U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE TENNESSEE GEOLOGICAL SURVEY,
A. H. PURDUE, STATE GEOLOGIST.

SOIL SURVEY OF SHELBY COUNTY, TENNESSEE.

BY

HUGH H. BENNETT, IN CHARGE, RISDEN T. ALLEN, AND L. VINCENT DAVIS, OF THE UNITED STATES DEPARTMENT OF AGRICULTURE, AND C. R. WATKINS, JR., OF THE TENNESSEE GEOLOGICAL SURVEY.

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1916.]

WASHINGTON:
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1919.

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LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., April 10, 1918.

SIR: In the extension of the soil survey in the State of Tennessee during the field season of 1916 a survey was undertaken in Shelby County. This work was done in cooperation with the Tennessee Geological Survey.

I have the honor to transmit herewith the manuscript report and map covering this work and to request their publication as advance sheets of Field Operations of the Bureau of Soils for 1916, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

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SOIL SURVEY OF SHELBY COUNTY, TENNESSEE.

By HUGH H. BENNETT, In Charge, RISDEN T. ALLEN, and L. VINCENT DAVIS, of the U. S. Department of Agriculture, and C. R. WATKINS, Jr., of the Tennessee Geological Survey.—Area Inspected by HUGH H. BENNETT.

DESCRIPTION OF THE AREA.

Shelby County is situated in the southwestern corner of Tennessee. Its western boundary is the Mississippi River[1] and its southern boundary the Mississippi State line. Tipton County borders it on the north and Fayette County on the east. The area of the county, as mapped,[2] is 743 square miles, or 475,520 acres.

The uplands of Shelby County are predominantly undulating to gently rolling. Along the larger streams there are belts of rolling country, with many comparatively steep slopes bordering the numerous valleys that have been carved by their tributaries. The rougher areas in most instances occur where these short tributary streams have dissected the land most thoroughly, such as the areas between Wolf River and Eads, to the northwest of Arlington, south of Brunswick, and in some other places. The uplands west of the Loosahatchie River and the tributary Big Creek—Bear Creek system are very rolling, with narrow, winding ridges forming the watersheds between the principal streams, flanked by numerous subordinate short ridges extending out from the principal divides. These shorter ridges slope gradually to the stream lowlands, but their slopes are on

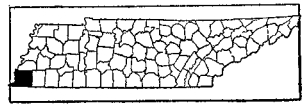


FIG. 1.—Sketch map showing location of the Shelby County area, Tennessee.

[1] Uncertainty seems to exist as to whether some of the islands shown on the accompanying soil map belong to Tennessee or to Arkansas. The preponderance of opinion among the county officials and others questioned was that they belong in the State of Tennessee, as shown.

[2] The base map was constructed in the field by plane-table traverse. The maps of the Mississippi River Commission were used to a large extent in outlining the islands in the Mississippi River and to some extent in showing its eastern shore. Some changes were made in the outlines of the islands, bars, and river shores on the basis of observations. The shore line along the Mississippi is constantly changing in many places, and the river front and the islands are not mapped precisely. The houses on the islands are not indicated, as traverse work was not done here, and the soil boundaries are only approximately correct. The traverse work, with the exception of most of that west of the Illinois Central Railroad north of Memphis and about 125 square miles along the Nashville, Chattanooga & St. Louis Railway, and southward to the State line between Normal and Forest Hill, was done by Mr. Watkins. Some of this work was later revised. Some of the houses, streams, and private roads are not so accurately located as the main public highways.

the average much steeper than those leading down from the main divides, and in places cultivation is impracticable. The smoothest areas in the county are the crests of the broad divides, such as those between Nonconnah Creek and Wolf River, to the south of Nonconnah Creek, between Wolf River and Loosahatchie River, between Loosahatchie River and Big Creek, and north of Big Creek. Smooth land is relatively more extensive in the two situations first named. From the center of the divide between Wolf River and Nonconnah Creek nothing but flat country is seen.

Where the upland has not been so thoroughly dissected by streams the surface in general is undulating, ranging locally from nearly level to very gently rolling. The surface of these less dissected areas indicates that originally the upland of this general region was essentially flat. There are no hills or ridges that rise conspicuously above the general upland level. As the streams cut deeper and as they and their branches extend into the undissected plateaus, the extent of rolling surface becomes larger.

In general, the stream slopes are so gentle that they can be cultivated, but the steepest ones can not be safely plowed, as heavy rains cause gullying of the surface. Already areas here and there are gullied and rough. The bluff between the uplands and the Mississippi bottoms is steep or precipitous. Where the uplands abut upon the river lowlands, as at Memphis and to the south, the bluffs are clifflike, but generally less than 100 feet high. On the average, Shelby County has a much smoother topography than most areas similarly situated along the Mississippi River farther south, where much of the surface is more like the rougher sections of the county near the streams and in the excessively rolling areas in the northwestern part. Probably more than 90 per cent of the upland can be safely cultivated and, probably, upon at least 70 per cent of this all kinds of improved farm implements, including cultivators, harrows, and gang plows, can be used very satisfactorily.

The first bottoms and second bottoms, or terraces, along the streams are flat and nearly level, but relieved slightly by occasional hummocks and swales, by some minor depressions along tributary drainage ways, and by abandoned stream channels and swales in the lower bottoms. The sandy lands of the Mississippi bottoms are somewhat hummocky, especially near the river, where recent deposits of sand have been made. The surface of all the alluvial lands is admirably suited to the use of improved farm implements.

The general elevation of the upland ranges from about 200 to 300 feet above sea level. In the eastern third of the county recorded elevations range from 348 feet above sea level at Eads to 375 feet at Collierville, and in the middle third from 246 feet at Woodstock to 263 feet at Bartlett, 280 feet at Lucy, 307 feet at Capleville, and

335 feet at Kerrville. In the city of Memphis the highest elevation is about 320 feet above sea level. The Mississippi bottoms, the lowest in the county, lie from 50 to 100 feet below the higher adjacent uplands. The elevations on Old Hen Island, which lies entirely in the Mississippi bottoms, range from 210 to 226 feet above sea level. Elsewhere in the bottoms of the county measured elevations are as low as 197 feet above sea level, as along the northern part of Presidents Island.

The uplands are nearly everywhere well drained, and there are no large areas into which at least shallow drainage-way depressions have not penetrated. The principal streams, aside from the Mississippi River, including the Loosahatchie and Wolf Rivers and Nonconnah and Big Creeks, have only moderately swift currents. They overflow their bottom lands frequently during the winter, and occasionally in summer. The nearly level bottom lands along these streams and the adjacent second bottoms are in general imperfectly drained, except near the tributary drainage ways.

Permanent settlement of the region now including Shelby County appears to have begun actively about the beginning of the nineteenth century. Memphis was founded in 1819, with a population of 53, and Shelby County was organized, with Memphis as its county seat, May 1, 1820. The population of the county in 1910 was 191,439, of which over two-thirds was included in the city of Memphis. The rural population averages 75.3 persons per square mile. The uplands are well settled, and there is considerable settlement in the Mississippi bottoms. White persons constitute 52 per cent of the population and negroes 47.9 per cent. The whites are mainly descended from the early settlers, who came chiefly from the older settlements of the Southern States. There are some foreigners in Memphis and on truck farms in that vicinity.

Memphis is a city of important manufacturing industries, particularly of lumber and cottonseed products. The other larger towns include Collierville, in the southeastern part of the county; Millington, in the north-central part; and Arlington, in the northeastern part, all ranging in population from 500 to 800. Smaller towns are distributed throughout the county.

Shelby County is splendidly supplied with railroads and public highways. Good pikes extend throughout the county in all directions and many of the roads that are not yet surfaced with gravel or macadam are graded and kept in good condition. Railroads and shipping points are so distributed that long hauls are not necessary in marketing farm products and lumber. Trunk lines radiate from Memphis in all directions, affording excellent means of communication with Chicago, Cincinnati, Nashville, Birmingham, Atlanta, New Orleans, St. Louis, and other large cities.

CLIMATE.

The climate of Shelby County is mild, humid, and in general well suited to agriculture.

The mean annual temperature, as recorded at Memphis, is 61.3° F. Sudden and pronounced changes in temperature are not common. In summer periods of hot weather occasionally occur, and a maximum of 104° has been reached. The thermometer falls as low as 10° above zero only about twice in the average winter, and zero temperatures do not, on the average, occur oftener than once a year. The lowest temperature on record is —9° F. Owing to the moderate winters, certain crops, including such vegetables as cabbage, can be grown throughout the year. Stock ordinarily needs little or no protection, if in good condition.

The mean annual precipitation is 50.34 inches. The rainfall is favorably distributed from month to month and in normal years is adequate for all properly cultivated crops. The heaviest rain occurs in late winter or early spring, and the late-summer and early-fall months are the driest. Heavy downpours sometimes occur, with 2.5 inches or more of rain falling in 24 consecutive hours. Droughts occasionally occur, generally late in the summer or early in the fall; they may last from 15 to 30 days. The rainfall in the driest year on record amounted to over 34 inches and in the wettest year to over 68 inches.

The normal growing season extends from March 21 to October 31, a period of 224 days, but killing frost has been recorded as late in the spring as April 16 and as early in the fall as October 2.

The following table shows the normal monthly, seasonal, and annual temperature and precipitation as recorded by the Weather Bureau station at Memphis:

Normal monthly, seasonal, and annual temperature and precipitation at Memphis.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	° F.	° F.	° F.	*Inches.*	*Inches.*	*Inches.*
December	43.5	76	2	4.38	4.43	3.64
January	40.3	79	— 8	5.21	3.42	8.43
February	43.3	79	— 9	4.35	1.95	8.13
Winter	4.22	79	— 9	13.94	9.80	20.20
March	52.1	87	15	5.77	3.48	7.9
April	61.8	90	27	4.83	1.60	5.10
May	70.7	96	40	4.34	2.00	4.42
Spring	61.5	96	15	14.94	7.08	17.45

Normal monthly, seasonal, and annual temperature and precipitation at Memphis—Continued.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	° *F.*	° *F.*	° *F.*	*Inches.*	*Inches.*	*Inches.*
June	77.7	100	50	4.37	1.82	3.55
July	80.7	104	58	3.51	0.45	2.82
August	79.2	102	53	3.20	6.78	7.56
Summer	79.3	104	50	11.08	9.05	13.93
September	72.8	99	39	3.05	5.56	9.07
October	62.5	92	29	2.74	1.57	2.75
November	51.4	82	16	4.59	1.52	4.88
Fall	62.2	99	16	10.38	8.65	16.70
Year	61.3	104	− 9	50.34	34.58	68.28

AGRICULTURE.

