

# SOIL SURVEY OF MONTGOMERY COUNTY, MISSISSIPPI.

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## DESCRIPTION OF THE AREA.

The Montgomery County area is located in north-central Mississippi, and the soils, crops, and agricultural practices found here are representative of a large part of the hill section of the State. Latitude  $33^{\circ} 30'$  and longitude  $89^{\circ} 30'$  pass through the area. The county was established May 13, 1871, having been carved out of Choctaw and Carroll counties. The territory of which these counties were originally a part was purchased from the Choctaw Indians under the terms of the treaty of September 28, 1830.

The entire county comprises an area of 259,264 acres or about 405 square miles, and lies within the Mississippi basin, all of its waters eventually reaching that river through one or the other of the small drainage basins of the Yazoo and Big Black rivers. The latter river passes in a northeast and southwest direction through the southern part of the county, receiving all of the drainage of the county south

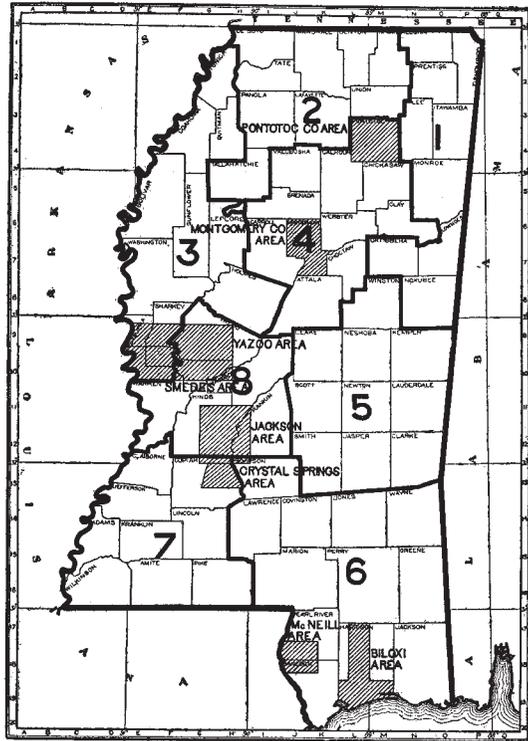


FIG. 12.—Sketch map showing location of the Montgomery County area, Mississippi.

of the river and a large part of that north of it. Fully three-fourths of the county drains into the Big Black River, while the remainder drains toward the Yazoo. The divide between these two small river systems is a low, indistinct ridge which crosses the county westward from 1

mile north of Dabney to Laura, thence southwestward to 1 mile north of Sawyer, and thence westward to the county line.

In general the area is hilly and rolling, with numerous streams and branches, nearly all of which have fertile bottoms. The most striking topographic features are the erosion forms upon the slopes of some of the hills, which have been so eroded and dissected as to present the appearance of a desolate barren mountainous region in miniature, with numerous serrated ridges and cross ridges. The western part of the area is more gently rolling than the eastern part, where the hills are more abrupt and broken. The lowest point is where the Big Black River leaves the area, while the highest point is on Duckhill. The latter is 550 feet above tide, while the former is about 300 feet above tide, so that there is a range in altitude of about 250 feet.

The present inhabitants of Montgomery County are nearly all the descendants of settlers who came from the Carolinas, Georgia, Virginia, Tennessee, and Kentucky, before or about the middle of the last century. These early settlers were mostly of Irish or Scotch-Irish extraction, and a few of them came direct from the Old World. The area has been practically free from the flood of foreign immigration that has swept over parts of the United States during the last half century, and whatever additions have been made to the population are those resulting from natural increase or from the few families that have continued to come from the States mentioned above. Until recent years the area has contributed a sturdy class of immigrants who have helped to build up the newer States of the Southwest. The early settlers brought with them slaves from the old States, and at present about 55 per cent of the population is white and the remainder colored.

All of the Government land has been taken up and the county as a whole is well settled, and is covered by a perfect network of public and neighborhood roads. The county has a stock law which is well enforced, and the growing scarcity of timber has compelled many to use wire for fencing instead of rails, as formerly. The farm houses, though often a considerable distance apart and in places rather far removed from the railroads, are brought in contact with the outside world by the rural free delivery and the numerous telephones which are being strung over all the county, and since the advent of these there has been a marked improvement in the settlement of the county. The most energetic and thrifty farmers do not move to the towns as formerly, but are content to remain in the country to improve their homes and farms.

The chief towns of the area are Winona, Duckhill, Kilmichael, and Stewart. Winona, the county seat and only railroad junction, is the largest of these towns. It is well supplied with schools, churches, and stores, and is the commercial and social center of the county. It has

one cotton mill, a cotton compress, and an oil mill. It is the best cotton market in the area, besides furnishing a ready market for all other farm and truck crops grown in the surrounding country. Duckhill, Kilmichael, and Stewart are small but thriving railroad towns. These latter towns furnish good cotton markets, besides a market for all farm produce grown roundabout.

The county is crossed in a north and south direction by the Illinois Central Railroad, which furnishes a ready outlet to northern markets and to New Orleans on the south. It is also crossed in an east and west direction by the Southern Railway, which furnishes an outlet to the Mississippi on the west and to Birmingham, Atlanta, and other markets on the east.

CLIMATE.

