

SOIL SURVEY OF BUTLER COUNTY, ALABAMA.

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DESCRIPTION OF THE AREA.

Butler County is situated in the south-central part of Alabama, midway between the eastern and western boundaries of the State. It is bounded on the north by Lowndes and Wilcox counties, on the east by Crenshaw County, on the south by Covington and Conecuh counties, and on the west by Conecuh, Monroe, and Wilcox counties. It lies between $31^{\circ} 31' 35''$ and $31^{\circ} 57' 41''$ north latitude and $86^{\circ} 27' 36''$ and $86^{\circ} 55' 13''$ west longitude and has an area of 493,248 acres, or about 771 square miles.

The surface features of Butler County are quite varied. Generally speaking, the topography is hilly or rolling, though limited areas of level land are frequently found on the high plateaus and in the lowlands along the streams. Formerly the topographic features of the county were considerably more uniform than they are to-day. Except in the northwest and southeast corners, where increases of elevations are quite marked, the hilly appearance of the county is not so much due to the presence of old established hills as to the occurrence of many deep gullies, which the streams have eroded through the otherwise level plain. While these gullies are not confined to any particular section, they are deepest and most numerous in the northern half of the county, where are to be found the sources of nearly all the streams, which fact accounts for the markedly irregular and broken topography.

By reference to the accompanying soil map it will be seen that the surface of Butler County is exceptionally well drained. Beginning

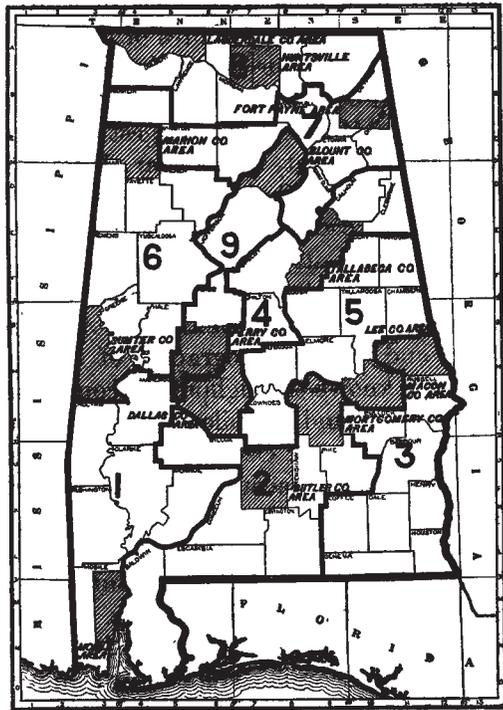


FIG. 14.—Sketch map showing location of the Butler County area, Alabama.

near the point where the Louisville and Nashville Railroad enters the county from the north there extends across the county in a south-westerly direction a low, narrow table-land marked on the map by the position of the old Federal road. This ridge cuts the county into two unequal parts and forms the divide between the two chief systems of drainage. To the east and south of this ridge occur a number of streams, of which the most important are Pigeon, Persimmon, Three Runs, Halls, Rocky, Panther, and Long creeks. These streams all flow in a southerly direction and finally reach the Gulf at Pensacola through the Escambia River and Pensacola Bay. Along their courses flat overflow lands are usually found, flanked on each side by steep slopes from 30 to 60 feet in height. These lowlands range from one-fifth of a mile to 2 miles in width and form one of the most notable topographic features of the county.

West of the divide the drainage waters flow in a westerly or north-westerly direction to the Alabama River, through which they enter the Gulf at Mobile. The largest and most important streams in this part of the county are Cedar, Wolf, Breastwork, and Pine Barren creeks. Muscle, Saddler, and Ishams creeks, tributaries of Cedar Creek, are also important streams entering the county from the north. These streams differ from those in the southern part of the county in that they occupy deeper and narrower valleys, whose walls are steep and precipitous. This condition has given rise to a very rough and rugged topography, of which the most prominent feature is what is known throughout the county as the "ridge." This "ridge" is a strip of land 10 miles or more in length which forms the divide between Wolf and Cedar creeks. Its height ranges from 100 to 200 feet above the adjacent bottoms. In places it has become extremely narrow, being barely wide enough to accommodate the road which follows it from end to end.

The present population of Butler County is made up chiefly of natives of the State of Alabama. According to the census of 1900, the population in that year was 25,760. The first settlers came from the State of Georgia, though later many families from South Carolina, North Carolina, and Virginia found their way to this region.

Although the county was first permanently settled more than ninety years ago, much of it still remains in its original forested condition. According to the census of 1900, only 27 per cent of the total area of the county was classed as improved farms. During the last seven years immigration has added somewhat to the population of the county, especially in the southern part. Fifty years ago one of the principal settlements was on the "ridge" in the vicinity of Cedar Creek, but with the opening of transportation facilities farther to the east this region was almost abandoned by the whites and is now largely occupied by negro tenants.

