin slope has two general drainage systems besides several smaller ones. In the northern part is the Big Sandy River and its tributaries, which flow northward into Carroll County and thence into the Tennessee near the north State line. The principal stream of the county is Beech River. It rises west of Timberlake and flows in a southerly course until in the vicinity of Hinson Springs, when it turns eastward and flows in that direction into and through Decatur County and empties into the Tennessee about 12 miles to the east of Darden. It has many branches, the largest being Big Creek, which flows into it just over the line in Decatur County, Browns Creek from the north, and Flat, Cane, and Piney creeks and a few others from the south. The county is generally well drained, except for some of the low, level bottoms.

The rocks underlying the county and entering into the formation of its soils consist of the unconsolidated sands and clays of the greensand or shellbed formation of the Cretaceous and the Orange sand formation of the Lafayette group of Tertiary age.

The whole of the eastern part of the county and the extreme southern part are formed by the outcrop of the greensand. This formation owes its color to a relatively small admixture of a greenish mineral called glauconite. It also contains numerous fossil shells and often small particles of mica. Very often on or near the surface of this formation there are iron concretions, some of them of considerable size and probably averaging the size of a man's head. Overlying these Cretaceous deposits and extending over the larger part of the county

is the Orange sand formation of the Lafayette division of the Tertiary. The Orange sand consists of stratified and cross-bedded sands of orange, red, yellow, brown, and white color, with sometimes an interstratified bed of white, gray, or variegated clay. Iron concretions, pipes, and ferruginous sandstone occur promiscuously throughout these sands. In the western part of the county there are several irregular-shaped areas of a partially consolidated pearl-gray clay underneath the surface materials.

The surface material, loess, which is more important in its bearing on the soils, belongs to an entirely different geological period and comes from a far different source. Safford, in his *Geology of Tennessee*, in speaking of this formation, designates it as the "bluff loam," and states that "its eastern edge is with difficulty defined," and his maps give an arbitrary boundary for its eastern limit which is far to the west of the area surveyed. However, this "bluff loam," which is from 40 to 100 feet in thickness at the bluff along the Mississippi River bottoms, its western limit, extends eastward, covering Henderson and the surrounding counties, and it is believed extends to the Paleozoic rocks on the east. This loess, a mixture of fine sand, silt, and clay, gradually thins out to the eastward, so that over this county it will not average more than 3 feet in thickness. It is supposed to be derived from glacial material which has been borne southward by glacial floods, deposited in shallow water, and redistributed by the wind. It is through the weathering of this loess, with certain modifications due to the underlying material, that the upland soils of the county have been derived.

The bottoms consist of the wash from the uplands and sediments deposited by stream overflow and belong to the most recent geological age.

SOILS.

Four types of soil are described in subsequent pages of this report, the materials classed as one type covering over 75 per cent of the total area of the county. About another 15 per cent is occupied by a very valuable bottom land type.

The following table gives the names and areas of the several types, while the accompanying map shows their distribution:

Areas of different soils.

Soil.	Acres.	Per cent.
Lexington silt loam.....	241,344	75.5
Waverly loam.....	47,360	14.9
Safford silt loam.....	28,544	8.9
Norfolk sandy loam.....	1,984	.7
Total.....	319,232

LEXINGTON SILT LOAM.

The Lexington silt loam, to a depth of about 12 inches, is a gray or yellowish-gray mellow silt loam. In the virgin state the surface 2 or 3 inches is usually slightly darker in color than the rest of the profile, owing to the accumulation of a small amount of organic matter. Where the type is under cultivation it is also usually somewhat darker in color and more friable. The subsoil to a depth of 36 inches consists either of a compact, plastic silt loam, slightly heavier than the soil, or of a silty clay varying from yellow to brown in color or sometimes tinged with red. Very often the subsoil in the lower depths is mottled yellow, brown, and gray and has a mealy texture. At an average depth of 3 feet the Orange sand occurs. The upper portion of this formation is usually a reddish medium sand with just enough clay to act as cementing material. Sometimes it occurs nearer the surface than 3 feet and very often erosion has exposed it on the surface or mixed the materials with the silty soil covering, making a sandy phase of the type. Such areas are so small or occur so irregularly scattered throughout the whole type that they could not be shown on the map with any degree of accuracy. In other places the silty covering is considerably more than 3 feet deep, and over these areas neither the soil nor subsoil is modified by the underlying sands. These areas are very much like the Memphis silt loam, and had they been larger would have been correlated with that type. As before stated, this type is the most extensive in the county and is found in all parts of the county, intersected by the narrow bottom lands and either surrounding or almost surrounding all the other soils.