Owing to the slight differences in altitude and the uniform topographic features the climate is practically the same for all parts of the county. The following tables, showing normal monthly and annual temperature and precipitation, and the average dates of the first and last killing frosts, illustrate the main features of the climate:

*Normal monthly and annual temperature and precipitation.*

Month.	Duckhill.		Month.	Duckhill.	
	Temperature.	Precipitation.		Temperature.	Precipitation.
	° F.	In.		° F.	In.
January.....	a 40.8	a 2.96	August.....	79.9	3.02
February.....	a 50.4	a 2.54	September.....	73.3	3.20
March.....	55.1	6.32	October.....	a 59.4	.88
April.....	63.8	3.30	November.....	52.6	2.77
May.....	a 69.0	2.45	December.....	52.6	2.77
June.....	76.5	a 1.10			
July.....	80.3	4.22	Year.....	62.8	35.53

<sup>a</sup> The departures from the normal for these months are not given in the Weather Bureau report, hence the temperature and precipitation given are for the year 1904 only. The figures for the year are also affected by these breaks in the record, but are shown as the nearest approximations to the actual conditions.

*Dates of first and last killing frosts.*

Year.	Duckhill.	
	Last in spring.	First in fall.
1902.....	Mar. 19	Oct. 29
1903.....	Apr. 4	Oct. 19
1904.....	Apr. 4	Oct. 21
Average.....	Mar. 30	Oct. 23

It will be seen that the average length of the growing season is nearly seven months. The annual rainfall is abundant and is fairly well distributed through the different months. One thing, however,

which does not appear in the tables is that the rainfall is often not well distributed during a single month. This is especially true of January, February, and March, when the rains often come in torrents, causing a great deal of damage to the uplands by washing and erosion, and to the lowlands by flooding and filling up the ditches. The greatest precipitation occurs in March and April, occasionally flooding the bottom lands and necessitating replanting or late planting of the cotton or corn. The least precipitation occurs in October, when there is usually a drought, but as this is after the growing season the crops are not materially affected.

The winters are short and mild, with very changeable weather. The average temperature for the winter months is about 45° F. The temperature seldom goes below 10° F., and there is usually but little snow. On account of the great humidity of the atmosphere and the construction of the dwellings for warm weather these frequent changes of weather are often severely felt. During the milder winters, however, garden vegetables are available during January, February, and March, and it is then possible to prepare the land for the next season's crop. It is not considered necessary to house stock. Spring commences in the early part of March, in which month the fruit trees begin to bloom. On account of the lateness of killing frost in spring fruit frequently suffers severely and a good fruit year is the exception. It is believed that the frosts are less severe on the higher elevations, and that fruit could be more successfully produced there than in the lowlands.

The summers are long, warm, and pleasant, and two or more crops can be grown upon the same field during a season. July is the hottest month, the average temperature being about 81° F.

#### AGRICULTURE.

In antebellum days about 25 per cent of the farmers of the area were slave owners, while the remainder were small farmers who worked their own lands. Some of the former operated large plantations, which were confined to the region south of Winona and in the vicinity of Lodi. In those days the county was sparsely settled and there was a great deal of Government land. The farms were often far apart, and each farm and plantation was practically self-sustaining. There were no railroads in the county, and cotton, the only money crop, was hauled either to Granada or Greenwood, whence it was sent in flat boats to the Mississippi River. Everything consumed at home, except a few luxuries like coffee and tea, was grown upon the plantation, and all of the common wearing apparel was made at home. Enough beef and pork were raised to supply the home demand. Wheat was one of the important crops and did well upon the virgin soil. It was ground at mills along the streams and the

supply was sufficient for home needs. Tobacco was also grown, but only for local use. Sufficient corn was grown to supply the farms. Later wheat became unprofitable because of rust, and when a railroad penetrated the area and gave it better communication with the outside world wheat growing was discontinued. The growing of tobacco was also discontinued at the same time, the people preferring the manufactured product to that cured at home.

Farm operations were at first confined to the uplands because of the comparative ease with which the hills were cleared and put under cultivation, but later the bottom lands were used. The system of cultivating the hill land was careless and wasteful, especially upon the larger plantations, where as soon as the soil became "worn out" the fields were abandoned and allowed to gully and wash, and new fields were cleared, which in turn were abandoned after a few years.

Following the civil war and up to a decade ago the agriculture of the area was of a nonprogressive kind. There was no improvement in the agricultural implements used, in the care of the land, or in the crops grown. Owing to the low price of cotton for many years after the war and to the discouragement of the people many of the small landowners moved to more prosperous farming sections in other States.

The principal areas at present under cultivation are the bottoms and lower hill slopes. In recent years, owing both to the good prices for cotton and to the readjustment of the people to the changed conditions, land all over the area has doubled and in some places trebled in value. The usual price for upland farms is \$10 an acre, while farms about equally divided between the uplands and bottoms bring from \$15 to \$20 an acre. Bottom lands sell for from \$25 to \$35 an acre. Prices vary somewhat according to location, being higher closer to the towns and considerably cheaper farther away.

The agricultural practices are now in a transition stage and of a more constructive character. The people are beginning to realize the value of permanently improving their farms, of rotation and diversification of crops, of improved agricultural implements, and of building better barns and houses. The increased valuation of the property binds the people closer to their homes and no one is moving to more progressive communities elsewhere. Business is upon a firmer basis than ever, the number of farmers who pay cash for supplies instead of buying upon credit becoming greater year by year. As a result of this marked improvement in farm properties all of the chief towns of the area are growing and prospering and new industries are springing up.