Greenville, the county seat, with a population of about 5,000, and located on the Louisville and Nashville Railroad, is the largest and most important shipping point. Georgiana, Chapman, Dunham, Garland, and Bolling are small towns on the main line of the Louisville and Nashville Railroad and serve as important shipping points for all farm products. At Chapman and Dunham lumber mills are operated continuously throughout the year, and furnish employment to a large force of men. Three spur railroads, used exclusively for lumbering purposes, lead out from these mills into various parts of the county, making it possible to conduct the industry on an extensive scale. McKenzie, located in the southern part of the county on the Alabama and Florida Railroad, is a growing town and an important shipping point for that part of the area. Scattered throughout the western part of the county are centers of from 200 to 300 inhabitants, of which Forest Home, Monterey, and Manningham are the most important.

Except in the southeastern and northwestern parts of the area the transportation facilities are good. The main line of the Louisville and Nashville Railroad crosses the county in a northeast and southwest direction and forms direct connection with Mobile and New Orleans and all the principal cities of the North and East. From Georgiana the Alabama and Florida Railroad, a branch of the Louisville and Nashville, extends 100 miles in a southeasterly direction to Graceville, Fla.

The principal markets for the cotton of the county are Mobile and New Orleans, and for the vegetables and truck Chicago, Cincinnati, and Pittsburg.

CLIMATE.

The geographic position of southern Alabama in the Gulf Coastal Plain is such as to give it a mild, temperate climate. Though the summers are long, the heat is somewhat tempered by the cool breezes from the Gulf, while the winters are short and long periods of cold are exceptional.

As there is no Weather Bureau station in Butler County the data given in the tables below have been taken from the records of the stations at Fort Deposit and Evergreen—the former being located just a few miles outside of the county to the north and the latter 10 miles to the southwest of the county. These figures, which represent approximately the climatic conditions of Butler County, show that the mean temperature during June, July, and August is 80° F., and for December, January, and February about 49° F.

From 1897 to 1904 the average date of the last killing frost in spring at Fort Deposit was March 17 and at Evergreen March 11, while the average date of the first killing frost in fall at Fort Deposit

was November 21 and at Evergreen November 8. Thus it is seen that the growing season for even the tenderest vegetables covers a large part of the year. During the winter months a large variety of forage crops continue to thrive and furnish feed for stock. Most of the plowing is done in January and February, and farming operations can be carried on during every month of the year.

The mean annual precipitation as recorded at the Evergreen station is 52.40 inches, with a good distribution throughout the year. The following tables show the mean annual and monthly temperature and precipitation and the dates of last and first killing frosts at the two stations named:

Normal monthly and annual temperature and precipitation.

| Month. | Fort Deposit. | | Evergreen. | | Month. | Fort Deposit. | | Evergreen. | |
|--------------|---------------|-----------------|---------------|-----------------|--------------|---------------|-----------------|---------------|-----------------|
| | Temper-ature. | Precipi-tation. | Temper-ature. | Precipi-tation. | | Temper-ature. | Precipi-tation. | Temper-ature. | Precipi-tation. |
| | ° F. | In. | ° F. | In. | | ° F. | In. | ° F. | In. |
| January..... | 46.2 | 4.58 | 48.2 | 3.00 | August..... | 80.0 | ..... | 80.0 | 5.26 |
| February ... | 49.4 | 5.86 | 51.1 | 6.14 | September .. | 75.9 | 2.36 | 74.9 | 3.13 |
| March..... | 57.6 | 6.30 | 57.2 | 5.64 | October..... | 65.3 | 2.74 | 64.8 | 2.23 |
| April..... | 66.2 | 3.64 | 65.5 | 3.69 | November .. | 55.7 | 3.78 | 56.0 | 2.18 |
| May..... | 73.9 | 3.02 | 72.7 | 2.58 | December... | 49.5 | 4.84 | 49.8 | 5.86 |
| June..... | 79.4 | 4.42 | 78.3 | 6.35 | Year..... | 65.0 | ..... | 64.9 | 52.40 |
| July..... | 81.2 | 4.71 | 80.6 | 6.34 | | | | | |

Dates of first and last killing frosts.

| Year. | Fort Deposit. | | Evergreen. | | Year. | Fort Deposit. | | Evergreen. | |
|-----------|-----------------|----------------|-----------------|----------------|-----------|-----------------|----------------|-----------------|----------------|
| | Last in spring. | First in fall. | Last in spring. | First in fall. | | Last in spring. | First in fall. | Last in spring. | First in fall. |
| 1897..... | Mar. 3 | ..... | Mar. 1 | Nov. 30 | 1902..... | Mar. 20 | Nov. 28 | Mar. 18 | Nov. 27 |
| 1898..... | Apr. 6 | Nov. 22 | ..... | Oct. 27 | 1903..... | Feb. 25 | Oct. 25 | Feb. 22 | Oct. 24 |
| 1899..... | Apr. 6 | Dec. 5 | ..... | Nov. 5 | 1904..... | Mar. 4 | Nov. 28 | Mar. 4 | Oct. 24 |
| 1900..... | Mar. 18 | ..... | Apr. 5 | Nov. 10 | Average. | Mar. 17 | Nov. 21 | Mar. 11 | Nov. 8 |

AGRICULTURE.