The topography of the Lexington silt loam is moderately rolling to hilly. The hilly portion consists mainly of long, winding ridges, forming the watersheds between the streams, and is sparsely settled and but little cultivated. The more level portions, occurring largely in the central part of the county, are more thickly settled and here is found the best farm land and greatest development of the type. Much of the rough topography is due to erosion. Almost every rain washes little gullies in the plowed lands, and when once started they quickly extend and form deep erosions. Some of these have reached a depth of 30 or 40 feet. Many of the old abandoned fields are seriously cut up by these gullies, and scarcely any effort has been or is being made to prevent their formation and extension. The rolling lands should be given contour cultivation or be terraced to prevent this damage.

The topography gives practically all of the type excellent drainage. The character of the deep subsoil is such that considerable of the soil moisture is removed by seepage. The growing crops are seriously

injured by droughts if of extended duration, but they are seldom damaged by wet weather, as are those on the lowlands. Springs are more numerous than in any other soil, and the well-water is of very much better quality than that occurring in the greensand formation.

Both the soil and the subsoil of the typical Lexington silt loam have a common origin, but when we consider its sandy phases we must look to two far separated and widely different sources for the materials forming them. At one time the region now occupied by Henderson County, as well as nearly all of west Tennessee, was submerged in a shallow sea. At this time the stratified, cross-bedded, and many-colored Orange sand, which underlies the type and contributes to its modifications, was laid down. The whole region was subsequently elevated and erosive agencies carved it into hills and valleys. During the Glacial Period it is believed that the present surface material was brought from the ice fields farther north by glacial flood waters deposited in shallow water and distributed by the wind.

The Lexington silt loam is adapted to the general farm crops of the section. Corn yields year after year from 15 to 20 bushels per acre, with an occasional crop on the best land of 30 to 40 bushels. Cotton is quite extensively grown and yields on an average from one-fifth to two-fifths of a bale per acre. Much of the less rolling land will yield from one-half to two-thirds bale of cotton and from 25 to 35 bushels of corn, but on the contrary much of it will not come up to the average given even in favorable seasons. Clover grows readily, except for difficulty in securing a stand in dry seasons, and should be grown more extensively. Cowpeas are grown by almost every farmer, very often being planted in the corn at the time of the last cultivation. The practice of planting this crop, as well as other legumes, is to be commended, as it leaves the land in better condition, besides furnishing valuable forage. A prominent farmer says: "I can grow a crop of corn on the same field year after year, and by planting cowpeas with it each year secure a larger yield each succeeding crop and leave the land in a more productive state than when I began." Strawberries do well, but have not been extensively grown. All kinds of vegetables are easily grown, and if shipping conditions were better would be the source of a considerable income to the farmers. The grazing land of this type could be made to return greater profits than at present, as Japan clover and other grasses grow luxuriantly without seeding and are capable of furnishing feed for a much greater number of cattle than are now kept.

The natural forest growth consists of white, red, post, and black-jack oaks, chestnut, some hickory, and black gum. Most of the merchantable timber has been removed, yet many railroad ties and staves are still made.

The value of the Lexington silt loam varies with the topography. The rough ridge land can be bought for \$2 to \$5 an acre, some of the more moderately rolling for \$5 to \$7, and the best and more level areas for from \$15 to \$20 an acre.

The following table gives the average results of mechanical analyses of typical samples of the Lexington silt loam:

Mechanical analyses of Lexington silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
12799, 13502.....	Soil.....	0.3	1.9	2.0	5.7	5.2	69.4	15.2
12800, 13503.....	Subsoil.....	Tr.	1.3	1.5	4.3	1.6	63.0	27.9

To ascertain its manurial requirements an examination of this soil was made by the wire-basket method. For this purpose a sample was selected from a field which had recently received a rather heavy application of stable manure, but prior to that time had been in constant cultivation for many years without the use of fertilizers of any kind.

The results obtained indicate that an excellent increase in productivity may be secured by the use of stable manure; that nitrate of soda will give a good increase, while a small increase may be obtained by the use of cowpeas and lime. Lime alone, acid-phosphate, or sulphate-of-potash tests showed little or no improvement in the soil.

These tests were made with wheat plants as an indicator. To what extent they are applicable to other and unrelated crops or to fields which have previously received different treatments has not been determined, but they are no doubt applicable in a general way to a large part of this soil throughout the area.

SAFFORD SILT LOAM.