Whenever it is possible to do so the majority of farmers use their bottom lands exclusively, the hill land being held in rather low esteem. During a wet season the crops upon the bottom lands suffer from an

excess of moisture. During a dry season, on the other hand, the crops upon the hills are apt to suffer from lack of moisture. The crops should be divided between the bottom lands and the hill lands, and thus insure safe farming and steady prosperity. The majority of farms are not as self-sustaining as they were in the early days. The usual system is decidedly one sided, everything being sacrificed to cotton, a large percentage of the corn, meat, and potatoes consumed being purchased with cotton money. With all the dependence placed upon one crop, and money coming in but once a year, the planters in the majority of cases are still obliged to purchase supplies upon credit, and thus pay more for them than the prosperous farmer who raises a diversity of crops and is able to pay cash. Another result of this one-sided system of farming is that the farmer is often obliged to market his cotton as soon as possible, instead of holding his crop for the best prices.

Short-staple cotton, corn, oats, pears, sweet potatoes, peanuts, sorghum and sugar cane, truck crops, clover, and live stock are the principal farm products of the area. Of these cotton is the most important.

While the area as a whole is well adapted to the crops grown, a great deal is yet to be learned as to the adaptation of the individual soil types to the present crops and to others—for instance, alfalfa, strawberries, melons, and tomatoes—which should be grown. Nearly all the crops are planted indiscriminately upon the different soil types. It is not generally recognized that each soil type is adapted to certain crops and needs special treatment both in methods of cultivation and fertilization in order to secure the best results. It is recognized that of the bottom lands the best for all crops are the smaller branch bottoms and that next in value come the bottoms along the large streams, while the least valuable are the broad second bottoms along the Big Black River.

As a rule very little attention is paid to the matter of crop rotation, many fields having been planted to cotton continuously for over twenty-five years. The usual methods at present are to keep the best land for cotton and the poorest for corn, and to grow each as long as a fair yield is secured.

The question of labor is a serious one and is becoming more so each year. Much of the available labor has been absorbed by the mills, factories, and railroads; and most of that remaining in the country districts lacks efficiency. Very little white labor is obtainable, because it is so easy to acquire property that anyone of ambition may own a farm. The tillers of small farms do most of their own work, while in the case of the larger plantations the custom is to divide them into small parcels and rent each parcel to a colored family. A little labor is hired by the month, the usual price being \$15 a month and board. A great deal of labor is required during cotton picking, and is

supplied by the colored people, the pay for picking ranging from 50 cents to 75 cents per hundred pounds. To the most progressive farmers it is becoming more and more evident that in order to be successful they must either do their own work or give it personal supervision.

Practically all of the land of the area is held by the white population and is free from mortgage. Only about 45 per cent of the farms, however, are worked by the owners, the remaining 55 per cent being parceled out and worked by the colored people under the tenant system. The rental customs in Montgomery County are common to all the hill sections of the State. The tenant may furnish his tools, feed, and horses, and provide for himself and family, receiving two-thirds of the corn and three-fourths of the cotton, or occasionally three-fourths of both. If the tenant has nothing, the landlord furnishes everything and each takes one-half of the crop. Finally the tenant may pay "standing rent," in which case the owner furnishes nothing but the land, and receives from \$2 to \$4 an acre in cash, or a specified number of pounds of seed cotton or bushels of corn. Very little land is leased under the last arrangement except close to towns.

When the tenant works on the "one-half plan" the landowner is usually obliged to go his security with the merchant for a specified amount of supplies, and on the sale of the cotton the account is balanced, the landowner being protected by the landlord's lien. Except in the case of "standing rent" the tenant has free use of the buildings, a garden, and wood, and is permitted to keep cows, pigs, and chickens for family use, and is not chargeable with keeping buildings and fences in repair. A few of the most progressive negroes have purchased small farms. The farms of the county range in size from 40 acres to over 1,000 acres. The usual size, however, is 80 or 160 acres.

The live-stock interests of the area are neglected, hogs being practically the only stock marketed. Generally the cattle kept are inferior, the reason being not so much a lack of pasture or favorable climate as the lack of attention in feeding and housing and a failure to grade the herds up either for general, dairying, or beef purposes. During the past fifty years some pure-bred stock has been introduced, but it has been permitted to mix with the inferior native stock. Dairying receives almost no attention, and it is believed that a few modern dairies would prosper in the vicinity of the larger towns, where most of the families are compelled to keep a cow in order to make sure of their milk and butter supply. A few of the farmers buy up stock in the fall to consume their surplus hay and feed during the winter, but the cattle are usually put upon the market in an unfinished condition and necessarily bring a low price. The demand for farm mules is much greater than the local supply, and since the home-raised animal endures the work and climate better than those shipped

in it is believed that mule raising would prove profitable. Stock can be pastured for at least eight months of the year, and forage crops, such as cowpeas, Japan clover, Bermuda grass, sorghum, corn, millet, winter vetch, oats, and rye, can be grown in abundance. These, together with peanuts, sweet potatoes, acorns, and cotton-seed meal would make a sufficient winter supply. With all of these opportunities within their grasp there is no reason why the farmers of the area should not pay more attention to stock raising and thereby increase the productivity of their soils by the addition of manure.

## SOILS.

The soils of the area are such as to warrant a higher state of productivity and a greater degree of prosperity either in general or special agriculture than prevails at present. They fall naturally into two general divisions—the upland soils and the bottom-land soils. In the upland are found two distinct types—the Memphis silt loam and the Orangeburg fine sandy loam. In the bottoms there occur three types—the Lintonia loam, Waverly silt loam, and Meadow.