The first permanent settlement made in Butler County was in 1815, near what is now known as Pineflat. In 1819 the county was regularly organized, and two years later Greenville was founded as its county seat. About this time agriculture began to be developed in the northwestern part of the county on the rich bottom lands of Wolf and Cedar creeks. At first the planters built their homes on the lowlands which they farmed, but finding the location unhealthful they soon moved their families to the high, sandy "ridge," where for over half a century they continued to live and till the rich alluvial lowlands. From the first, cotton and corn were the chief crops grown. Sufficient wheat and vegetables for home consumption were also pro-

duced. Cattle and hogs were soon introduced and all the meat used was produced at home. No fertilizer was used and the meager cultivation which the land received soon caused the lighter types of soil to become worn and unproductive. As this occurred the corn and cotton crops were moved to newer fields, while the old lands were abandoned and allowed to grow up to forests of scrub pine. Until about 1860 the farmers continued to grow their own wheat, the thrashing being done by thrashers usually stationed at the cotton gins. But with the high price of cotton immediately following the civil war the wheat crop was dropped from the rotation and a larger acreage was devoted to the production of the former crop.

The completion of the railroad from Montgomery to Mobile opened a market on the Gulf and gave a great stimulus to the agriculture of the county, especially to the production of cotton. When the price of this staple began to decline the acreage of oats was increased, reaching 15,350 acres in 1885, though in 1900, according to the Twelfth Census, it had dropped again to only 4,618 acres. In 1885, however, the acreage of cotton was twice that of corn. During the last few years the production of oats has again increased, it having been found more profitable to raise this grain for stock than to devote so large an acreage to the production of corn.

The introduction of truck crops in the vicinity of markets has also had a salutary effect on the agriculture of the county in encouraging the diversification of crops.

According to the census of 1900, the total value of products not fed to live stock was \$1,325,370. Of this amount \$1,057,350 represented cotton alone. The miscellaneous vegetables were valued at \$32,991, and the 1,181 acres of sugar cane grown produced 125,421 gallons of sirup, which was valued at about \$50,000. Although the trucking industry has been introduced recently, the crops grown have been of splendid quality and have brought good prices in the northern markets.

As a rule, little attention is given to the adaptability of the different soils to crops. Cotton and corn are grown on all the soils, regardless of the open structure of some of the sandy types. Where facilities for marketing can be had the adaptability of the Norfolk fine sand and the Orangeburg soils to fruit and truck crops is generally recognized. However, the chief rotation practiced in the county is cotton followed by corn, and cotton again the third year. In late years it has become the custom to plant cowpeas in the cornfields during the latter part of the summer, in which case the crop not only furnishes good fall pasturage, but also leaves in the soil a large quantity of nitrogen and organic matter.

The methods used in Butler County are those peculiar to the Southern cotton States. Only on the heavy soils are 2-horse implements

used, and even then the plowing is shallow. The lighter soils are usually broken with a small 1-horse plow in January or February to an average depth of from 3 to 5 inches. In preparing the land for cotton or corn the most usual practice is to turn two furrows together in such a way as to form a ridge between the rows of the previous season. Later two other furrows are thrown to this ridge and the preparation for the crop is complete. Sometimes the land is plowed only where the crop is to be planted, the ground between the rows being left untouched until the summer cultivation. This practice is very unprofitable, as the crops produced are usually small. Where the land is subject to erosion, terraces are constructed, and considerable attention is given to making the rows conform to topography. Very little machinery is used in the county. Oats are usually sown by hand in the fall. During the last few years it has been a common practice to sow them on unplowed ground and cover them with a common turning plow. No grain is thrashed, the oats being cut for hay or bound and fed to stock in the sheaf.

Except in a few localities the fertilizing value of cotton seed does not seem to be appreciated. A large proportion of the cotton seed produced in the county is sold at the oil mills, though the price received is less than their value if used as a fertilizer at home.

According to the United States census of 1900, \$54,500 was expended for commercial fertilizers alone, while the total expense for labor for that year was only \$64,080. The usual wage paid ranges from \$10 to \$15 a month. In the spring, when extra help is needed for chopping cotton, laborers are paid from 50 to 75 cents a day, with partial board, and in the fall, when cotton is picked, from 50 to 75 cents per 100 pounds—the women and children being important factors in the gathering of the crop. The labor of the farms is almost exclusively of the negro race. The authority quoted gives the proportion of the farms of Butler County operated by the owners as 40 per cent, and this is probably about the proportion to-day. Most of the rented land is worked for a part of the crop, the owner receiving one-half of the crop when he furnishes the land, teams, buildings, and implements, and one-third of the corn and one-fourth of the cotton when he furnishes only the land. When cash rent is paid, about \$2.50 an acre is the average rate.