Agriculture was the principal industry of the early settlers in this region. At first farming was carried on chiefly to support the family, and consisted of the growing of corn, grain, potatoes, and vegetables and the raising of hogs and a small number of cattle. The production of cotton for market soon became important, and cotton has remained the principal money crop. Agriculture is practically the only occupation of the rural population, and many of the residents of Memphis are landowners whose farms are operated by tenants and overseers.

The prevailing type of agriculture is the growing of cotton as the money crop in conjunction with the production of corn, chiefly as feed for the work stock. Cotton occupied 107,099 acres, or 57 per cent, and corn 60,298 acres, or 32 per cent, of the 187,794 acres in cultivation in the county in 1909, according to the census. The acreage devoted to cotton has shown an increase at each census year. The annual production reaches forty or fifty thousand 500-pound bales, the largest production being that of 1913, when 57,820 bales were harvested. Most of the cotton produced is short staple, but some long-staple cotton is grown in the Mississippi bottoms and by a few farmers on the Memphis silt loam near the bottoms.

The acreage of corn apparently shows little change, although the acreage occupied in 1909 was about 10,000 acres less than that in 1899. A considerable number of farmers do not produce sufficient corn to supply the farm demands. Comparatively few farmers except a few on bottom-land soils sell corn, and the total quantity sold is comparatively small.

Among the crops of less importance are hay and forage, cowpeas, oats, wheat, and vegetables. The area devoted to hay and forage crops increased from 7,993 acres in 1899 to 11,231 acres in 1909. By far the most important hay crop consists of the small grains. Timothy and clover mixed occupied 476 acres in 1909 and timothy alone 140 acres. Wild grasses were cut from 1,599 acres. Since the last census year the acreage devoted to hay and forage has probably increased more than in the preceding decade, as lespedeza (Japan clover) has become an important hay crop on many farms within the last few years. A few farmers also have put in alfalfa. The county, however, is by no means self-supporting in hay production and considerable quantities are annually shipped in.

The production of wheat is of relatively little importance, but a considerable number of farmers now produce much or all of the flour required for home use. Oats are grown largely for feeding to stock in the sheaf.

In the vicinity of Memphis a large number of market gardeners are engaged in the production of vegetables for the city market. The products are largely delivered to the stores or retailed on the streets.

The vegetables grown include potatoes, snap beans, garden peas, lettuce, radishes, cabbage, onions, and beets, with some strawberries and bramble berries.

The growing of tree fruits is not very important in Shelby County. There are no large commercial orchards. Many farms have a few peach and apple trees, but usually these are not given much attention in the way of spraying, and the production is not large. The 1910 census reports 15,836 apple trees and 42,154 peach trees in the county and 5,076 grapevines. Strawberries are reported as occupying 116 acres.

Stock farming is not carried on to an important extent, and comparatively few hogs and beef cattle are marketed. The census reports 16,000 head of cattle and 23,784 hogs sold or slaughtered in 1909. Most farmers raise a few head of hogs every year for home use, but many buy pork. A few farmers buy cattle and fatten them for market, feeding in winter and pasturing them in the summer. Dairying is of more importance than the raising of beef cattle. A large number of farmers keep dairy cattle, mainly in small herds ranging from 6 to 30 cows, though some have as many as 50 cows. Most of the dairy farmers either sell the milk to Memphis creameries or retail it on the street. Some butter is sold in the same way. The value of dairy products in 1909 amounted to $549,178, an increase of 46 per cent over that reported for 1899.

The following table shows the relative importance of the principal crops in the last four census years:

Acreage and production of principal crops.

Year.	Cotton.		Corn.		Hay.		Wheat and oats.	
	Acres.	*Bales.*	*Acres.*	*Bushels.*	*Acres.*	*Tons.*	*Acres.*	*Bushels.*
1879	92,620	46,388	55,260	996,210	1,290	1,704	8,780	96,111
1889	101,047	35,666	45,726	876,040	5,486	7,479	1,917	28,918
1899	102,197	39,175	70,679	1,342,720	[1] 7,993	13,438	2,468	35,270
1909	107,099	32,853	60,298	942,517	[1] 11,231	11,468	1,106	19,319

[1] This acreage includes wild and tame grasses, grains cut green, and coarse forage.

The agriculture of the county is only slightly influenced by the topographic features, aside from the fact that a smaller proportion of the slope land is cultivated than of the smoother areas and that the lower bottoms, where overflows are more frequent and the drainage is poorer, have been much more largely left in timber and are used chiefly as pasture land. Soil characteristics have not prominently influenced the types of farming from place to place, although in some degree they do influence the methods of cultivation; for example, the clayey slopes are more generally broken with turning plows than are the well-drained silty soils and can not be cultivated as soon after rains. The Mississippi bottoms in this county are not protected by levees, and preparation of the seed bed is usually later here than in the uplands and in the bottom lands of the other streams, owing to the necessity of waiting until the spring overflows have subsided. The Mississippi bottom soils, including both the sandy and the clayey types, do not require such deep breaking or as much cultivation as most of the other soils, both because there is little growth of crab grass, the chief grass pest of the uplands, and because the soils do not crust over after rains as do all the other soils of the county, the sandy types here remaining friable and the heavy soils cracking to a desirable pulverulent condition upon drying. Fertilizer or manure is not used on the Mississippi bottom soils, and seldom on the bottom lands along the other streams. As the Mississippi bottoms are subject to annual overflows, the houses are built on high posts, and there are dirt mounds and two-story barns or barns built on mounds to provide for the stock in times of high water. Some farmers take the stock to the uplands during high water.

In general, little recognition is given to soil adaptation, and cotton, corn, and other crops are usually grown on all types of soil indiscriminately. There is some tendency to select the better drained, brown bottom soils (the better drained Collins silt loam) for corn, and in the Mississippi bottoms the clay "buckshot" land (Sharkey clay) for corn, not because it is better suited to this crop but because the associated sandy land is considered better suited to cotton. The Collins silty clay loam is generally used for pasture land and the

more poorly drained areas of the Collins silt loam and Olivier silt loam are, to some extent, used as pasture and hay land. All three of these soils, locally styled "buckshot land," are not considered valuable for the production of cotton and corn, owing to the small gravel-like concretions present, but are considered well suited to grass and lespedeza. The Memphis silt loam and silty clay loam are selected for red clover and alfalfa. The farmers realize that the soils in general are well suited to grass, but stock raising has not been developed into an important industry, as is the case in places in the same belt of soils to the south of this county.[1]

In the preparation of the seed bed and the cultivation of crops two methods are in use. The older and less efficient system is gradually giving way to the newer, although it is still the more common, owing largely to the predominance of tenant farmers.

Under the old system the land is generally plowed late and to a shallow depth, often the cotton and corn land is simply rebedded over the old "middles" or water furrow, in many cases even without running a preliminary furrow in the middle. Turning plows and "middle busters" drawn ordinarly by a single mule are used for this operation. This breaking does not cover the entire surface, and it is seldom more than 4 inches deep. When the cotton or corn is up, scrapers and sometimes turning plows are run close to the plants on each side, throwing the dirt toward the middle of the rows. This method is very effective in destroying the grass growth; it leaves only a narrow, undisturbed ridge from which to hoe out the grass when the plants are thinned to the proper stand. Shovel and turning plows are subsequently employed for the interrow tillage, the plants being laid by on beds. Under this method of breaking and tilling the land is not plowed deeply enough or early enough, and the scraping and deeper middle cultivation favor excessive loss of moisture. On the flat bottoms and terraces where surface drainage is not sufficiently rapid the growing of crops on ridges or beds has the merit of assisting drainage by keeping the crops above the surface water that accumulates with heavy rains.

Under the methods employed by the better farmers, including some of the tenants, the entire surface is broken flat as early as the weather permits after harvest, usually in January, February, or early March. Heavy turning plows and disks drawn by two or three mules are employed and the ground is broken to a depth of about 8 inches. Some farmers follow the turning plow with a subsoil plow,

[1] It is the opinion of the writer that the wide belt of loessial soil, the Memphis silt loam, and the soils of the associated first and second bottoms, bordering the Mississippi River on the east from the vicinity of Baton Rouge through western Mississippi and Tennessee into Kentucky, constitute the best land for lespedeza, white clover, bur clover, Bermuda grass, and other grasses and forage crops in the Southern States, east of the mesquite-grass lands of the great ranching sections of central Texas.

extending the breaking to a depth of 10 or 12 inches. The most intensive preparation is given where the thorough preliminary plowing is followed with one or more cross harrowings with disks and toothed harrows. The land is laid off in rows or beds with a middle-buster or similar plow and harrowed down nearly flat. The crop is cultivated as nearly on the level as possible, with light-running implements, including harrows, double-shovel cultivators, and small shovel plows. The first cultivation is given with a light one-horse harrow. If there is a rain before cotton is up, some farmers run over the land with a light harrow to break the crust that forms. Hoeing is resorted to for thinning the stand and removing the grass from between the cotton or corn plants. The land is cultivated as soon as possible after every rain until the crop is laid by, in order to break the undesirable surface crust that forms after rains on all the soils of the county, except those of the Mississippi bottoms. This deep, thorough preparation of the seed bed, followed by shallow, nearly level cultivation, provides a desirable seed bed, effectively destroys weeds and grass, and favors the conservation of soil moisture, and it is on the farms where such methods are employed that the better yields are made—three-fourths to 1 bale of cotton or 35 to 40 or more bushels of corn per acre.

In those sections of the county where the better farming methods are practiced, there is a noticeably greater degree of prosperity among the farmers, and such sections are sometimes locally referred to as consisting of "good land." In some of these instances the land is actually better, having better drainage or a smoother surface, but equally as often the good appearance of the land is due to more efficient methods of farming. In several instances soil that was classed as "worn out" was upon examination found not to differ apparently from land giving good yields, except in conditions resulting from the employment of inefficient methods, chiefly continuous shallow plowing, which have brought about unfavorably compact soil conditions and have given rise to an impoverished but not a "worn-out" soil.