The following table gives the actual and relative extent of each of these soil types.

*Areas of different soils.*

Soil.	Acres.	Percent.	Soil.	Acres.	Percent.
Memphis silt loam.....	126,848	48.9	Waverly silt loam.....	24,064	9.3
Orangeburg fine sandy loam..	46,144	17.8	Meadow.....	21,184	8.2
Lintonia loam.....	41,024	15.8	Total.....	259,264	.....

The location and the boundaries of each type are shown upon the accompanying map. None of these types are new, some or all of them having been mapped in areas previously surveyed in Mississippi and in some of the other States of the Atlantic and Gulf coasts.

Three geological formations are represented within the area. The oldest and lowest is the lignitic Eocene, the next above is the Lafayette, and the next above is the loess.

The Eocene formation is composed of white and drab clays, and since it comes to the surface at but a few points and in very limited areas it is negligible so far as influence upon the soils is concerned and does not need to be discussed. The Lafayette is composed of deep-brown, red, and pink clays, sands, and gravels. The region in which this formation occurs is characterized by hilly, rough, and broken topography and excellent drainage. The loess occurs as a thin mantle, which originally covered the whole region. In the western part of the county this mantle is 15 or 20 feet thick, while in the eastern and southeastern parts of the county it thins out, so that at present it is entirely lacking in places or occurs only in small detached areas. This mantle is being removed by erosion, and as the erosion has been most

active along the Big Black River and its larger tributaries more of the underlying Lafayette formation is exposed there. Where the loess is thinnest it has been greatly dissected and eroded, forming narrow gulches, sharp ridges, and deep ravines. Where it is thickest the surface is moderately hilly and rolling, with no very deeply cut steep-sided stream valleys.

The Memphis silt loam and the Orangeburg fine sandy loam are distinct soil types, derived from different geological formations and belonging to different soil series. This, however, does not hold true of the bottom-land soil types, all three of which are closely related, since they are largely sedimentary and have been formed by erosion from the two upland types.

#### MEMPHIS SILT LOAM.

This is the most widely distributed soil type in the area. The soil ranges in depth from 6 to 12 inches, with an average of about 9 inches. Its color varies from light-brown to brown, and in whatever part of the area it may be encountered its texture is uniformly a silt loam. The subsoil to a depth of 3 feet or more varies from a light-brown to a chocolate-brown silt loam with a slightly greater clay content than the soil. The line of demarcation between soil and subsoil is not always distinct.

Owing to its close texture and the composition of both soil and subsoil the type is rather peculiar in its field behavior. Where it is deeply plowed and has an abundance of organic matter incorporated with it the soil is friable and absorbs and retains moisture very well. If not thus cared for, however, it packs and puddles during beating rains, and the water runs off instead of being absorbed. Owing to the tendency of the soil to "melt" and "dissolve" the water carries with it not only great quantities of the surface soil, but also cuts deep vertical gullies.

The Memphis silt loam is found well developed on the uplands in all parts of the area except south of the Big Black River and in the region west and northwest of Kilmichael. It is especially well developed in the western third of the county. Here it is gently to moderately rolling, with no very deeply cut stream valleys. In all other parts of the county, however, it is rolling to hilly. In these latter locations excessive erosion often takes place, many hillsides being washed and gullied beyond reclamation. Owing to its topographic features the surface drainage is naturally good.

The Memphis silt loam is derived from the weathering of the loess, a very uniform material that extends from the bluffs bordering the Mississippi Delta eastward over a large part of the State.

The Memphis silt loam was originally forested with a mixture of pine, post oak, red oak, hickory, and poplar, and a small growth of dogwood. Most of the timber has been removed.

The type can not be said to be particularly well adapted to any one crop, but is a safe soil for all of the general farm crops of the county, besides giving considerable promise as a trucking soil. The yields of cotton range from one-fifth bale to 1 bale per acre, with an average of one-half bale. Corn ranges from 8 to 25 bushels, with an average of about 12 bushels. Oats do very well and are fed in the sheaf. Sweet potatoes are grown in garden patches only, but yield at the rate of from 125 to 250 bushels per acre, the average being about 200 bushels. Cowpeas make an excellent stand, as do also Japan clover and Bermuda grass. These two latter plants are excellent both for hay and pasture. Judging from the small garden patches of strawberries, peanuts, tomatoes, cabbage, radishes, and lettuce seen upon the type, and judging also from the success of these truck crops upon the same type of soil elsewhere in Mississippi, it is evident that the Memphis silt loam in the present area has considerable promise as a trucking soil. By rotation and intensive cultivation all of the average yields of the general farm crops mentioned above can easily be doubled and in some cases trebled.

The cultural methods followed upon the Memphis silt loam are those commonly used on all the different soil types of the county. Shallow spring plowing—from 2 to 4 inches deep—is the usual practice and ridge cultivation is universal. Cotton and corn are planted continuously on the same field as long as it is at all profitable to do so. Eventually the organic matter is exhausted and the soil becomes very susceptible to wash and erosion. During the last few years an attempt has been made to overcome this decrease in productivity caused by loss of organic matter by applications of commercial fertilizers.