The soil of the Safford silt loam, to a depth of 8 to 10 inches, consists of a gray or light-yellow silt loam. It is loose and rather incoherent when dry and is easily cultivated, a good tilth being secured. When wet, it packs slightly. The surface material grades into a tough plastic clay or clay loam having a red or reddish-brown color, and this, at a depth of about 3 feet, grades into greensand. Sometimes the greensand, or a grayish yellow clay derived from it, is nearer the surface, and quite often the soil has been entirely removed by erosion, leaving the heavier subsoil exposed. In other places the soil is deeper than in the typical profile, but both these phases are of local occurrence. The boundaries of this type are not distinct, as it passes gradually into other types.

The Safford silt loam occurs only in the eastern and southern parts of the county, reaching its greatest development in the vicinity

of Sardis. The topography does not favor extensive cultivation. It is rolling to hilly and erodes badly. Very little of it is gently rolling, and even where it has been cleared and cultivated scarcely any care has been given it, as is evident from the many abandoned fields, which, if proper steps had been taken to prevent erosion, would still be producing good crops. Terracing or contour cultivation should be practiced on these rolling lands.

While the Safford silt loam has excellent natural drainage, the heavy character of the subsoil prevents the loss of soil moisture by seepage, and crops do not suffer from drought as quickly as on the other upland soils of the area.

The origin of this soil is due to two widely different agencies. The silt loam soil covering is undoubtedly due to a deposit of loess derived from glacial material farther northward, while the subsoil is derived from the weathering of the greensand marl or a shallow deposit of clayey material above it or from a mixture of both. The greensand owes its color to soft greenish grains of a mineral called glauconite, a compound of silica, oxide of iron, alumina, potash, and water. In deposits where the proportion of this mineral in the deposit is high the marl may have some value as a fertilizer, as, for instance, in some parts of New Jersey. An analysis of an average sample of the greensand, as it occurs in Henderson County, shows only 0.1 per cent of phosphoric acid—an insufficient amount to warrant its use. In many places throughout the soil type iron concretions are present in great quantities, some of them being as large as a bushel measure and the average being about the size of a man's head.

The Safford silt loam is adapted to all of the general farm crops grown in this latitude, such as corn, wheat, cotton, hay, etc. The heavy subsoil makes it more desirable for clover and wheat than any of the other upland soils. Formerly considerable wheat was grown, yielding from 15 to 20 bushels per acre, but in recent years the yield has decreased to 6 or 8 bushels, and often less, and the acreage is now very small. Corn will produce an average of from 15 to 25 bushels and cotton from one-third to one-half bale per acre, and in favorable seasons these yields may be exceeded materially. A rotation of crops and the growing of leguminous crops, with the occasional plowing under of the latter, would aid greatly not only in the maintenance of the productivity, but also in the reclamation of the abandoned fields. Much of this soil is used for grazing and makes an excellent pasture, Japan clover growing luxuriantly.

The native timber growth consists of white, red, black-jack, and post-oak, chestnut, some hickory, and beech. One of the distinguishing features of the type is the beech, as it is not usually found on any of the other upland soils. Most of the merchantable timber has been removed.

The following table shows the average results of mechanical analyses of typical samples of the soil and subsoil of this type:

Mechanical analyses of Safford silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
13238, 13504, 13506.....	Soil.....	0.1	0.7	0.8	3.8	16.9	60.7	16.5
13239, 13505, 13507.....	Subsoil.....	.1	.3	.3	2.8	12.7	29.9	53.4

NORFOLK SANDY LOAM.

The Norfolk sandy loam is quite variable in character. An average section to a depth of about 9 inches shows a gray or brown light sandy loam, the sand being mainly of the fine and medium grades. The subsoil consists of a slightly heavier sandy loam, having a yellow or yellowish-red color. In depressions the soil is much deeper and may be either more loamy or more sandy than the average. On the small elevations the subsoil itself is often exposed and occasionally consists of a bed of loose yellowish sand.

Two of the areas of this soil differ from the rest of the type in that they carry a considerable quantity of large and small fragments of a reddish-brown ferruginous sandstone. One of these stony areas is covered by a stunted growth of shortleaf pine, the only forest of this species in the county.

The Norfolk sandy loam occupies only a very limited area in the county, the largest bodies of it being situated west of Wildersville and near the mouth of Piney Creek. There are two other small bodies of it—one about 4 miles northwest of Lexington, the other about the same distance north of Chesterfield. Many small irregular-shaped areas of this sandy loam occur in the Lexington silt loam, which could not be shown on the soil map with any degree of accuracy and were therefore included with that soil.