The market gardeners employ intensive farming methods, using manure liberally and tilling thoroughly. A succession of crops is frequently grown in the same field by planting one crop between rows of another at a later date.

Crop rotations have not come into use so much as improved methods of soil treatment. Cowpeas, lespedeza, and in some sections of the county red clover and crimson clover, together with some vetch and alfalfa, are sown occasionally, probably more to provide hay and pasturage than with the intention of rotating crops. The farmers have generally noticed markedly beneficial results following the growing of such crops. One farmer using the predominating

upland soil, the Memphis silt loam, reports that, following the growing of lespedeza, three successive crops gave remarkably heavy yields, due apparently to the soil-enriching effects of the legume. In some parts of the county it is difficult to get a stand of red or crimson clover on the same kind of land which gives general success elsewhere. This difficulty may be due to need of inoculation. Red clover is grown mainly in the northwestern and northern parts of the county. It seems to succeed best on slopes occupied by the Memphis silt loam and silty clay loam.

Commercial fertilizers are used to only a very small extent, and some farmers do not even use the little manure that is produced, though generally this is applied, and invariably with good results. Much manure from the Memphis stables is used in market gardening. Some ready-mixed, rather low grade commercial fertilizers are applied to cotton on a few farms at the rate of about 200 to 300 pounds per acre. A mixture of cottonseed meal and acid phosphate in the ratio of 1 to 2 by weight is used by some farmers for cotton in applications of about 200 to 300 pounds per acre. Increased yields have generally followed the use of such fertilizers, but some farmers report decreased yields resulting from the use of the latter mixture in dry years, the cotton shedding much more than in adjacent unfertilized fields on the same soil (Memphis silt loam). This would suggest that the proportion of acid phosphate was too high or that ground phosphate rock would be a better form in which to apply phosphorus, although it may be possible that had the soil been liberally supplied with organic matter, as by plowing under some crop like cowpeas or rye, such "burning" would not have occurred. In general, little effort is made to build up the organic-matter supply of the soils, the only vegetable matter incorporated during long periods of continuous cropping being the cotton and corn stalks. It is noticeable that where these crops are light and the amount of organic matter returned to the soil consequently small, the land dries out to a grayer color and a more lifeless, compact condition than where heavier crops are made. Where lespedeza is grown the same soil subsequently assumes a more brownish color and a more mellow structure than where it is neglected. By growing crops to supply organic matter, preferably the legumes, such as clover, lespedeza, cowpeas, and vetch, in rotation with other crops, yields are increased and, in addition, commercial fertilizers generally give better and more lasting returns. One farmer reports a yield of over 1 bale of cotton per acre on the Memphis silt loam following the turning under of crimson clover, the use of manure, and a moderate application of cottonseed meal and acid phosphate.

A few farmers have used ground phosphate rock and ground limestone, the latter mainly for alfalfa and clover. Good results have

followed such treatment on the uplands and, owing to certain similar characteristics of the bottom-land soils, except those of the Mississippi bottoms, such as an acid reaction to litmus in all cases, it is probable that they also would show good results. These soils are very similar to certain types in Illinois on which the use of ground phosphate rock and ground limestone has been very beneficial. The highly productive Mississippi-bottom soils are generally neutral to litmus, and owing to this condition and to their tendency to crumble at the surface in drying, as soils generally do that have a sufficient content of lime, it is probable that they do not need liming.

In the northern part of the county good results have followed the tiling of second-bottom land (Collins silt loam). It is probable that ditching or tiling would do much to prevent the "rusting" of cotton and the yellowing of corn on the imperfectly drained first-bottom and second-bottom soils (the Collins and Olivier silt loams) as well as on the somewhat similar upland soil (Grenada silt loam).

In general, the soils of Shelby County can be brought to a considerably higher state of productiveness through such means as deep, thorough, and early preparation of the seed bed, frequent shallow cultivation, the growing of legumes, the occasional plowing under of a winter cover crop, the addition of lime, manure, commercial fertilizer, and ground phosphate rock and, in the case of the "crawfishy" or "buckshot" lands, except those of the Mississippi bottoms, by draining. Owing to the excellent adaptation of the soils to grass and a large variety of good grazing crops, many of which only need to be started to spread rapidly, even over the washed and gullied slopes, stock farming, particularly the raising of beef cattle and hogs, and dairying could well be made more important, as the market and transportation facilities and other conditions are favorable. The capabilities of the soils indicate that it would be more profitable to substitute a more diversified type of agriculture, at least in an adjunctive way; for instance, to combine dairying and the raising of cattle and hogs with the growing of cotton and corn, and an increased production of forage and grazing crops. The land now in cultivation, if farmed properly, is probably capable of yielding largely increased output of cattle, hogs, sheep, and dairy products. All of the unoccupied land can be used for raising stock.

There is no land in the county that can not be used to good advantage. On the most severely gullied slopes, lespedeza, Bermuda grass, and white clover succeed and afford good grazing, while the most poorly drained bottoms can be used as pasture and hay land without costly drainage improvements. Overflows, at least those of short duration, do not kill a number of successful grazing and hay crops, such as lespedeza and Bermuda grass. Under farming systems better adapted to the soils, their productiveness could be increased

and all sustenance crops produced on the farm, so that it would be unnecessary to buy meat, corn meal, and hay in the quantities now imported.

Much of the farm labor in Shelby County is performed by negroes, working as day or month laborers or as share tenants. There appears to be a sufficient supply of labor.

At the time of the 1910 census 21.2 per cent of the farms in the county were operated by owners, 78.3 per cent by tenants, and 0.5 per cent by managers. Most of the leased land is operated by share tenants, who furnish only their labor and receive usually one-half the crops. Where the landlord furnishes only the land, he usually receives one-third the corn and one-fourth the cotton. Land rents for about $3.50 to $7.50 an acre cash, according to the location, topography, and soil. Some tenants give a 500-pound bale of cotton for the use of about 10 acres of land.

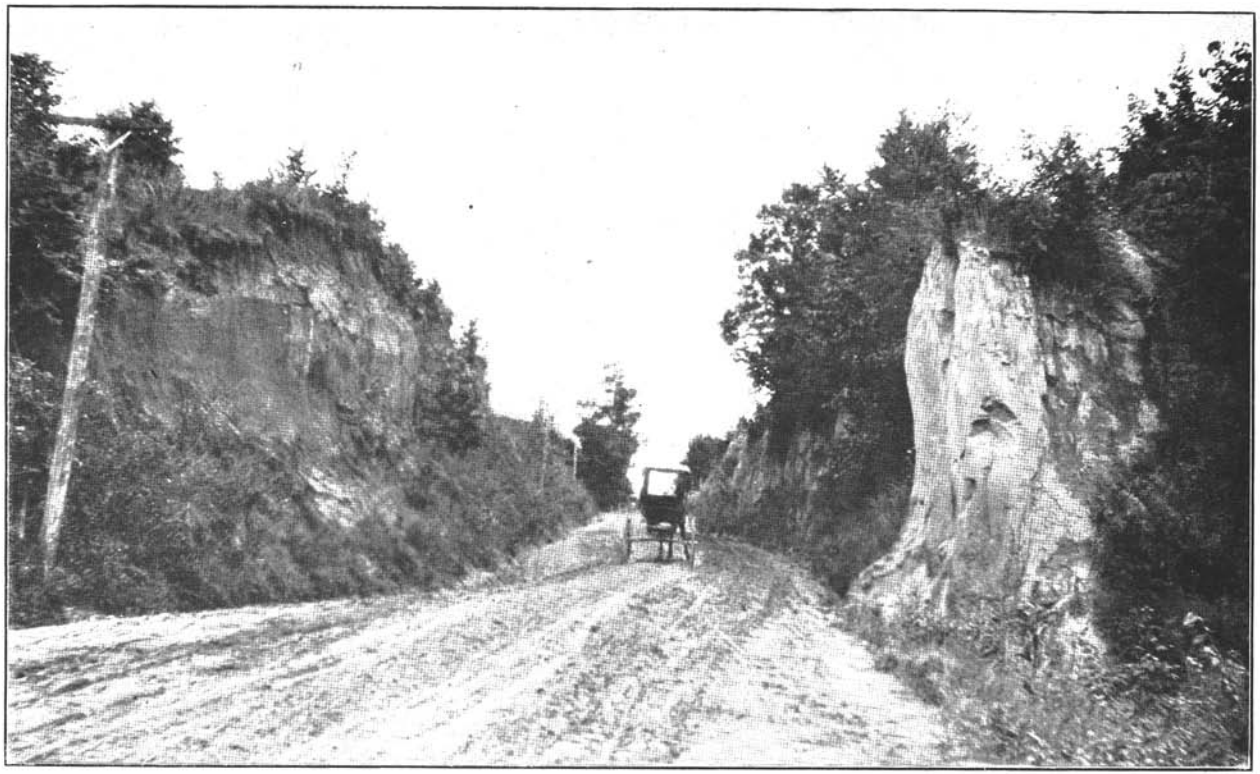
In 1910, 67.2 per cent of the total area of the county was in farms, and 75.9 per cent of the farm land was improved. The average size of farms was 43.4 acres, and their total number 7,934.

Farm lands range in price from $25 to $125 or more an acre, according to the location, improvements, and character of the soil. In the vicinity of Millington land is held for $60 to $125 an acre, and at higher figures near Memphis. Smooth land on or near the pikes rarely sells for less than $50 to $75 an acre. In the vicinity of Colliersville and Brunswick and in some other localities land is reported to be held at $25 to $40 an acre. The most improved farms in the Mississippi bottoms probably could not be bought for less than $40 to $50 an acre, but some tracts where Johnson grass is prevalent or where deep, loose sand has washed over the surface are said to be valued at lower figures.

SOILS.