In 1900, according to the Twelfth Census, the county contained 334,719 acres in farms, of which 134,763 acres, or about 40 per cent, was improved. The average size of the farms was 103 acres. The total value of farm lands in 1900, including buildings and improvements, was \$1,830,925. A large proportion of the farm lands of the county is held at from \$4 to \$7 an acre, although a few of the farms near Greenville and in the vicinity of Forest Home are valued as high as \$100 an acre.

The great needs of the agriculture of the county are a greater variety of crops and more thorough cultivation. Instead of using the land almost entirely for cotton and corn, other crops, such as fruit, tobacco, Irish potatoes, and a variety of truck should be introduced. Rarely should a rotation be practiced which does not provide for live stock on the farm, which means that grasses, peas, velvet beans, and other forage crops must be grown as well as cotton and corn. Such a practice would not only furnish at nominal cost a large amount of valuable fertilizer, but a cover crop for the soil throughout the winter months, which would be of much service in preventing the damage of fields by erosion.

Although the practice of terracing the land is quite general, many valuable areas throughout the county are ruined each year by erosion. To aid in preventing this waste the land should be plowed deeper and the heavy subsoil brought up and mixed with the soil. In some cases where erosion has just begun it would doubtless be well to discontinue cultivation, first seeding to grass and turning the land into a range for stock. For this purpose no better crops can be found than Bermuda grass and burr clover. The dense roots of the Bermuda grass soon take possession of the soil, binding it firmly in place, while the combination of plants makes excellent pasturage for stock the year round.

Throughout the county a more thorough system of cultivation is badly needed, but during the last few years the supply of available labor has been gradually growing less, while the acreage of cotton has remained about the same, if it has not actually increased. Under these conditions the acreage of cotton should be reduced and a greater proportion of the land devoted to live stock. The advantages of such a course are obvious. The introduction of live stock would provide another much-needed source of revenue and would have a tendency to build up worn-out land. By reducing the cotton acreage a saving would be effected in the outlay for commercial fertilizers, while the better culture which could be given the crop would result in the production of a greater quantity of lint per acre at a reduced cost per pound.

SOILS.

Butler County lies near the northern limits of the physiographic division of the United States known as the Gulf Coastal Plain. The soils are derived from the weathering and reworking of marine deposits. Broadly speaking, they may be divided into two general classes—the upland or sedimentary soils, and the lowland or alluvial soils.

Owing to the different sources from which the materials have been derived and because of present differences in color, structure, and

drainage, the soils of the uplands fall naturally into the four groups or series. These are called the Orangeburg, Susquehanna, Norfolk, and Houston series, the soils belonging to the first three series occupying probably four-fifths of the entire area of the county. As the material forming distinct series differs in texture or in depth, it is again divided into separate classes known as soil types. Thus the Orangeburg series is represented in the county by five soil types, the Norfolk series by three, and the Susquehanna series by two, while the Houston possesses only one.

Geologically, the formation of the soils dates from three great periods or ages—namely, the Cretaceous, the Tertiary, and the present. Although Cretaceous rocks occur more or less generally throughout the northern part of the county, the formation gives rise to but one soil type. This type, designated on the accompanying map as Houston clay, is a heavy black soil found only in limited areas in the northwest corner of the county.

The Eocene-Tertiary has contributed more to the soils of the county than has any other geological horizon, being represented by the Clayton, Lignitic, and Claiborne stages. These formations, while sufficiently distinct in a geological sense, do not differ enough in essential features to impress marked characteristics on the soils derived from them. Hence the types occurring on the one are as frequently found occurring on the other.

The chief evidences of the Clayton stage are found in the limonite rocks, which occur throughout the Orangeburg and Susquehanna soils to the north of Greenville, in the vicinity of Searcy Station. Immediately south of this formation begin the soils of the Lignitic stage, which cover the greater part of the area. Only in the rough, hilly section in the southeast corner of the county is the influence of the Claiborne stage in evidence. Here the soils are still of the Orangeburg and Susquehanna series and do not differ materially from those in other parts of the county.

Except in the lowlands of Wolf and Cedar creeks, where a heavy, black phase of Meadow occurs, most of the alluvial soils are found in the southern half of the county. These, exclusive of Meadow, consist of three types—Myatt fine sand, Myatt fine sandy loam, and Ocklocknee clay. With the exception of the latter type, and the black clay in the northwest corner of the county, all the alluvial soils are covered by a mantle of fine gray sand. The black clay above referred to is derived from the adjoining type of Houston clay, and if found in sufficient extent would doubtless be correlated with the Wabash clay of other areas.

The county has 16 distinct soil types, all of which are common to the other States of the Gulf Coastal Plain. Usually the corresponding types of the same series are in the main identical, though minor,

unimportant variations are sometimes noted. Examples of such variations in Butler County are seen in the Norfolk and Susquehanna fine sandy loams. Here the yellow clay subsoil of the Norfolk fine sandy loam is of a reddish hue, while in the States west of the Mississippi River it is more frequently a bright yellow. So, too, the subsoils of the Susquehanna fine sandy loam sometimes differ slightly, due to the fact that in Butler County the underlying Cretaceous rock is considerably nearer the surface than it is in some other areas.