To secure the best results on this type of soil deep fall or winter plowing—from 7 to 9 inches deep—exposing the soil to the fining and pulverizing action of the winter freezing and thawing should be practiced. In the spring the land should be thoroughly pulverized with a disk harrow. Ridge cultivation does not seem necessary on the upland soils of this area, and instead of planting cotton or corn continuously some definite rotation of crops should be followed. The following rotation is suggested: Sow oats and after the oats are cut sow cowpeas. In the fall the peas should be cut for hay and the ground plowed deeply. In the spring pulverize the soil thoroughly and plant to cotton without bedding the ground. After the cotton is harvested plow the land deep and expose again to winter freezing. The following spring prepare the soil thoroughly and plant to corn without bedding the ground. The cultivation of both the cotton and the corn should be shallow. At the last cultivation of the corn cowpeas should be sown. The following year the field should be allowed to grow up to grass and be used as a pasture. It is believed that by following this four-year system of rotation the yields could be greatly increased.

For the maintenance of a sufficient supply of nitrogen in the soil cowpeas or other legumes can be depended upon, thus providing for one of the most expensive elements of a complete fertilizer, while the application of barnyard manure would also prove beneficial to the soil.<sup>a</sup>

There are many steep, eroded, gullied hills in the Memphis silt loam type which never should have been cleared and cultivated, but should have been allowed to remain in forest. It is recommended that all of the steeper slopes be left in forest and that the gullies in all of the badly eroded fields be filled with brush and the fields allowed to reforest themselves.

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

*Mechanical analyses of Memphis silt loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
14756.....	Soil.....	0.0	0.5	0.8	1.6	12.0	61.9	23.7
14757.....	Subsoil.....	.0	.2	.3	.6	17.2	59.8	22.2

WAVERLY SILT LOAM.

The soil of the Waverly silt loam is a yellowish-brown silt loam, varying in depth from 6 to 12 inches, with an average of about 10

<sup>a</sup>To investigate the effects of various fertilizing materials upon this soil, six large samples were collected at points near Winona and Kilmichael, Miss. These were taken from fields representing the usual agricultural conditions of the area. Cotton and corn are the principal crops. The land is plowed to a depth of only 3 or 4 inches, and cultivation is, in general, shallow. Upon one of the fields some manure has been used at irregular intervals, about 1 ton per acre, and upon another commercial fertilizer at the rate of 200 pounds to the acre was applied in 1905. In some instances cowpeas are grown with corn but, except for plowing in of the stubble, no crops have been grown for the improvement of the soil. The yields average about one-half bale of cotton and from 20 to 25 bushels of corn to the acre.

The result of tests on these samples, while held to apply strictly only to the fields from which the samples were taken, no doubt indicate in some degree the proper manurial practice for this soil throughout the area. The largest increase in plant growth was obtained by the use of cowpea vines to which lime was added. This increase was somewhat greater than that derived from the use of complete fertilizer with lime or from manure, the two latter being nearly equal. Applications of nitrate of soda, acid phosphate, and sulphate of potash, singly and in combination, gave varying results as to increase in plant growth, the least effective being acid phosphate used alone. The effect of lime applied alone was somewhat beneficial.

The superior results obtained by the use of cowpea vines, and the further observation that stable manure produced an increase in plant growth upon the soil almost equal to that derived from the use of complete fertilizer and lime, is a forcible argument for the introduction of green manuring crops into the rotation upon this soil, when by continuous and clean cultivation it has been deprived of a great proportion of its organic matter. It clearly shows the lack of humus and the importance of humus as a factor in the maintenance of productiveness.

inches. The soil is underlain to a depth of several feet by a silty clay material of drab or gray to almost white color, which in the lower depths contains numerous brown or black iron concretions. Occasionally these concretions are present in the soil and strewn upon the surface.

The type occurs principally as flat areas along the bottoms of all the larger streams in the county. These flat areas vary in width from one-eighth to three-fourths of a mile. It also occurs as a second bottom along the Big Black River, and for a considerable distance up the larger tributaries of that river it is found as an extension of the second bottom. About 90 per cent of the type is under cultivation now or has been at some time in the past.

The drainage of this type never has been good, and this condition, extending over a long period of time, is responsible for the drab-gray color of the subsoil. The flat bottoms are subject to frequent overflow in the winter and to an occasional overflow in the spring and early summer months. Sometimes crops fail altogether because of long-continued floods. When the streams remain at their normal level crops do well, and the possibilities for drainage are good. In most places the type has been greatly improved by large open drains, but much still remains to be done in the way of increasing the number of these large drains, constructing shallow laterals, and installing tile drains.

The Waverly silt loam is alluvial in origin and is still in the process of formation. A large percentage of the material is brought from the surrounding hills and is spread out over the flat bottoms as a thin sediment during each overflow. Since the forests have been removed the water does not stand as long upon the bottoms as formerly, and the drainage conditions are naturally better; but as this is also true of the uplands, the increased washing and erosion in the uplands causes the ditches to fill up and the bottoms to build up more rapidly. In some instances the drab and gray subsoil, which is usually encountered at about 10 inches, is covered over with upland washings to a depth of 2 or 3 feet. Where this was the case and the other conditions warranted it, these areas were mapped as Lintonia loam. The condition just described is particularly apt to occur in the form of natural levees bordering the banks of the large streams.

The trees originally found upon the type were water oak, white oak, maple, hickory, gum, and a few red and post oaks. The type was cleared and put under cultivation with great difficulty, and the fact that at present such a large percentage is under cultivation is evidence of its agricultural value. It is an especially good soil for cotton, corn, sorghum, cane, and hay. Cotton yields from one-half of a bale to 1½ bales per acre, with an average of about 1 bale. Corn ranges from 15 to 30 bushels, with an average of about 20 bushels.