The upland soils of Shelby County are derived from the bed of silty material, known as loess (see Pl. I), which covers practically all the upland. In its unmodified state it consists of a layer of silty material ranging in thickness from 10 to 15 feet in the eastern part of the county to 40 feet on the Mississippi River bluffs. At a depth of some 20 to 30 feet there seems to be a stratum in the loess, with a much higher proportion of clay than in the upper portion. This layer occurs too deep to affect the soils of the uneroded uplands, but shows its influence in the occurrence of the Memphis silty clay loam on the slopes. The loess deposit overlies a series of sand, clay, and gravel beds belonging to the widespread coastal-plain deposits of late geological age. These beds are exposed in the valley slopes of the eastern part of the county.

There are differences in the loessial material other than in its depth. The lower very silty layer is calcareous and effervesces with hydro-



ROAD CUT IN LOESS DEPOSIT.

Note how the material stands in almost perpendicular banks.

chloric acid below a depth of about 15 feet in the western part of the county, while in the eastern part the material shows no such calcareous feature. Throughout the uplands, and also in all other parts of the county except the Mississippi bottoms, the material of the surface soil, subsoil, and upper substratum shows an acid reaction to litmus paper. There is comparatively little gray mottling or dark and brownish concretions or concretionary material in the soil section in the western part of the county, but in the eastern part gray mottling usually is reached either in the lower subsoil or in the upper substratum—that part of the vertical section just below the 3-foot depth—and concretionary material is commonly associated with the gray mottling. The concretions encountered in the various soils consist of iron compounds.

This silty deposit covering the uplands is believed to be wind deposited. Its uniform character, fine texture, and the fact that it thins out toward the east, giving way finally to sandy material corresponding to the sandy beds which immediately underlie it in Shelby County, indicate that it was laid down by wind action. At the present time dense clouds of dust are drifted away from the sand bars in the Mississippi River on windy days in dry weather.

The sandy strata of the basal beds are distinctly of water-transported origin. The gravel present, consisting mainly of chert, is well rounded by water action, and the beds are stratified. These beds represent sediments deposited in an arm of the sea that in past geological time extended up the present Mississippi Valley for a considerable distance into Missouri.

The soils of the first bottoms and second bottoms consist of stream-transported material, or alluvium, of recent or relatively recent deposition. That in the first bottoms is being added to by each overflow. The second bottoms or terraces were similarly formed, but at a time when the overflows reached higher levels than at present. Along the Mississippi River the material consists of wash from the many different kinds of soil occurring over the vast Mississippi drainage basin. Along the other streams the material has been washed entirely or very largely from upland soils derived from the silty or loessial covering. In the Mississippi bottoms the soils consist mainly of clay, silty clay loam, and very fine sandy loam; along the other streams they consist either of silt loam or silty clay loam, mainly the former.

The typical soil profile of the loess consists of 6 to 12 inches of a brown, light-brown, or pale-yellow silt loam with often an inch of gray silt on the surface of the virgin soil. This is underlain by a reddish-brown or yellowish silty clay loam to silty clay, often with a reddish shade. Its thickness varies up to 18 to 20 inches, being

thicker on flat areas and thinner on rolling areas. Below this appears the unmodified parent silty loess, friable, and yellowish brown in color. On very flat areas, however, a horizon of silty material, whitish in color, either as a persistent horizon or as a brown horizon spotted with white spots, lies immediately beneath the heavy layer. This horizon is succeeded downward by a compact layer of 1 to 3 or 4 inches thickness, rather impervious to moisture. Beneath this lies the parent loess.

The soils of the county are derived directly from the wind-deposited and water-deposited materials, through the processes of weathering. Where the drainage has been good, organic matter has been incorporated with the soil to give it a brownish color; where the drainage has been poor, there has been comparatively little oxidation, the air being excluded by the excess water, and grayish and bluish colors predominate, especially in the subsoil. This probably accounts also for the brownish and dark concretions, or "buckshot," and concretionary material present in the subsoil and often in the surface soil. Running water has washed away the surficial silty layer in places, giving rise to clayey soils, and it is possible that percolating water acting through long periods may have formed the clay layer in the upland soils by a transposition of the fine clay particles from the surface layer down into the subsoil.

The soils of the county are separated on the basis of texture, that is, according to the relative content of sand, silt, and clay, into soil types; the types are grouped into series according to common characteristics of origin, color, and drainage. Seven soil series are represented in Shelby County, the Memphis and Grenada in the uplands, the Collins in the first bottoms of local streams, the Olivier and Lintonia on stream second bottoms, and the Sharkey and Sarpy in the Mississippi River bottoms.

The Memphis series is characterized by brown, mellow surface soils, except in the case of the silty clay loam type, which is slightly reddish and somewhat stiff at the surface. The subsoils consist of reddish-brown or buff silty clay loam to silty clay, of moderately crumbly or only slightly stiff structure. This heavier material usually extends to a depth of 3 feet or more without important change, but in the eastern part of the strip in the bottoms skirting the east side of the Mississippi River gray mottling and brownish and dark-colored concretionary material made up of iron compounds usually are present at depths of about 3 feet. Drainage characteristically is good. The surface varies from rolling or rough near the Mississippi River and some of the other large streams to undulating or nearly level over the broader divides where streams have not so thoroughly and deeply dissected the land. Both surface soil and subsoil give an acid reaction with litmus paper. The series

is represented in Shelby County by the silt loam and silty clay loam types.

The Grenada soils are derived from the same material as the Memphis soils and superficially resemble them. They differ in having very conspicuous grayish mottlings in the lower subsoil, below which lies a compacted layer containing either small or large quantities of rusty-brown and black concretions or concretionary material, the concretions being very irregular in shape. This layer is rather impervious to moisture and air. The soil material of this series is decidedly acid, according to the litmus-paper test. The Grenada soils occupy level, depressed, and gently sloping areas. The silt loam is the only type mapped in this county.

The Collins soils occur in the first bottoms of streams entering the Mississippi River. The material represents alluvium washed largely or entirely from the upland soils of this county and adjoining sections. The series is characterized by the brown or light-brown color of the surface soil and the yellowish color and generally heavier texture of the upper subsoil. The lower subsoil is highly mottled with gray, bluish gray, and yellow. It usually is compact, and in many places it contains a large quantity of brownish and black concretions and concretionary material. The Collins soils are subject to overflow, and the drainage between periods of overflow is imperfect, owing to the level surface and the impervious nature of the lower subsoil. The soils are not so poorly drained, however, as to be uncultivable. Litmus-paper tests indicate that the soil is decidedly acid. The Collins silt loam and silty clay loam are mapped in this county.

The Olivier soils have essentially the same physical characteristics as the Collins. The principal difference between the two series is that the Olivier soils occur on second bottoms and typically are not subject to overflow. The silt loam is the only type mapped.

The Lintonia soils are derived from the same material as the Olivier and also occur on the second bottoms above overflow. They have better underdrainage than the Olivier. In physical characteristics the series is similar to the Memphis, the surface soil being brown and prevailingly very silty, while the subsoil consists of heavier textured, reddish-brown, or buff-colored material. The soil is acid. The Lintonia series is represented by a single type, the silt loam.

In the Mississippi bottoms of Shelby County there are two series of soils, the Sharkey, consisting of brownish surface soils overlying mottled bluish and rusty-brown clay, and the Sarpy, consisting of brown surface soils passing into lighter brown or grayish, lighter textured subsoils. The soil material of these series generally is neutral to litmus. The Sarpy soils occur characteristically as front lands near the banks of the Mississippi and of the bayous traversing

the bottoms, and have good underdrainage, while the Sharkey soils occur mainly as back lands over the lower areas of the bottoms and do not have so good underdrainage. There frequently is no perceptible difference in elevation between the members of the two series; in fact, the sandy Sharkey soils lie as high as the sandiest soils of the Sarpy series and even occur in places as front lands. The Sharkey soils are locally known as "buckshot land," owing to the fact that the heavier types crack at the surface into fine aggregates, giving the soil a crumbly or granular character. The term "buckshot land" in this instance has an entirely different meaning from the same term as applied to the more poorly drained bottom and terrace lands of other streams, the poorer drained areas of the Collins and Oliver soils, where it indicates the presence of small, round iron concretions. The Sharkey and Sarpy soils in this county are subject to deep overflows, not being protected by levees. Each of these series is represented by three types.

The following table gives the actual and relative extent of each soil type mapped in Shelby County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Memphis silt loam	203,264	46.6	Sarpy silty clay loam	9,792	2.1
Ridge phase	19,008		Sharkey silty clay loam	6,080	1.3
Collins silt loam	82,240	17.3	Lintonia silt loam	4,544	1.1
Olivier silt loam	38,016	8.0	Colluvial phase	448	
Collins silty clay loam	31,296	6.6	Sarpy fine sand	4,480	0.9
Grenada silt loam	25,344	5.3	Sharkey very fine sandy loam	3,200	0.7
Memphis silty clay loam	22,016	4.6			
Sharkey clay	15,488	3.3	Total	475,520	.....
Sarpy very fine sandy loam	10,304	2.2			

MEMPHIS SILT LOAM.

The typical Memphis silt loam consists of a brown to light-brown silt loam underlain at 8 to 12 inches by reddish-brown or buff-colored silty clay loam to silty clay, ranging from moderately stiff to somewhat crumbly in structure. The subsurface material usually has a lighter brown color than the surface soil. When dry the surface has a light-brown to somewhat grayish color, gray being most prominent in fields where the organic-matter supply has largely been depleted. Some gray mottling frequently occurs in the lower subsoil and in the upper part of the underlying substratum, and the color of the subsoil is in some places less reddish than in the typical soil. Occasionally brown or dark-colored concretionary material, apparently iron oxide, occurs at this depth. The substratum at a depth of 4 or

5 feet consists of friable silt loam closely resembling the surface soil. There are many eroded places in this type where the sandy beds of Coastal Plain material lie near the surface, and in some places they are exposed, as on the slopes north of Wolf River. The exposures and the areas in which the sandy material occurs within the 3-foot section, however, are not sufficiently extensive to be mapped separately.