The topography of the Norfolk sandy loam is one of its distinguishing features. It occurs in the rolling country of the uplands and has a billowy appearance, a depression here and an elevation there, arranged in no regular order. The slight elevations all have about the same general level. The topography of the stony phase differs from the remainder in that it does not have the billowy appearance and is quite hilly. Owing to its topographic position and open texture the drainage is excessive.

The Norfolk sandy loam has been derived from the sandy clays of the Lafayette in areas where the loess covering has been removed by erosion or in some cases by the admixture of wind-blown sand with the materials of the loess.

This type is the least productive soil of the county. The depressions generally produce fairly well, but the elevations are almost sterile. The soil is best adapted to early truck and other crops which need a well-drained warm soil. The growing and turning under of leguminous crops, such as clover and cowpeas, and the liberal application of barnyard manure, would not only cause better yields through the addition of organic matter and nitrogen, but also through increasing the power of the soil to retain moisture.

Corn and cotton are the crops grown most extensively, and small yields are obtained, the average yield of the former being not more than 8 to 10 bushels, and of the latter not more than one-sixth to one-fifth bale per acre. A few peach trees are seen, and usually they produce well. The hilly stony phase is adapted to peaches and small fruits, but is not at present cultivated to any great extent.

The following table gives the average results of mechanical analyses of typical samples of the Norfolk sandy loam:

Mechanical analyses of Norfolk sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
13018, 13496.....	Soil.....	0.1	5.8	14.8	31.0	5.5	32.4	10.1
13019, 13497.....	Subsoil.....	.1	4.1	10.7	22.7	4.4	36.6	21.0

WAVERLY LOAM.

The surface soil of the Waverly loam, to a depth of 10 to 12 inches, consists of a fine mellow brown loam. The soil is underlain by a subsoil of gray, grayish-yellow, or mottled gray and brown loam, having about the same texture as the soil. In the eastern part of the county both soil and subsoil contain fine particles of mica. In some places it approaches a fine sandy loam in texture, and along some of the larger streams it grades toward a rather heavy silty clay. Near the sources of the streams and in places along their courses the areas are inclined to be rather wet and like the Meadow mapped in other areas. A similar condition occurs in some of the lower parts of the wider bottoms.

The Waverly loam, which is strictly a bottom land type, occurs along the streams in all parts of the county, the most extensive and important areas being along Beech River and its larger tributaries in the eastern part of the county and along the North and South Forked Deer rivers in the western part. The surface is nearly level and but little above the streams, and the natural drainage is inclined to be rather poor. In some few instances the straightening of the stream courses and the making of open ditches has helped to remedy this condition. The extension of this practice is strongly recommended, for

in this way practically all of the low, wet areas of the type can be brought under cultivation and the value of the whole type enhanced. These bottoms are often overflowed, but the crops are seldom destroyed.

The Waverly loam is an alluvial soil formed of the materials washed down from higher levels. This process of formation is still going on, as every rain washes down material from the hillsides and every overflow adds a deposit of sediments. In recent years low, swampy places in some of the bottoms have been filled in, making firm land. The process of the formation of the Waverly loam has not progressed as far in the wider bottoms as it has along the smaller streams. In many parts of the wide area along Beech River and in the areas along the North and the South Forked Deer rivers there exists the heavier silty clay phase of the type and a few low wet places which have not yet been built up by the deposition of the more loamy materials.

This is the most productive soil in the county and is adapted to the general farm crops of the region. Corn is probably most extensively grown and yields from 15 to 50 bushels per acre, the average being about 25 bushels. Cotton does relatively well, averaging one-half bale per acre, and in favorable seasons a yield of 1 bale is not uncommon. A few peanuts are grown in the eastern part of the county. They will probably yield from 40 to 50 bushels per acre. Cowpeas are quite extensively planted and yield about 1½ tons if cut for forage, or about 30 bushels of seed per acre.

The native timber growth consists of black and sweet gums, a few tupelo gums, beech, oak, hickory, etc. Much of the timber has been removed, yet considerable of it has not been cut over at all. The best part of the Waverly loam is the most valuable farm land in the county. The average price is about \$20 an acre; but choice improved tracts of it are valued much higher. Unimproved it sells for \$10 to \$12 an acre.

The following table shows the average results of mechanical analyses of typical samples of the soil and subsoil of the Waverly loam:

Mechanical analyses of Waverly loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
13020, 13494.....	Soil.....	0.3	0.5	0.4	8.1	15.4	58.5	16.6
13021, 13495.....	Subsoil.....	.1	1.1	.7	11.0	18.0	44.8	23.6

AGRICULTURAL CONDITIONS.