The following table gives the names and areas of the several soil types shown on the accompanying map:

Areas of different soils.

| Soil. | Acres. | Per cent. | Soil. | Acres. | Per cent. |
|----------------------------------|---------|-----------|--------------------------------|---------|-----------|
| Susquehanna fine sandy loam..... | 147,072 | 29.8 | Norfolk sand..... | 20,544 | 4.2 |
| Orangeburg fine sandy loam..... | 89,856 | 18.2 | Houston clay..... | 10,880 | 2.2 |
| Myatt fine sandy loam..... | 41,536 | 8.4 | Greenville fine sandy loam.... | 9,152 | 1.9 |
| Meadow..... | 37,248 | 7.5 | Orangeburg sand..... | 4,096 | .8 |
| Orangeburg fine sand..... | 34,304 | 6.9 | Orangeburg sandy loam..... | 3,264 | .7 |
| Norfolk fine sandy loam..... | 25,472 | 5.2 | Orangeburg clay..... | 1,728 | .4 |
| Norfolk fine sand..... | 23,296 | 4.7 | Ocklocknee clay..... | 768 | .2 |
| Susquehanna clay..... | 22,656 | 4.6 | Total..... | 493,248 | ..... |
| Myatt fine sand..... | 21,376 | 4.3 | | | |

ORANGEBURG FINE SAND.

The soil of the Orangeburg fine sand consists of from 15 to 36 inches of gray fine sand. At an average depth of 20 inches begins a red, sandy clay which continues to a depth of several feet. The surface when the fields are dry is almost white and resembles the soil of Norfolk fine sand, the only difference between the two types being in the depth and character of the subsoil. The soil is free from stones or gravel and the loose structure makes it easy to cultivate.

The Orangeburg fine sand is of relatively small extent, though it occurs in a number of small bodies scattered throughout the county, being most prominent in the vicinity of Greenville and along the west side of Pigeon Creek. It usually occupies level uplands or gentle slopes leading down to streams. Both surface drainage and under-drainage are good. The soil retains moisture fairly well.

The Orangeburg fine sand is a sedimentary soil formed by the weathering of the Lafayette clays and sands. The native vegetation is red oak, black-jack oak, post oak, and hickory.

The type responds quickly to fertilization and admits of cultivation under a wide range of moisture conditions. Besides the staple crops the soil is adapted to peaches, tomatoes, melons, and other early truck. At present, aside from a few small peach orchards, the land is used only in the production of cotton and corn. The yield of cotton

is one-fourth to one-half bale per acre, with an average of about one-third bale; corn yields from 12 to 20 bushels, with an average of about 15 bushels per acre.

As is the case with all the sandy soils of the area, the greatest need of the type is more organic matter. In the absence of live stock this can be best supplied by turning under green manures. For this purpose cowpeas will prove a valuable crop, adding not only organic matter but considerable nitrogen to the soil.

Except in the southern part of the county, a large proportion of the Orangeburg fine sand is under cultivation. The value ranges from \$7 to \$15 an acre, depending on location and improvements.

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

Mechanical analyses of Orangeburg fine sand.

| 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. | <i>Per cent.</i> |
| 16367..... | Soil..... | 0.7 | 4.0 | 5.5 | 45.4 | 25.9 | 14.2 | 4.4 |
| 16368..... | Subsoil..... | .6 | 5.0 | 3.3 | 29.8 | 23.0 | 14.6 | 23.0 |

ORANGEBURG SANDY LOAM.

The Orangeburg sandy loam to a depth varying from 4 to 15 inches consists of a medium gray to brown sand or light sandy loam. At an average depth of about 10 inches the soil gives place to a red sandy clay containing a high percentage of mica, iron concretions, and small gravel. There are compact layers through both soil and subsoil, probably due to the presence of lime and iron salts. Except for this the soil is mellow and easily tilled.

As is the case with all the coarser soils, the Orangeburg sandy loam occurs only in the northern part of the county. The principal bodies are found on what is known as the "ridge" in the vicinity of Manningham and Forest Home. The topography is hilly and broken, the type being found on high ridges and steep slopes, which positions insure excellent surface drainage.

The Orangeburg sandy loam is a sedimentary soil derived from the Lafayette formation. In its original condition the material consisted of clay covered by a mantle of soil much deeper and heavier than at the present time, but the rain waters have carried away most of the fine material in the soil and left only a shallow covering of coarse sand above the clay.

Where unimproved the soil supports a growth of red oak, white oak, post oak, and hickory. If well fertilized it is productive and adapted to a variety of crops. Peaches, small fruits, and early truck should do well and could doubtless be produced at a good profit on the areas nearest to markets and shipping points.

The principal crops grown at present are cotton and corn. The former yields from one-fourth to one-half bale per acre, with an average of about one-third bale, and the latter from 12 to 20 bushels, with an average of about 16 bushels per acre.

Owing to the open structure of the soil and the shallow plowing practiced the land dries out rapidly in the spring and may suffer from drought during the growing season. The soil is deficient in organic matter and would be greatly benefited by deeper plowing and the turning under of leguminous crops as green manures.