Cane and sorghum are grown only in small patches for home use. The cane yields about 200 gallons of sirup per acre. Bermuda and other grasses can be cut twice a year, giving a total yield per acre of about 3 tons of excellent hay.

The usual method of cropping is to plant cotton and corn year after year without rotation and without making use of leguminous crops or barnyard manure. The practice of constant cropping with clean cultivated crops can be pursued longer upon this type than upon any other in the area without apparent exhaustion of the soil, because it is constantly being changed by materials brought from the uplands.

A great deal of trouble is experienced with cotton rust, and to overcome this the best farmers use kainit at the rate of 300 or 400 pounds per acre. Cotton-seed meal is very beneficial in growing corn, sometimes doubling the yield. Very satisfactory results are obtained without using a complete fertilizer by applying kainit for cotton and cotton-seed meal for corn.

Ridge cultivation is the common practice on this type, and when the ridges are made to run toward the streams the practice is very beneficial, as it facilitates drainage. For this reason it is recommended that the ridge method be continued. It is believed, however, that if the fields were well supplied with large open ditches, shallow laterals, and tile drains there would be less and less need of the ridge method of cultivation. Since the soil is so often flooded in the winter it is necessary to plow it in the spring.

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

*Mechanical analyses of Waverly silt loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
14760, 14762.....	Soil.....	0.3	1.4	2.0	9.4	10.8	57.3	18.7
14761, 14763.....	Subsoil.....	.5	1.8	1.9	10.8	9.9	49.0	26.3

ORANGEBURG FINE SANDY LOAM.

This type varies in color from gray to light brown, but in the virgin fields, where the organic content of the soil is considerable, it is known as "black sandy land." The depth of the soil ranges from 5 to 15 inches, with an average of about 10 inches. In texture it varies from a very fine sandy loam to a medium sandy loam. Occasionally, however, the texture is heavier, a small percentage of silt, the remnants of the loess which once covered the entire county, having been left behind and mixed with the sand. The subsoil to a depth of about

3 feet is a heavy red sandy clay. Below this depth the sand content increases and the clay content decreases.

The Orangeburg fine sandy loam occurs principally south of the Big Black River and in the region west and northwest of Kilmichael. It is also found in small isolated patches in all other parts of the county, but in many places, because of their limited extent, these could not be shown upon the map.

The region occupied by this type is usually hilly, rough, and broken. All of the highest hills show this type, and often it forms long narrow ridges, down whose sides extend eroded gulches, sometimes a hundred feet in depth. It is only occasionally that level areas occur. Owing to the texture of the soil and subsoil and to its topographic position, both the surface and underground drainage are excellent. In fact, the drainage is frequently excessive, and the crops suffer from lack of moisture.

The Orangeburg fine sandy loam is derived from the weathering of the Lafayette formation, and its occurrence in such large areas adjoining the Big Black River and its largest tributaries is due to the more complete removal by erosion of the overlying loess along those streams. The occurrence of this type in small isolated patches in other parts of the area is due largely to the variability of the original deposition of the Lafayette formation and to differences in the degree of subsequent erosion of that formation.

The original growth upon this type was pine and black-jack oak. Most of the pine has been removed, but a great deal of the oak still remains.

All of the crops of the area are grown upon the Orangeburg fine sandy loam, some very successfully and others with very little success. It is unusually well adapted to peanuts, sweet and Irish potatoes, and watermelons. Cotton yields from one-sixth to one-half bale per acre, with an average of about one-fourth bale. The yield of corn ranges from 10 to 20 bushels per acre, with an average of about 15 bushels. Oats are fed in the sheaf, but if thrashed the yield of grain would be low. Sweet potatoes yield from 125 to 250 bushels per acre, with an average of about 200 bushels. The yield of Irish potatoes ranges from 100 to 200 bushels per acre, with an average of about 150 bushels. The yields for all crops are better upon newly cleared land.

The cultural methods upon this type are the same as those followed upon the Memphis silt loam, namely, shallow plowing, ridge cultivation, and constant cropping to cotton and corn without rotation with other crops. It is recommended that, instead of making cotton and corn the money crops upon the Orangeburg fine sandy loam, trucking be made the chief industry. The plowing should continue to be shallow, but the ridge method of cultivation, it is thought, should be discontinued, because it facilitates erosion and hastens evaporation of

soil moisture. When cotton, corn, and oats are grown the rotation may be the same as that recommended for the Memphis silt loam, except that in the fourth year cowpeas should be grown exclusively. Cowpeas should always figure prominently in the rotation and may be depended upon for an adequate supply of nitrogen, besides putting the soil in good physical condition and supplying reasonably large quantities of humus.<sup>a</sup>

The Orangeburg fine sandy loam as at present handled is not a very valuable type, except south of the Big Black River, where it occurs in large areas and is cultivated with a fair degree of success. In all other parts of the county it is held in low esteem, and is in some localities owned and worked mostly by negro farmers. The more hilly areas of this type should be left in forest, and only the moderately hilly, gently rolling, and leveler areas cultivated. It is believed that the higher locations would be excellent for peaches and other small fruit, because the liability of injury from frosts would be less upon these high elevations than in the valleys below.