The gray mottling and the brownish and dark-colored concretionary material in the lower subsoil and upper part of the substratum are more in evidence in the eastern part of the county; the Memphis silt loam in approximately the eastern half of the county might, in fact, be considered a mottled-subsoil phase of the type. It approaches the characteristics of the Grenada silt loam, but it neither has the intensely mottled and distinctly compact lower subsoil typical of the Grenada, nor does it contain so much concretionary material. In places there is some compaction in the lower subsoil of areas mapped as the Memphis silt loam, but the material is not so compact as that of the Grenada. Apparently these mottled-subsoil areas do not have so good internal or subsoil circulation of moisture and air as the typical Memphis silt loam, and they are evidently not quite so productive.

In every instance where tests were made both the soil and subsoil were found to be distinctly acid to litmus. The upper part of the substratum also gave an acid reaction, but in some places the lower substratum, below a depth of 12 or 15 feet, was either neutral or effervesced slightly with hydrochloric acid. The substratum of the mottled-subsoil areas in the eastern part of the county was found to be acid wherever tested. Locally this land is known as "hill land," "red clay land," referring to the red clay of the subsoil, "poplar hill land," and "poplar and papaw land."

As mapped, the type includes many small patches of Memphis silty clay loam on the slopes and some areas of Grenada silt loam in the more nearly level areas and on lower slopes near stream bottoms.

The type is distributed throughout the uplands of the county, occupying a very large part of the smoother divides and the gentler slopes. Its surface varies from nearly level or undulating over the broader, less dissected divides to gently rolling and rolling near the streams, where the valleys of the drainage ways entering the larger streams make the surface more irregular. The slopes usually are gentle, the type giving way to the Memphis silty clay loam or the ridge phase of the Memphis silt loam on the steeper slopes. It is the most extensive soil in the county.

Both the surface drainage and underdrainage of the typical soil are well established. Improperly cultivated slopes erode badly, giv-

ing rise to the Memphis silty clay loam. In the summer cultivation can usually be resumed the second sunny day after heavy rains. Where deeply broken and well cultivated the soil conserves moisture well.

This is the most important soil in the agriculture of the county, and probably 80 per cent or more of it is in cultivation. The remainder is mainly forested with white oak, red oak, poplar, sweet gum, hickory, and elm, with some post oak, box elder, dogwood, black locust, ironwood, papaw, and black gum. The oak, poplar, sweet gum, and hickory attain considerable size and constitute valuable timber.

Cotton and corn dominate the agriculture on this soil. Crops of minor importance are oats, lespedeza, red clover, wheat, sorghum, cowpeas, and vegetables, strawberries, and sweet potatoes. Cotton is the money crop. Vegetables, potatoes, and berries are grown by market gardeners mainly in the vicinity of Memphis, and are sold in that city. Lespedeza, white clover, and Bermuda grass grow wild over much of the type, and afford good pasturage.

Aside from the raising of a few hogs by most farmers for home use, not much attention is devoted to live-stock industries. On a number of farms, however, dairy herds of 6 to 30 or more cows are kept. The milk is disposed of mainly at Memphis, being either sold at the creameries or retailed on the streets of that city. Some butter is made on farms for the local markets. The cows are maintained largely by grazing in the summer, but considerable feeding is necessary in the winter, especially where winter grazing crops, such as rye and oats, are not grown. Many herds are kept on farms that include areas of the Memphis silt loam, but the greater part of the pasture area is on the associated stream bottoms. A few farmers sell veal and occasionally a few head of beef cattle, and some buy up feeders and fatten them for market by summer grazing or winter feeding, or both.

This is a medium-early soil; it is considered earlier than the Collins and Olivier silt loam of the bottoms and second bottoms, and probably is the earliest soil in the county. The sandy lands of the Mississippi bottoms would perhaps mature crops earlier if they were not overflowed.

According to statements of farmers, the average yield of cotton on this soil is a little over one-third bale per acre; the range is from about one-fourth to two-fifths bale on the more poorly managed farms to one-half to three-fourths bale where better methods are used. Occasionally in the more intensively cultivated fields yields of 1 bale per acre are obtained in favorable seasons. Corn yields from 10 to 15 bushels per acre where less improved methods are employed to as much as 40 bushels or more where better methods are followed.

Lespedeza gives one cutting of one-half ton or more per acre. Vegetables, potatoes, and berries produce heavy yields, especially where manured.

The greater part of the type is farmed by tenants, many of whom employ indifferent methods of soil management, breaking the land, or simply rebedding over the old middles late in the season with light 1-horse plows, seldom plowing deeper than 4 inches, and cultivating the growing crops rather deeply with turning plows and shovel plows, seldom using cultivators and harrows. The better farmers follow much more improved methods. They break the land early to a good depth and plow broadcast with heavy 2-horse turning plows, or 2-horse and 3-horse disks, harrowing frequently before planting, and cultivating the growing crops nearly on the level with light-running cultivators, harrows, and shovel plows. They seldom use scrapers or barring-off plows for the first cultivation. Grain land usually is prepared and seeded in the fall.

Most of the fields on this soil are fenced, and the barns and the cotton houses usually are adequate for the housing of stock and the storing of feed and cotton.

Most of the fertilizer used in the county is applied to this type for cotton, but the total quantity used is small. Only a few farmers use fertilizer. The application made usually consists of about 200 to 300 pounds per acre of either a mixture of 1 part cottonseed meal with 2 parts of acid phosphate, or some commercial fertilizer, generally of low grade. Some manure is used and a few farmers have applied lime, ground limestone, and ground phosphate rock. The lime is mainly used in starting clover and on alfalfa, which is grown in a few fields. In general, good results are reported from the use of these materials, but in some cases it is said that in dry years the cottonseed meal and acid phosphate mixture causes the cotton to shed excessively.

Land of the Memphis silt loam is held at $25 to $40 an acre in the eastern part of the county, and at $60 to $125 an acre in the western part; some areas near Memphis sell for higher prices. Smooth land, near the pikes, has the highest value.

The Memphis silt loam is a good grass soil. Lespedeza grows abundantly on this type, both in seeded areas and as a wild crop, and white clover, Bermuda grass, and other grasses do very well. The soil is well suited to vetch, soy beans, cowpeas, sorghum, bur clover, and peanuts. The raising of hogs and cattle and dairying apparently could profitably be made much more important industries, at least as adjuncts to the present system of cotton-and-corn farming. In various parts of western Mississippi this type is being used to an increasing extent for the raising of cattle and hogs for market. The manure produced can be used to great advantage in

building up the soil, and the growing of legume crops for both field and cut forage would have a very beneficial effect on the land.

The results obtained by the farmers who practice deeper, earlier, and more thorough preparation of the seed bed and shallow, flat cultivation indicate that good yields can be obtained by proper soil treatment. The good results that have come from the use of ground limestone and ground phosphate rock on similar soil in the north-central Prairie States, together with the prevailing acid nature of the Memphis silt loam, indicate that these materials could be used to good advantage. By liming and inoculating, some good fields of alfalfa have been established (see Pl. II, fig. 1). Good crops of red clover are grown in the northern part of the county. It is claimed that in some parts of the county red clover can not be grown successfully except with the application of lime and inoculation of the soil.

Crop rotations are not generally practiced on this soil, and a large number of farmers pay no attention to replenishing the supply of organic matter. On account of the light growth made by crops in many fields that have deteriorated from long use and shallow plowing little vegetable matter is returned to the soil when the plant residue is plowed under, and in some sections it is claimed that the land is "worn out." With proper methods of soil improvement, however, such land can be made to produce good crops.

Strawberries, bramble berries, Irish potatoes, tomatoes, and a large number of vegetables have proved successful on this type of soil. The market gardeners about Memphis produce a wide variety of vegetables, but strawberries are not grown very extensively. There is no apparent reason why trucking and berry growing could not successfully be carried on in an important way.

Among the crops that succeed on this soil, as has been shown in this county or elsewhere on the same soil type, but which are not grown in an important way, are orchard grass, soy beans, peanuts, Sudan grass, and velvet beans. Bermuda grass and Johnson grass grow luxuriously, but are not popular, because they spread rapidly and are hard to eradicate in cultivated fields.

Memphis silt loam, ridge phase.—The Memphis silt loam, ridge phase, comprises the strongly rolling or ridgy upland in the extreme northwestern part of the county at the headwaters of Jakes and Big Creek-Bear Creeks. The country is characterized by comparatively narrow, winding ridges from which short subordinate ridges reach out in various directions between the short streams heading near the crest of the main ridge. Though the ridges are narrow they usually have rounded or flat crests. The valleys are deep and the slopes prevailingly steep—in many instances so steep that cultivation is not attempted. Drainage is everywhere thorough; the run-off from

FIG. 1.—ALFALFA ON MEMPHIS SILT LOAM, NEAR KERRVILLE.

FIG. 2.—CONTOUR CULTIVATION ON SLOPES OF THE MEMPHIS SILT LOAM, RIDGE PHASE.

the steeper slopes is so rapid as to cause damaging erosion. In general, all the slopes require contour cultivation to prevent the soil from washing (Pl. II, fig. 2).

There is little difference between this phase and most of the typical Memphis silt loam in the western part of the county, but it includes more patches of Memphis silty clay loam on the slopes. The surface soil is a brown, mellow silt loam, ranging in depth from very shallow on the slopes to as much as 10 or 12 inches over the crests of the divides. It is underlain by a moderately crumbly silty clay loam to silty clay, of reddish-brown or buff color. The silt loam remains the predominating soil on the slopes, but there are numerous included patches of silty clay loam here, and the average depth of the soil is less than over the ridge crests. Both soil and subsoil give an acid reaction with litmus. There is a slight effervescence with hydrochloric acid in the very silty substratum at depths below 15 feet.

This land is locally called "poplar-ridge land" and "poplar and papaw ridge land," owing to the abundance of poplar and the presence of papaw in the native growth. Probably 50 per cent or more of it is under cultivation. Nearly all the ridge crests and gentler slopes are farmed. The steeper slopes and ravines are forested with beech, white oak, sweet gum, black gum, walnut, hickory, red oak, redbud, poplar, and papaw.