About one-half of the Orangeburg sandy loam in the county is under cultivation. It is held at from \$7 to \$10 an acre.

The results of mechanical analyses of the soil and subsoil of this type are given in the following table:

Mechanical analyses of Orangeburg 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. | <i>Per cent.</i> |
| 16359..... | Soil..... | 0.0 | 5.4 | 22.7 | 37.9 | 14.4 | 16.8 | 2.9 |
| 16360..... | Subsoil..... | 4.8 | 15.4 | 5.7 | 18.1 | 10.0 | 16.7 | 29.6 |

ORANGEBURG FINE SANDY LOAM.

The soil of the Orangeburg fine sandy loam is a gray medium to fine sand or fine sandy loam. The depth ranges from 4 to 15 inches, with an average of about 10 inches, where a subsoil of a red sandy clay is found extending to a depth of 36 inches or more. Scattered over the surface frequently occur small iron concretions and iron sandstones, but these are never so numerous as to interfere with cultivation.

The Orangeburg fine sandy loam is widely distributed in Butler County. The most extensive bodies are found east of Greenville and in the western part of the county in the vicinity of Forest Home, Monterey, and Pineflat. Smaller bodies occur in various parts of the county. The Orangeburg fine sandy loam has a variety of topographic features, ranging from steep, rugged hillsides to broad, level plains. The larger bodies, especially those near Greenville and at Forest Home, are level or gently rolling. As a rule, the drainage is good; in fact, on the hillsides it is apt to be excessive. East of Greenville there are several square miles of almost level land and there the drainage is rather poor. Tile drains would be of great benefit in that area, especially during the wet spring months.

The Orangeburg fine sandy loam is derived from the sands and clays of the Lafayette formation. The native vegetation is red oak, white oak, hickory, and longleaf yellow pine. Near Pineflat is one of the most productive bodies of this type, made so, it is said, by the

decay of the plant remains derived from the heavy growth of oaks and hickory which originally covered this section. East of Greenville and in the vicinity of Forest Home a greater proportion of the forest growth was pine, which in its decay seems to contribute less to the soil than do the hardwoods.

The Orangeburg fine sandy loam is one of the earliest soils in the county, and is admirably adapted to the production of fruits and truck crops. Peaches especially do well, though as yet only a few orchards of commercial importance are planted on this soil. Judging from the success which has attended the growing of Cuban seed tobacco on the Orangeburg fine sandy loam in other sections of the State, there seems little doubt that the same type of leaf can be successfully grown in Butler County.

The soil is also well adapted to the production of strawberries, though the difficulties of securing labor and, in many cases, the present lack of transportation facilities are drawbacks to the development of the industry. Cotton and corn are the chief crops grown, and as much of the type lies far from markets a large part of it will continue for some time to be used in the production of these crops. However, near the main line of the Louisville and Nashville Railroad, where shipping facilities can be secured, a profitable trucking industry has been built up, the most notable examples of success being in the vicinity of Greenville and Dunham. Here radishes are said to net the grower \$300 an acre, onions yield from 250 to 500 bushels, Irish potatoes from 75 to 150 bushels, and sweet potatoes from 250 to 500 bushels per acre. The yield of cotton on this soil ranges from one-third to three-fourths bale per acre, with an average of about one-half bale. Corn yields from 15 to 30 bushels, with an average of 20 bushels per acre. Little difference is observed in the value of this type and the Greenville fine sandy loam. It is said by some, however, "that for the production of radishes the gray surface soil is somewhat better, while for cotton and corn the red soil of the Greenville fine sandy loam is more desirable."

As is common on most of the soils of the area, ridge cultivation is practiced, and the plowing is usually very shallow. Many fields have been in cultivation from twenty to forty years, and during this time the soil has never been broken more than 4 or 5 inches deep.

Naturally such fields are producing only nominal yields. As the type is easily affected by drought, more attention should be given to the storing of moisture in the soil. To do this the land should be plowed deeper in the spring and given more frequent shallow cultivations throughout the growing season. Incorporating organic matter in the soil will also greatly increase its power to hold moisture. The use of barnyard manure and green manuring crops will accomplish this. For cotton and corn from 200 to 300 pounds of com-

mercial fertilizer is used per acre. This is usually mixed in the proportions to give 8 per cent of phosphoric acid, 2 per cent of ammonia, and 2 per cent of available potash. For early truck crops better results are said to be secured by the use of a better grade of fertilizer containing 8 per cent of phosphoric acid, 3½ per cent of ammonia, and 6 per cent of potash, and from 1,000 to 1,500 pounds of this mixture is applied per acre.

The Orangeburg fine sandy loam is considered one of the most desirable soils in the county, being both early and productive. A larger proportion of the type is under cultivation than of any other soil in the area, and wherever the type is found agriculture is in a prosperous condition.

The value of the land ranges from \$7 an acre for uncleared bodies far from market to \$50 or more an acre for improved areas in the vicinity of Greenville and Forest Home.