The following table gives the results of mechanical analyses of a typical sample of the soil and subsoil of the Orangeburg fine sandy loam:

*Mechanical analyses of Orangeburg fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
14766.....	Soil.....	0.2	5.7	8.3	38.6	9.7	30.8	6.6
14767.....	Subsoil.....	.2	5.3	9.3	31.2	5.4	16.6	31.7

LINTONIA LOAM.

The soil of the Lintonia loam is a yellowish-brown silt loam, with an average depth of 10 inches. The subsoil is a yellowish-brown silt loam extending to a depth of 3 feet or more. There is no difference in the texture of soil and subsoil and often there is little difference in

<sup>a</sup> Tests by the wire-basket method, using a large sample of this soil obtained from a field 3 miles west of Kilmichael, show that this soil is responsive to applications of fertilizer in the form of nitrate of soda, sulphate of potash, and acid phosphate, used either singly or in various combinations, the greatest increase being observed when all three are used with the addition of air-slaked lime. Good increases were also obtained from the use of cowpea vines to which lime was added, and with stable manure.

Of the single fertilizer ingredients, nitrate of soda gave the highest increase, and its influence was apparent when used in combination with either of the other elements. Lime, acid phosphate, and sulphate of potash used separately were each beneficial.

While the results are held to be strictly applicable to this field only, they will doubtless apply to much of this type in this vicinity. They agree well with the experience of the owner of the field from which the sample was taken, who in 1905 with the application of 300 pounds of fertilizer to the acre obtained a very substantial increase in cotton over the crop of 1903 when no fertilizer was used.

color. Throughout the profile there is a small percentage of very fine sand, and often this sand occurs as thin layers in the subsoil. Owing to its texture and surface features the Lintonia loam is the easiest soil in the county to work and is practically all under cultivation.

This is the most widely distributed soil type in the county, being found along the streams in all parts of the area. It occupies the branch bottoms and the talus slopes bordering the large stream bottoms, hence its surface features vary from level, or nearly level, in the branch bottoms to gently sloping on the talus slopes.

The Lintonia loam is both colluvial and alluvial in origin, being the wash from and constituting a mixture of the two upland soil types, the Memphis silt loam and the Orangeburg fine sandy loam. The small percentage of very fine sand in both soil and subsoil and the thin layers of this sand in the subsoil are the result of wash from the Orangeburg fine sandy loam.

In the stream bottoms, owing to the slight rise each way from the stream to the foot of the hills and to the thin layers of sand in the subsoil, both the surface and underdrainage of the Lintonia loam are good. These bottoms, however, are frequently flooded during the winter months and occasionally during the growing season, but they are seldom under water for more than an hour or two at a time. These brief inundations are regarded as of more benefit than injury, since each one leaves a thin deposit of rich material washed from the uplands. As a whole the type would not be benefited by tile drainage. It is advised, however, that a ditch be dug at the base of the hills so as to carry off the seepage water and rain wash from the uplands.

The native growth upon the Lintonia loam consisted of birch, gum, poplar, beech, ash, and hickory. Practically all of this timber has been removed.

The crops grown upon this type are cotton, corn, sorghum, and sugar cane. It is unusually well adapted to these crops, besides being well suited to oats, Irish potatoes, grass, and pasture. It is also very good soil for strawberries, garden vegetables, pears, and plums. Cotton yields from one-half bale to  $1\frac{1}{4}$  bales per acre, with an average of about three-fourths bale. Corn yields from 15 to 50 bushels per acre, with an average of about 25 bushels. Sorghum and sugar cane yield very well, but only enough is grown for home use. Irish potatoes yield from 100 to 200 bushels per acre, with an average of about 150 bushels. Scarcely enough of these are grown for home use. Oats yield very well, but are fed in the sheaf. This type would also seem adapted to trucking and fruit growing, especially for pears and plums.

The usual practice upon this type is shallow spring plowing, ridge cultivation, and constant cropping to cotton and corn without rotation with other crops. This is naturally the most productive type

in the area, and farms are usually selected with a view of having as much as possible of it upon them. One reason why the Lintonia loam continues to be the most productive soil type in Montgomery County, in spite of the careless methods and constant cropping without rotation, is because it is not subjected to washing and erosion and is constantly being added to by deposits of soil and organic matter from the uplands.<sup>a</sup>

The following table gives the results of mechanical analyses of a sample of the soil and subsoil of the Lintonia loam:

*Mechanical analyses of Lintonia loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
14752.....	Soil.....	0.1	0.4	0.5	2.7	18.5	60.2	17.1
14753.....	Subsoil.....	.0	.1	.0	.8	19.1	53.5	26.4

#### MEADOW.

The upper few inches of the material composing the Meadow is a brown silt loam. The underlying material to a depth of several feet is a drab or gray silt or silty clay. Adjacent to the streams, old bayous, and sloughs there is often considerable sand in both soil and subsoil.

In the present area this type includes all flood lands that are now unsuitable for tillage and never have been cleared of the original heavy growth of timber. This growth consists of sweet and black gum, sycamore, poplar, beech, water oak, and some cypress.

The greatest development of this type is found along the Big Black River, in the southeastern part of the area, where it occurs as a strip about 15 miles long and 2 miles wide. It is also found along some of the largest streams in other parts of the area.

<sup>a</sup>In order to determine the manurial requirements of this soil, a study was made of a sample by the wire-basket method. This sample was obtained a short distance south of Kilmichael, Miss., from a field which has been in continuous cultivation for over forty years, cotton and corn being grown alternately.