Cotton and corn are the principal crops. The yields are about the same as on the typical Memphis silt loam. There are relatively more fields of red clover and red clover and timothy mixed on this soil than on any other in the county. Red clover, which is grown mainly on the slopes, does well. Less live stock is raised than might be expected in view of the topography, the abundance of wild plants valuable for grazing, and the fact that the soil is well suited to many forage crops. The same farming methods are practiced as on the typical soil, except that contour cultivation is extensively practiced. Some of the slopes are gullying in spite of the efforts to prevent it, showing conclusively that contour cultivation alone is not sufficient on many slopes to hold in check the run-off following heavy downpours. In such cases substantial terraces should be constructed or these steeper slopes should be used only for soil-binding crops, such as grasses and clovers, and for pasture. It would apparently be profitable to raise more hogs and beef cattle, and to extend dairying. The ridge phase is considered a desirable soil. It responds readily to good treatment, and yields of over 1 bale of cotton per acre have been obtained with the use of manure and the plowing under of crimson clover. With the introduction of the legumes, such as lespedeza, vetch, cowpeas, and clover, into the rotations every two to four years with deep, thorough, early preparation of the seed bed and frequent shallow cultivation of the growing crops,

and the raising of more live stock, incorporating in the soil the manure produced, it is believed yields of three-fourths to one bale of cotton or about 40 bushels of corn per acre could be maintained in the better areas.

MEMPHIS SILTY CLAY LOAM.

The typical Memphis silty clay loam consists of a light reddish brown silty clay loam or heavy silt loam, passing at about 3 to 6 inches into reddish-brown or buff-colored, slightly stiff to moderately crumbly silty clay loam or silty clay. The immediate surface frequently consists of heavy silt loam or silt loam of a brownish to only faintly reddish color, and on the other hand there are many freshly washed patches where the redder and stiffer subsoil material occurs at the surface. In places the lower subsoil is considerably more silty and browner or yellower than the upper subsoil. Both surface soil and subsoil are acid to litmus. Gray mottling and brownish and dark-colored concretionary material frequently are present in the subsoil, especially in the areas in the eastern part of the county.

This soil occurs throughout the uplands of the county on eroded slopes, mainly near the larger stream courses, where the country has been more thoroughly dissected. It usually occurs on the valley slopes, and represents areas of Memphis silt loam from which the silty surface material has been wholly or partly washed away, exposing or bringing near the surface the subsoil clay. It is known locally as "red clay land," "stiff red land," and "red hill land." The type is most extensive along Wolf River and its tributaries, along West, Grays, and East and West Beaver Creeks, and the numerous tributaries entering Loosahatchie River near its confluence with Beaver Creek; and along the south side of Loosahatchie River, west of the Covington Road. Many areas too small to be shown satisfactorily on the map are included with the Memphis silt loam.

The slopes occupied by this soil vary from gentle to steep. The type is thoroughly drained, and, in fact, the chief obstacle to farming is the tendency to erosion by the rapid run-off. Some slopes have been gullied as a result of careless tillage, and are now suitable only for grazing.

The Memphis silty clay loam is an important soil in this county. Probably 30 per cent of it is in cultivation, the remainder being forest or pasture land. Cotton and corn are the principal crops. Many small fields are devoted to red clover. The soil is considered productive when first cleared, but has the reputation of declining in productiveness under cultivation. Cotton and clover seem to give the best results. On new land cotton yields average nearly one-half bale per acre. Little attention is given to live stock.

This soil is handled in the same way as the Memphis silt loam, and is used for the same crops. For efficient plowing heavier implements

and teams are needed than on the Memphis silt loam, but light farm machinery is used by all except some of the better farmers.

Crops are said to suffer on this land in dry seasons, particularly in the older fields. This is due to the fact that the prevailing shallow plowing permits the removal by erosion of much of the surface material, bringing the subsoil clay, of low organic-matter content, to or near the surface. This bakes in dry weather and the moisture evaporates rapidly. In general, the topography favors erosion, with consequent loss of fertility. Deep early plowing, harrowing to pulverize the clods, and growing green-manure crops, such as cowpeas, vetch, clover, and lespedeza, in the rotations will do much to keep the soil in a productive condition, erosion being largely prevented by such means. The furrows should be run with the contours, and on the steeper slopes terraces should be maintained. The steepest slopes should not be tilled, except perhaps to seed them with soil-binding crops, such as Bermuda grass and lespedeza. Under present conditions it would seem that a much larger proportion of this land should be used for pasturing stock, including beef cattle, hogs, sheep, horses, and mules. The addition of lime or ground limestone at the rate of 1 ton of burned lime or twice this quantity of ground limestone per acre undoubtedly would prove beneficial.

GRENADA SILT LOAM.

The Grenada silt loam superficially resembles the Memphis silt loam, from which it differs mainly in having a mottled grayish, brownish, and yellowish compact lower subsoil, usually containing brown and black concretions and concretionary material (probably iron oxide). The dry soil is grayer and compacts more than the Memphis, and the upper subsoil as a rule is yellower. The typical Grenada silt loam consists of a light-brown to brown silt loam, underlain at about 8 to 12 inches by yellowish-brown to slightly reddish brown silty clay loam to silty clay. This passes generally at 18 to 24 inches into a compact stratum of mottled gray or bluish-gray and yellowish silty clay loam, in most places containing small concretions and concretionary material. The concretions are not so rounded and well formed as those found in other soils. In many places the lower subsoil is a mottled yellowish and grayish, rather plastic silty clay containing enough concretions and concretionary material to make boring with the soil auger difficult, especially when the material is dry. In included areas of poor drainage brownish and grayish mottlings and concretions occur in the surface soil and upper subsoil. Such patches are locally called "buckshot land."

The principal areas of the Grenada silt loam lie in the southeastern part of the county. The soil map shows it extending westward along the ridge between Wolf River and Nonconnah Creek

to a point a few miles west of Germantown. The boundary between the Grenada and Memphis silt loams in the field is not well defined, the change from one soil to the other being gradual. The Memphis silt loam in the vicinity of the boundary is not essentially different in appearance or character from the Grenada, and vice versa, and many spots mapped as Memphis in the eastern part of the county might properly be mapped as Grenada. Some included areas of Memphis silty clay loam have some of the characteristics of the Grenada silt loam, but are too small to be mapped separately.

The Grenada silt loam occupies nearly level areas in the less eroded uplands, and lower slopes near streams. In places, as in the areas west of Kerrville, it grades into the first-bottom and second-bottom soils. Underdrainage is poor, the compact lower subsoil apparently acting much like a hardpan and interfering with the movement of moisture and air.

This soil, though not very extensive, is largely in cultivation, being used chiefly for the production of cotton and corn. It is handled in the same way as the Memphis silt loam. The more poorly drained included patches of so-called "buckshot" land generally are not used except for pasture and hay lots. Crop yields are somewhat lighter than on the better areas of the Memphis silt loam, but good yields are often obtained. The soil needs applications of burnt lime or ground limestone. Tiling or ditching, deep plowing, frequent shallow cultivation, and the maintenance of a good supply of organic matter by adding manure or growing green-manure crops, preferably the legumes, are the chief requisites in the improvement of this soil.

In the following table are given the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Grenada silt loam:

Mechanical analyses of Grenada silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
401620	Soil, 0 to 12 inches	0.8	3.4	1.2	1.4	5.6	73.4	14.0
401621	Subsoil, 12 to 22 inches	1.6	3.8	1.4	1.9	4.6	71.7	14.9
401622	Lower subsoil, 22 to 36 inches.	.2	2.0	1.3	1.7	5.6	66.6	22.4

COLLINS SILT LOAM.

The Collins silt loam typically consists of a light-brown to brown silt loam, underlain at about 6 to 12 inches by mottled grayish or brownish to yellowish silt loam. This passes beneath into mottled yellowish and bluish-gray, rather plastic silty clay loam to silty clay, containing black and brownish concretions and concretionary material. Both the surface soil and subsoil are distinctly acid to litmus.

In the lower, more poorly drained situations gray and brownish mottlings and concretions appear in the surface soil and subsoil. Such areas approach the characteristics of the Waverly silt loam, which has been mapped in other parts of the country, where the soils of the uplands are identical with or similar to those in Shelby County. There are also included small areas, in the higher parts of the bottoms near the foot of the uplands and in the bottoms of many of the smaller streams, of brown, mellow silt loam. The gray mottled subsoil is deeper here than in the typical soil. Such areas represent an approach toward the Vicksburg silt loam, as mapped elsewhere. They have better drainage and are more productive than the typical soil. These variations are too inextensive to be mapped separately.

The typical Collins silt loam locally is known as "buckshot land," on account of the presence of small rounded concretions. In dry weather the surface material assumes a light-grayish color and an undesirable compact structure. The type occurs in extensive broad strips in the bottoms of all the larger streams except the Mississippi River, and in narrow strips along nearly every stream of any size in the county. The larger strips are those in the bottoms of upper Nonconnah Creek, Big Creek, upper Loosahatchie and Wolf Rivers, and Crooked, Beaver, West Beaver, Fletcher, Grays, and Johns Creeks. Along some of the streams, as the Loosahatchie and Wolf Rivers and Nonconnah Creek, this type gives way in the lower part of the bottoms nearest the channels to the heavier, less well drained Collins silty clay loam, and on the outer margins it grades into the Olivier silt loam, a second-bottom type. In places the line separating these soils is not sharply defined, but characteristically there is a slight drop to the Collins silty clay loam and a sharp, though sometimes slight, rise to the Olivier silt loam.

The surface is level except for the occasional depressions of abandoned stream ways and the hummocks and swells of the better-drained areas. Overflows occasionally cover these bottoms, particularly the lower part. The inundations generally take place in winter, but occasionally they occur in the summer and result in crop injury. Underdrainage is poor.

This is the most important first-bottom soil in the county. Probably more than one-half the type is in cultivation. The remainder supports a forest growth including much merchantable timber and consisting mainly of overcup or "cow" oak, water oak, willow oak, sweet gum, elm, sycamore, ironwood, honey locust, hackberry, box elder, hickory, ash, birch, willow, black gum, and holly.

The principal crops are cotton and corn. This soil is used to support many of the small dairy herds that are maintained in the summer. The lespedeza, white clover, Bermuda grass, and other wild plants that flourish afford good grazing.