The results of mechanical analyses of typical samples of the Orangeburg fine sandy loam are given in the following table:

Mechanical analyses of Orangeburg 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. | <i>Per cent.</i> |
| 16361..... | Soil..... | 0.4 | 2.3 | 1.3 | 19.1 | 37.5 | 31.9 | 7.3 |
| 16362..... | Subsoil..... | .1 | 1.4 | .9 | 16.9 | 31.8 | 23.7 | 25.6 |

ORANGEBURG SAND.

The Orangeburg sand consists of from 15 to 20 inches of a gray or red, medium-textured sand, underlain by a subsoil of red sand, beneath which at a depth of 20 to 30 inches occurs a red sandy clay. Large fragments of ferruginous sandstone are sometimes found scattered over the surface, but they rarely are so numerous as to interfere with cultivation.

The Orangeburg sand occurs only in limited areas and in the northern part of the county. The most noticeable bodies are found 1 to 3 miles northwest of Greenville, in the vicinity of Manningham, Monterey, and Ridgeville, and in the northeast corner of the county. The type is found on high plateaus and ridges and the surface is both level and rolling. The drainage is always ample for agricultural purposes and on the rolling areas is frequently excessive.

The Orangeburg sand, like all the soils of the Orangeburg series, is formed by the weathering of the materials of the Lafayette formation. The soil is very similar to the Orangeburg fine sand, the only difference being in the texture of the surface soil. This difference has been brought about mainly by the action of rains, which have washed away the finer particles and left only the coarser ones.

Where the land is uncleared it is occupied by sand jack, black-jack, red, and post oak.

For ordinary crops unless well fertilized the Orangeburg sand is only moderately productive. It is well adapted to peaches, berries, melons, and all early truck. Under skillful management it is probable that a fine grade of filler tobacco could also be produced. Though only fair yields of cotton and corn are secured the most of the type in cultivation is devoted to the production of these crops. On account of its loose structure the soil would be much improved by the addition of organic matter.

Only about one-third of the Orangeburg sand in the county has been cleared and brought under cultivation. Its value ranges from \$7 to \$10 an acre.

The results of mechanical analyses of the soil and subsoil of this type are given in the following table:

Mechanical analyses of Orangeburg sand.

| 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. | <i>Per cent.</i> |
| 16357..... | Soil..... | 4.3 | 25.5 | 16.2 | 27.3 | 6.1 | 14.6 | 6.2 |
| 16358..... | Subsoil..... | 1.7 | 21.2 | 14.3 | 21.8 | 5.4 | 8.6 | 26.1 |

ORANGEBURG CLAY.

The Orangeburg clay consists of 1 to 4 inches of red fine sand or fine sandy loam overlying red sandy clay. Both soil and subsoil contain a high percentage of ferruginous sandstone and iron concretions, but these are not so numerous as to interfere seriously with farming operations.

Owing to its limited extent the Orangeburg clay is of but little importance in Butler County. It is found in the vicinity of Greenville in small bodies ranging in size from 10 to 400 acres. The topography is level or gently rolling and the drainage is usually good. The Orangeburg clay is sedimentary, and, like the other soils of the Orangeburg series, owes its formation to the weathering of the Lafayette. It originally supported a growth of red oak, post oak, and hickory.

Peaches, pears, and small fruits do well on this soil, though only small quantities are grown. It is probable a high grade of filler tobacco could be profitably produced. The yields of cotton range from one-third to three-fourths bale and of corn from 15 to 30 bushels per acre.

On account of the compact structure of the subsoil the plowing is usually very shallow, and in consequence a hard layer has been formed a few inches below the surface. As the heavy clay subsoil has naturally a high capacity for moisture, this shallow plowing is doubtless responsible for the soil drying out so rapidly during the

growing season. Deeper plowing and the incorporation of organic matter in the soil would be very beneficial in this respect.

Nearly all the Orangeburg clay is under cultivation. Its value ranges from \$7 to \$25 an acre.

The results of mechanical analyses of the soil and subsoil of this type are shown in the following table:

Mechanical analyses of Orangeburg clay.

| 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. | <i>Per cent.</i> |
| 16355..... | Soil..... | 0.0 | 1.2 | 4.6 | 39.5 | 9.6 | 18.7 | 26.2 |
| 16356..... | Subsoil..... | .4 | 3.0 | 4.4 | 26.0 | 8.3 | 14.9 | 42.8 |

GREENVILLE FINE SANDY LOAM.

The soil of the Greenville fine sandy loam is a red sandy loam of fine to medium texture, ranging in depth from 4 to 15 inches. The subsoil to a depth of several feet is a bright-red sandy clay. Over much of the type the red clay is found within 6 or 8 inches of the surface, and where such areas occur the soil is a heavy, fine sandy loam containing a relatively large amount of silt and clay.

The type differs from the Orangeburg fine sandy loam chiefly in the color of its soil, it being a uniformly bright-red color instead of the gray of the Orangeburg fine sandy loam.