The tests show the largest increase from the use of cowpea vines with lime, and this was considerably in excess of that obtained through any other treatment. Stable manure also gave a good increase. Nitrate of soda alone gave better results than either sulphate of potash or acid phosphate used singly, and by itself was as effective as any of the combinations.

The manifest need of maintaining the humus content of soils is strikingly brought to notice in these tests. Similar benefits may reasonably be expected to follow the introduction of green manuring crops in a regular system of rotation upon soils which have been subjected to similar clean-culture conditions, so that while these results are held to be strictly applicable only to the field from which the sample was taken, they will doubtless apply to many others which have been subjected to the same system of cropping.

The surface of the Meadow is always flat, and is broken only by sloughs, old oxbows, and bayous—former channels of the present streams. Along the Big Black River the surface of the type is about 10 feet above the river when the water is at its normal level. It is much less than this along the other streams where it occurs.

It is liable to be flooded at any season of the year, and after heavy rains it is always covered with water, which sometimes stands for weeks at a time.

This type is sedimentary in origin, being formed by wash from the uplands. It is still in process of formation, each successive flood bringing with it material that is left as a thin deposit over the bottoms. The soil is rich in organic matter, and if cleared, ditched, and diked it would be a very productive type. At present it is of value only for its timber and the pasture it furnishes during the summer. It supports a good growth of cane and wild grasses.

#### SUMMARY.

Montgomery County is located in north-central Mississippi, comprises an area of about 405 square miles, or 259,264 acres, and is representative of a large part of the hill section of the State. It lies within the Mississippi basin, and all of its drainage waters flow into that river. In general, the surface is hilly and rolling, with numerous small streams, nearly all of which have fertile bottoms.

The present inhabitants of the county are nearly all descendants of settlers who came from the Carolinas, Georgia, Virginia, Tennessee, and Kentucky before or about the middle of the last century. The area has been practically free from the flood of foreign immigration which has swept over parts of the United States during the last half century.

The county is fairly well supplied with railroads, being crossed in a north and south direction by the Illinois Central, and in an east and west direction by the Southern Railway. It is covered by a network of public roads, which are good, except in very wet weather. The country houses have a daily rural free delivery of mail, and are nearly all supplied with telephones. Several towns situated on the railroads furnish a market place for the farm products.

Montgomery County has a warm, temperate climate. The summers are long, warm, and pleasant, and two or more crops may be grown upon the same land during one season. The winters are short and mild, with very changeable weather. Heavy rains often occur during January, February, and March, causing a great deal of damage to the uplands by washing and erosion, and to the lowlands by flooding and filling up the drainage ditches. The average length of the growing season is nearly seven months.

Short-staple cotton, corn, oats, pears, sweet potatoes, peanuts, sorghum and sugar cane, truck crops, clover, and live stock are the principal farm products of the county. The usual farming system is decidedly one-sided, everything being sacrificed to cotton, a large percentage of the corn, meat, and potatoes consumed being purchased with cotton money. The methods in use are not the best, many farms being operated entirely on the "one-horse" system. It is only upon the best managed and most productive farms that the large, efficient 2-horse plows, cultivators, disk harrows, and other improved implements are used. As a rule, very little attention is paid to the matter of crop rotation, many fields having been planted to cotton continuously for over twenty-five years.

The question of labor is a serious one and is becoming more so each year, much of the available labor being absorbed by the mills, factories, and railroads. The owners of small farms do most of their own work, while in the case of the large farms and plantations the custom is to divide them into small parcels and rent each parcel to a colored family.

Practically all of the land of the area is held by the white population and is free from mortgage. Only about 45 per cent of the farms are worked by the owners, the remaining 55 per cent being worked by colored people under the tenant system. Where the tenant furnishes his tools, feed, and horses and provides for himself and family, he receives two-thirds of the corn and three-fourths of the cotton. Where the tenant furnishes nothing but his labor, he receives one-half the crop. In this case the landowner furnishes the tools, work animals, and seed and goes security with some merchant for a specified amount of supplies for the tenant. When the crop is sold the account is balanced, the owner being protected by the landlord's lien.

The soils of Montgomery County fall naturally into two general divisions—the upland soils and the bottom-land soils. The upland is occupied by two distinct types—the Memphis silt loam and the Orangeburg fine sandy loam. The bottom land comprises three types—the Lintonia loam, Waverly silt loam, and Meadow. The two upland soils are derived from different geological formations and belong to different soil series. The three bottom-land types are closely related, since they are largely sedimentary and have been formed by wash from the two upland types.

The Memphis silt loam, the most extensive type in the area, is the best all-around general farming soil. It is used for cotton, corn, oats, sweet potatoes, cowpeas, Japan clover, and Bermuda grass. Because of the success of strawberries and tomatoes upon this type in other areas in Mississippi it is recommended that these crops be grown here upon a commercial scale.

The Orangeburg fine sandy loam is not naturally a strong soil for cotton and should be used for the crops to which it is especially adapted in this climate, namely, peanuts, sweet potatoes, watermelons, Irish potatoes, and, upon the highest elevations, peaches.

The Lintonia loam is very well adapted to cotton and corn, as well as to all the other crops of the region. Strawberries would do well upon this type, and it has great possibilities for trucking purposes.

The Waverly silt loam needs special treatment in order to grow cotton successfully. When well drained, it is an exceptionally good soil for corn, sugar cane, and sorghum.

The Meadow is of no value at present except for its timber and as a summer pasture for cattle and hogs.

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