Crop yields vary considerably with the season, especially on the more poorly drained "buckshot" land, which becomes very hard in dry weather and soggy in wet seasons. In dry years cotton "burns" or "rusts" seriously and corn makes a poor growth. A moderate and evenly distributed rainfall is necessary for best yields. The included areas of deeper brown soil containing fewer concretions produce well, cotton frequently yielding three-fourths bale and corn 50 to 60 bushels per acre without especially intensive treatment or fertilization. On the average about the same yields are obtained on the Collins silt loam as on the Memphis silt loam. Lespedeza, which is increasing in popularity, gives heavy yields, as much as 2 tons per acre being obtained from the two cuttings that are sometimes made in the bottoms. This crop succeeds even on the most undesirable areas of "buckshot" land. Yields of all crops are said to have been increased in areas that have been tile drained.

Land of this type has about the same selling value as the Memphis silt loam.

For its improvement the greatest need of the Collins silt loam probably is better underdrainage. In most cases this can best be supplied by tiling, but deep ditching is beneficial. Deep plowing, the addition of lime, and the occasional growing of a legume crop, such as lespedeza or cowpeas, in rotation with the other crops increases the productiveness of this soil. Among the crops that do well but are not grown to any considerable extent are Bermuda grass, Johnson grass, redtop and sorghum. Oats and wheat also succeed, particularly in the better-drained areas.

COLLINS SILTY CLAY LOAM.

The surface soil of the Collins silty clay loam is a brown silty clay loam, usually mottled faintly with grayish, especially in the subsurface layer. The subsoil, encountered at depths of about 8 to 16 inches, consists of mottled bluish-gray and brownish silty clay loam. Small brown and black concretions are generally present, and frequently occur in large quantities throughout the soil section. The soil hardens and assumes a lighter color at the surface upon drying. Crawfish mounds are of common occurrence. Locally the soil is known as "buckshot land" or "crawfish land."

This type occurs in low, nearly level strips along several of the larger streams, the principal areas being those on Loosahatchie and Wolf Rivers and Nonconnah Creek. It is subject to frequent overflows, especially in winter. Underdrainage is poor. The type is fairly extensive, but only a small part of it is cultivated. The greater part is heavily forested with overcup oak, willow oak, water oak, post oak, sweet gum, hackberry, honey locust, ash, ironwood, holly, sycamore, and hickory. Cypress is abundant in places. The tree growth

includes some valuable merchantable timber. Poison ivy, grapevines, and other vines make so thick a growth in places as to give the dense and tangled appearance of a tropical forest.

Cotton and corn are the principal crops grown. The average yields are not high. Cattle and hogs are grazed to some extent. The soil supports some valuable grazing plants, including lespedeza and white clover, and if cleared could all be used as pasture and hay land. Two-horse teams and heavy plows are required for efficient plowing. Tiling and ditching and probably the addition of lime are necessary to bring the soil into the best condition for cultivated crops.

In the following table are given the results of mechanical analyses of samples of the soil and subsoil of the Collins silty clay loam:

Mechanical analyses of Collins silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
401623	Soil, 0 to 16 inches.....	0.0	0.2	0.4	1.6	3.3	74.4	20.1
401624	Subsoil, 16 to 36 inches.....	.6	.6	.4	1.0	2.2	80.6	15.2

OLIVIER SILT LOAM.

The Olivier silt loam is essentially similar to the Collins silt loam in composition. It differs principally in occurring on second bottoms, not subject to overflow. Aside from the overflows, the same drainage conditions exist, and the type has similar inclusions of more poorly drained, less productive "buckshot" areas, as well as better drained areas in which the gray mottling occurs at greater depth than in the typical soil.

This soil is extensive, and probably 75 per cent of it is in cultivation, so that it is important in the agriculture of the county. The most extensive areas occur along both sides of the Wolf River almost continuously from the Mississippi bottoms at Memphis to the eastern county line, also along upper Nonconnah Creek, Big Creek and its principal tributaries, and Fletcher Creek and Johns Creek. The surface is nearly level, with occasional hummocks and swells, on some of which the Lintonia silt loam occurs.

Much of the type lies only a few feet higher than the adjoining first bottoms, but portions of it stand 10 to 15 feet or more above the latter. In places it is difficult to establish definite boundaries between this soil and the Collins silt loam, but generally the boundaries are sharply defined. Areas of the Lintonia silt loam often skirt the bluff line next to the bottoms, and the type as mapped includes a large number of small bodies of this soil that can not be shown satisfactorily on the map.

The Olivier silt loam is used chiefly for growing cotton and corn, and is handled in the same way as the Collins silt loam. Essentially the same farming methods are used on the uplands, except that cultivated crops more frequently are grown on ridges. The type is in need of better underdrainage. For its further improvement it requires about the same treatment as the Collins silt loam. Average yields are probably a little better than on the Collins soil, owing to the freedom from overflows. It is an important agricultural soil.

In the following table are given the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Olivier silt loam:

Mechanical analyses of Olivier silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
401611	Soil, 0 to 10 inches.....	0.2	1.6	1.2	1.4	6.5	79.4	9.8
401612	Subsoil, 10 to 18 inches.....	.1	.6	.6	1.6	5.3	72.4	19.3
401613	Lower subsoil, 18 to 36 inches.	.0	.6	.6	1.4	4.4	73.2	19.7

LINTONIA SILT LOAM.

The Lintonia silt loam consists of a brown silt loam underlain at 8 to 14 inches by reddish-brown or buff silty clay loam to silty clay, of moderately stiff to slightly crumbly structure. The lower subsoil of the level areas, back from the bluff lines, where the underdrainage is not so good, frequently shows some gray mottling and contains concretionary material, but this feature is not nearly so conspicuous as in the case of the Olivier silt loam. The Lintonia silt loam very closely resembles the Memphis silt loam in composition. Both the surface soil and subsoil are acid. As mapped the type includes patches of the Olivier silt loam.

The Lintonia silt loam occupies second bottoms, the principal areas lying along the lower Loosahatchie River and lower Nonconnah Creek. The surface ranges from level to faintly undulating, the latter type of surface occurring locally. The type has well-established underdrainage. Only a small total area of this soil is found in the county, and it is not very important in the agriculture. It is used chiefly for cotton and corn, and is handled in practically the same way as the Memphis silt loam. Its requirements appear to be much the same as those of that soil.

Lintonia silt loam, colluvial phase.—The Lintonia silt loam, colluvial phase, occupies a narrow strip along the foot of the bluff adjoining the Mississippi bottoms. It consists of a brown, mellow silt loam, underlain at about 2 feet by brown to dark-brown, heavy silt

loam to silty clay loam. The dark color of the subsoil may be due to subsurface seepage from the adjoining slopes. The soil, however, has good drainage. The surface is level to very gently sloping.

Practically all the phase is cultivated. Cotton averages about one-half bale and corn 35 to 40 bushels per acre, without fertilization.

SHARKEY VERY FINE SANDY LOAM.

The Sharkey very fine sandy loam consists of a brown very fine sandy loam, underlain at 12 to 24 inches by mottled dark-bluish and rusty-brown clay. Some faint rusty-brown mottling frequently occurs in the lower part of the surface soil. The material of this type is neutral to litmus. Near the banks of the Mississippi River loose grayish sand has been deposited over some areas by recent overflows, giving the surface a hummocky appearance. On some of the hummocks the sand deposit is 3 feet deep. Areas of this kind are much less desirable as farm land than the other bottom soils. The deposition of sand over the better lands causes considerable damage in the unleveed bottoms.

The Sharkey very fine sandy loam occurs as rather narrow strips of front land, mainly along the banks of the Mississippi River. Most of the houses in the bottoms north of Memphis are on this soil. A large part of the type is in cultivation. It is used for growing cotton and corn, and gives good yields of both without manurial treatment. Cotton is grown more extensively than corn. The soil is very easy to cultivate, and where there is no growth of Johnson grass only light implements are required. The hummocky areas of deep sand are not generally tilled, but Johnson-grass hay is cut from some of them, and in places sweet clover makes a good growth. The native forest on the type includes pecan, hackberry, honey locust, and ash, with a considerable growth of grapevines. Wild dewberries of good flavor grow abundantly on the areas of deep, loose sand.

In the following table are given the results of mechanical analyses of samples of the soil and subsoil of the Sharkey very fine sandy loam:

Mechanical analyses of Sharkey very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
401609	Soil, 0 to 14 inches.....	0.0	0.2	0.5	15.0	32.9	42.8	8.2
401610	Subsoil, 14 to 36 inches.....	.0	.2	.4	12.6	14.8	48.1	23.7

SHARKEY SILTY CLAY LOAM.

The surface soil of the Sharkey silty clay loam is a brown silty clay loam, with some faint rusty-brown mottling in places. It grades at 10 or 12 inches into a brown clay which shows bluish-gray and rusty-brown mottling, the mottling usually becoming more intense with increase in depth. In some places sandy layers are encountered within the 3-foot section. The surface soil is sticky when wet, but on drying it crumbles like the Sharkey clay. The material tested was neutral to litmus in both the surface soil and subsoil and did not effervesce with hydrochloric acid.

This soil occurs in the Mississippi bottoms, both south and north of Memphis. It is not extensive, but is locally important, as a large part of it is in cultivation. It lies a little higher than the Sharkey clay, and frequently occupies a zone of gradation between the clay of the lower back lands and the Sharkey very fine sandy loam of the front lands. It is somewhat easier to till than the clay. The forested areas support about the same growth as the clay type. Locally this soil is sometimes known as "medium gumbo" land.

This type is used for cotton and corn production. It yields, according to the statements of farmers, an average of about three-fourths bale of cotton and upwards of 75 bushels of corn per acre. Cotton yields frequently reach 1 bale per acre. No manure or fertilizer is used. This probably is the most productive soil in the county. As in the case of the Sharkey clay, the surface does not crust over after rains, and crab grass is not troublesome, so that generally less cultivation is required than on the upland soils. Late breaking of the land appears to be about as effective as early breaking, which may frequently be prevented by overflows. Johnson grass has become established in places, and is troublesome in the cultivation of crops.

Land of this type of soil probably can not be bought for less than $35 or $40 an acre where it occurs in large tracts. The bottom lands are not protected from overflows; there are consequently no levee taxes to pay, and the material deposited by the overflows, aside from the loose sand, is said to have the effect of maintaining a high degree of productiveness.