The general condition of the farming classes of Henderson County is good, though the opportunities for development have by no means

been exhausted. The farm dwellings are often old-fashioned and usually built of logs. In recent years, however, in the parts of the county having the more productive soils, the buildings erected have been more modern, indicating the general progress. As there are few crops grown that require storage, the outbuildings are few and small. The welfare of the laboring classes is increased by the opportunities for work afforded in lumbering. Credit is good, the banks do a thriving business, and a commercial failure is an uncommon occurrence. There is rural free delivery of mail to nearly all parts of the county. The community is fairly well supplied with schools, and all together the prospects are for continued general advancement.

A little more than 50 per cent of the farms are operated by the owners. Of the remainder practically none are rented for cash. Under the share system, where the owner furnishes tools and stock to do the work, he usually receives one-half the produce; but where the tenant furnishes everything he gives as rent from one-fourth to one-third of the crops. When land is rented, cotton is almost always the crop grown.

About 90 per cent of the whole county is classed as farm land, which is apportioned among 3,008 farms of an average size of 99.4 acres. Of the land classed as farm land a little more than 36 per cent is classed as improved, and of this only 68 per cent is under cultivation. "Improved" land as applied to this section is not comparable to the same term as used to describe the land of a more thickly settled and more highly developed part of the country. If it were, the percentages given would be very much smaller.

The labor is drawn from both the colored and the white races and is not as easily secured nor as efficient as could be desired. The negroes prefer to live in the towns and work on public work rather than in the rural sections. Wages are low and not much farm help is needed. The price paid for the best hands is \$1 a day and very often 50 cents is all that is offered for the average laborer. Most of the help is hired by the day instead of by the month, as the farmers need assistance only at certain seasons. In 1899 the average amount paid out for labor on each farm was between \$6 and \$7.

The two principal crops of the county are corn and cotton. Cotton is the money crop, and nearly every farmer has his cotton fields. The crop of 1899 amounted to nearly 5,000 bales, a yield of a little less than one-third bale per acre for the total area planted. The corn crop for the same year was between 750,000 and 1,000,000 bushels, a yield of a little over 20 bushels per acre on the acreage planted. Practically all of the corn grown is consumed at home. The total acreage of wheat was about one-seventh that of corn, and the average yield per acre was between 4 and 5 bushels. The acreage of wheat is constantly declining, owing mainly to the small yields secured.

Oats, cowpeas, and the grass crops come next in importance, but the acreage devoted to them is comparatively small.

But few tools of improved pattern are used in planting, cultivating, and harvesting the crops. Improved methods should be introduced, especially in the care of the rolling lands. At present they are allowed to wash with each rain and when too badly eroded are abandoned for new fields. The damage due to this cause should be prevented or at least held in check by contour cultivation and terracing. A rotation of crops, which should include leguminous crops, should be introduced. Fertilizers are not used to any extent, nor is much thought given to husbanding and using the stable manure.

The farm animals are no small item in the wealth of the county. Many fine mules are raised for market, and every farmer has a large number of hogs. Poultry products are also a source of considerable income. A large number of beef cattle are raised, and the number could be safely increased, as there are thousands of acres of grazing land lying practically idle. A few goats and more sheep are among the live stock kept in the county.

Transportation facilities are not as ample nor as efficient as could be desired. The Paducah and Memphis Division of the Nashville, Chattanooga, and St. Louis Railway crosses the county in a northerly and westerly direction from Lexington, and the Perryville Branch of the same system extends eastward from Lexington. With no competing lines freight and express rates are high. In fact, the freight rates from St. Louis and Paducah to Perryville by steamboat are said to be less than the freight rate for the short haul of 12 miles by rail from Perryville to Darden. Some of the shipping is still made by water from points on the Tennessee River. With lower freight rates and a faster service the introduction of truck growing would, it is thought, prove profitable.

The county roads are very numerous and exceedingly poorly kept. No good roads exist in the county, and during some seasons of the year they are practically impassable, except on horseback.

The population of the county is about 18,000, of which about one-ninth is colored. The largest town and county seat is Lexington, with a population of about 1,500. There are several small towns, Wildersville, Scotts Hill, Sardis, Darden, and Luray being the largest and most important. The home market is very limited, and the supplies largely exceed the demand. Memphis and Jackson on the west, Nashville, with connections for the north and east, and Paducah, with connections for the large cities of the north, are the best outlets for the products of the county.

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