This type is used successfully for alfalfa in other parts of the Mississippi bottoms, but at present is unsuited to the production of this crop in Shelby County because of the overflows. Elsewhere it has also proved a good onion and Irish-potato soil.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Sharkey silty clay loam:

Mechanical analyses of Sharkey silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
401607	Soil, 0 to 18 inches.....	0.0	0.1	0.0	1.1	4.8	71.0	22.7
401608	Subsoil, 18 to 36 inches.....	.0	.1	.4	6.2	3.6	52.2	37.5

SHARKEY CLAY.

The surface soil of the Sharkey clay is a brown to dark-brown clay, faintly mottled with dark bluish and rusty brown at the surface or a few inches beneath. It grades at about 6 to 10 inches into a stiff clay mottled with dark bluish gray, brown, and rusty brown in the upper, and with lighter bluish gray in the lower part. The surface material when wet is very sticky, giving rise to the local name "gumbo." Upon drying, the soil cracks into small aggregates and assumes a desirable, granular structure, from which has come the appellation "buckshot land." It can be plowed when very wet, the clods crumbling on drying. The soil where tested showed no effervescence with hydrochloric acid, but it was neutral or only faintly acid to litmus.

This soil is confined to the Mississippi flood plains, occupying most of the bottoms north and south of Memphis—that is, the bottoms connected with the main land. The greater part of the type is heavily forested with elm, sweet gum, hackberry, box elder, pecan, ash, maple, honey locust, sycamore and hickory, with considerable cane and grapevine, poison ivy, and other vines. It is all subject to overflow, as the bottoms in this county are not protected by levees. The higher land is in cultivation to cotton and corn, chiefly the latter. The soil is very productive, yielding, even with the rather shallow and rough cultivation generally practiced, 45 to 60 bushels of corn and one-half to three-fourths bale of cotton per acre. Both short-staple and long-staple cotton are grown. There is little crab grass, and the soil does not bake, so that less cultivation and hoeing are necessary than on the uplands.

It is believed that with the construction of canals through the lower areas of this type, it could all be cultivated, as the overflows usually recede early enough to allow the planting of cotton or corn.

SARPY FINE SAND.

The Sarpy fine sand consists of very recently deposited grayish to light-brownish, loose, fine sand, usually 3 feet or more in depth. It occurs generally along the margins of islands, and has a hum-

mocky surface. The principal areas are those on Vice Presidents and Presidents Islands, Josie Harry Towhead Island, and Island No. 40, and on the bar near the mouth of the Loosahatchie River.

Some of the small bars are occupied entirely by material of this kind. Part of the type represents former areas of heavy soil, over which deep sand has been spread, and in some included patches clay may lie within the 3-foot section.

This soil is of little importance agriculturally. It is almost entirely unused, and much of it is forested, mainly with willow and cottonwood. Dewberries flourish where there is little or no timber. In some places Johnson grass is fairly abundant. Probably the best use for this land at present is for growing Johnson grass for hay or pasturage. Sweet clover also probably could be grown.

SARPY VERY FINE SANDY LOAM.

The Sarpy very fine sandy loam consists of a light-brown to brown very fine sandy loam, passing into grayish material ranging in texture from a very fine sandy loam to a loose very fine sand. The material is neutral to litmus.

This type occupies all that part of Island No. 47 lying in Tennessee, and occurs also along the northern border of Cow Island, in several places in the bottoms north of Memphis, on Island No. 40, and on Presidents and Chicken Islands. The surface is generally somewhat hummocky. The type is subject to overflow, but is well drained between flood periods.

A large part of this type is in cultivation, and it is of considerable importance. Cotton and corn are grown. Cotton does particularly well, yields of one bale per acre sometimes being obtained, even without fertilization. The soil is very easily cultivated, and only light one-horse plows are required for efficient breaking. As in the case of the Sharkey very fine sandy loam, loose sand has been deposited over some areas near the streams, giving them a hummocky surface.

In the following table are given the results of mechanical analyses of samples of the soil and subsoil of the Sarpy very fine sandy loam:

Mechanical analyses of Sarpy very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
401627	Soil, 0 to 20 inches.....	0.0	0.2	0.6	20.8	29.4	42.5	6.1
401628	Subsoil, 20 to 36 inches.....	.0	.1	.2	40.4	37.9	17.9	3.1

SARPY SILTY CLAY LOAM.

The Sarpy silty clay loam is composed of a brown silty clay loam, underlain at depths ranging from about 8 to 26 inches by light-brown very fine sandy loam. In places, especially where the silty clay loam soil is shallow, as on some of the swells, the subsoil varies to a grayish, loose, very fine sand. As mapped (the islands are not mapped in as much detail as the mainland) there are included small areas of Sarpy very fine sandy loam and Sharkey clay and silty clay loam. The soil and subsoil are neutral to litmus. The soil is more inclined to crust and clod than that of the Sharkey silty clay loam, but it is easily tilled. The type is subject to overflow but has good drainage between periods of inundation.

The principal areas occur on Cow Island (or Coahoma Island) and the island to the east, on Island No. 40, and on Presidents Island. Most of the type is in cultivation to cotton and corn. Cotton yields an average of about one-half bale and corn 40 bushels per acre, without manurial treatment. The cultivation of crops is easy where Johnson grass has not become established.

SUMMARY.

Shelby County, with an area of 743 square miles, or 475,520 acres, lies on the Mississippi River in the southwestern corner of Tennessee. The greater part of the county consists of undulating to rolling upland, but it includes extensive areas of first and second bottoms.

Memphis, the county seat, with a population of 131,105 in 1910, is the largest city. The total population of the county is 191,439. The upland sections are thickly settled, and the Mississippi bottoms also are well occupied.

The transportation facilities are good.

A large part of the uplands and second bottoms and much of the first bottoms are in cultivation. Cotton and corn are the principal crops grown, cotton being the important cash crop. The corn is largely used for feeding work stock, the few hogs raised to supply the home demand, dairy cows, and other cattle. Market gardening is important in the vicinity of Memphis. Dairy herds, including generally from 6 to 30 or more cows, are kept by a large number of farmers. Raising beef cattle is not important, although the soils of the county are among the best grasslands of the South. Stock raising, in conjunction with general farming, could be greatly expanded without much increase in the cultivated area and without decreasing the acreage in cotton and corn.

At present much of the farming is done by tenants, who frequently employ inefficient methods. Tenant farmers on the upland obtain

yields of one-third to one-half bale of cotton per acre and of 10 to 20 bushels of corn. Where better methods are used yields of three-fourths and often 1 bale of cotton and 35 to 45 bushels or more of corn are obtained on similar land.

Very little commercial fertilizer or manure is used, but good results are generally reported by most of the farmers who do use these materials. All the soils of the county, other than those of the Mississippi bottoms, appear to be in need of lime, but lime is used in only a few cases.

Crop rotations are not in general use. The increase in yields of cotton and corn where these crops follow lespedeza and cowpeas indicates the need of introducing other crops, preferably the legumes, into rotations. Most of the alluvial soils, other than those of the Mississippi bottoms, are in need of underdrainage.

The principal upland soil of the county is the Memphis silt loam. A large part of this soil is in cultivation, chiefly to cotton and corn. This soil has been proved here and elsewhere to be well suited to these staples as well as to lespedeza, soy beans, peanuts, vetch, bur clover, sorghum, tomatoes, Irish potatoes, other vegetables, and strawberries. Wheat and oats do fairly well, and some good fields of alfalfa have been established with liming. Stock raising should prove profitable on this type.

The Memphis silt loam gives way to the Memphis silty clay loam on the slopes of many streams. This soil has the reputation of producing well when first used for crops, but of declining rapidly in productiveness. This soil occupies eroded slopes and must be farmed with special reference to control of erosion.

The bottoms and second bottoms, except those of the Mississippi River, are occupied chiefly by the Collins silt loam and silty clay loam and by the Olivier silt loam. Much of this land has imperfect underdrainage and needs tiling or ditching. Such land is best suited to lespedeza, redtop, Bermuda grass, and other hay and grazing crops. The deeper brown soils are productive of both cotton and corn, the crops chiefly grown. Yields often exceed those obtained on the uplands. Much of this bottom land is occupied by forest. All of it could be used to good advantage for stock and hay.

The Mississippi-bottom soils are classed in the Sharkey and Sarpy series. The Sharkey clay is extensive in the bottoms above Memphis, but most of it is forested. Some of the higher land is used successfully for growing cotton and corn. The Sharkey silty clay loam, which occurs in the bottoms north and south of Memphis, is a particularly productive soil. Cotton is said to give an average yield of three-fourths bale, and frequently 1 bale per acre, and corn upward of 75 bushels, without manurial treatment and with only moderate cultivation. The Sharkey very fine sandy loam, occurring

as river front lands, is also well suited to cotton, and gives good yields where deep, loose sand has not been spread over the surface by overflows.

On Cow Island, and adjacent islands and elsewhere in the bottoms, there is a considerable acreage of the Sarpy silty clay loam and very fine sandy loam. These soils differ from the Sharkey in that the subsoil consists of sandy material instead of clay. They are not quite so productive as the corresponding Sharkey types, but they are very good cotton and corn soils and are mainly in cultivation.

[PUBLIC RESOLUTION—No. 9.]

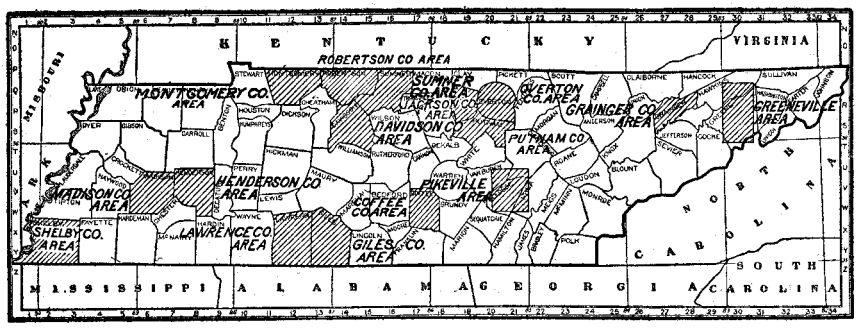
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

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.]



Areas surveyed in Tennessee.

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