The Greenville fine sandy loam, though an important soil type, is one of the least extensive in the county, its total acreage being less than 2 per cent of the area mapped. The type occurs immediately east of Greenville, between Pigeon and Little Pigeon creeks and in the vicinity of Glasgow post-office. It occupies level plateaus, and as they always lie in close proximity to streams the drainage is usually good. A few of the more level areas, however, in the vicinity of Greenville would be greatly improved by tile drains.

In origin the soil is residual, being formed by weathering of the Lafayette clays. The original growth was chiefly red oak, white oak, post oak, and hickory, very little pine being found on this type.

The Greenville fine sandy loam if well drained is the earliest soil in the county, and is well adapted to fruits and early truck crops. Under equal conditions it is considered a somewhat more productive soil for cotton and corn than is the gray-surfaced Orangeburg fine sandy loam. It should also produce a high-grade Cuban leaf tobacco, and there is an opportunity to develop a paying industry in the production of this crop. Irish potatoes, radishes, onions, etc., are grown on this soil and give large returns. Cotton and corn, however, are the chief crops, the yields ranging from one-third to three-fourths bale and from 15 to 30 bushels per acre, respectively. Inasmuch as good shipping facilities at Greenville are close at hand, it

would undoubtedly be found much more profitable to reduce the acreage of cotton and corn and to grow such additional crops as peaches, berries, and small fruits, as well as Irish potatoes, radishes, onions, etc. On account of its position and wide range of adaptation this soil is considered the most desirable in the county, some of the areas being held as high as \$100 an acre.

NORFOLK SAND.

The soil of the Norfolk sand, to a depth of 6 inches, consists of loose, incoherent gray sand, usually containing but a small quantity of organic matter. The subsoil, which is uniform to a depth of several feet, is an orange sand of about the same texture as the soil. The texture of the Norfolk sand in Butler County varies considerably, being sometimes composed chiefly of coarse and medium sand and again of medium and fine sand with small quantities of coarse material. Quartz pebbles, varying in size from one-eighth to three-eighths of an inch in diameter are usually abundant in both soil and subsoil. In newly cleared areas the surface has a loamy appearance, owing to the presence of a relatively high content of organic matter, but under the present system of cultivation the organic matter soon disappears.

The areas of Norfolk sand in this county vary from 10 acres to several square miles in extent. The principal areas are found in the northwestern part of the county along Wolf, Pine Barren, and Breastwork creeks, in the vicinity of Forest Home, Butler Springs, and Monterey. There are also a few areas in the northeastern part along Three Runs and Pigeon creeks. The type generally occurs as gently sloping areas in the valleys of these streams, although some areas are comparatively level. The sloping areas are subject to erosion, and gullies several feet in depth are frequently found.

Owing to its loose, incoherent structure and sloping topography, the type is naturally well drained. With thorough cultivation, however, it withstands droughts much better than some of the more compact soils.

The Norfolk sand is a sedimentary soil and probably owes its origin to beach deposits of the Tertiary and Quaternary ages. It occurs as a sandy mantle overlying the Lafayette clays. The native vegetation was post oak, black-jack oak, sand-jack oak, and hickory.

Inasmuch as the soil does not retain moisture well it is not adapted to general farm crops, but peaches, melons, small fruit, and early truck should do well. Excepting a little fruit and vegetables for home use, cotton and corn are practically the only crops grown at present. The yields of cotton range from one-fifth to one-third bale, and of corn from 10 to 15 bushels per acre.

As is general throughout the county, in preparing the land for cotton the soil is thrown up in ridges and the seed planted later on top

of these. Such a method allows the escape of a greater proportion of moisture from a soil which is already apt to be deficient in water content, and the low yields are in part due to this practice. The lack of moisture could be remedied to a certain extent by level cultivation and by incorporating organic matter in the form of cowpeas or some other leguminous crop, and if this soil is to be used in the cultivation of the staple crops changes in methods can not be urged too strongly.

About 75 per cent of the Norfolk sand is under cultivation. Mainly because of the distance from markets most of the land can be bought at from \$3 to \$8 an acre.

The results of mechanical analyses of the soil and subsoil of this type are given in the following table:

Mechanical analyses of Norfolk sand.

| 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. | <i>Per cent.</i> |
| 16349..... | Soil..... | 4.4 | 38.0 | 18.4 | 17.3 | 6.6 | 12.4 | 2.6 |
| 16350..... | Subsoil..... | 3.1 | 32.2 | 16.0 | 18.1 | 8.6 | 19.2 | 2.7 |

NORFOLK FINE SAND.

The soil of the Norfolk fine sand consists of loose, incoherent fine sand 10 inches or more in depth. On the surface the color is dark gray or light brown, the shades becoming lighter with increasing depth. The subsoil is a pale-yellow sand of about the same texture as the soil.

No large bodies of Norfolk fine sand are found in Butler County. The type, however, is a very general one, occurring in all sections of the county in bodies varying from a few acres to 1 or 2 square miles in extent. The largest and most numerous areas are found in the southern part, in townships 7 north and ranges 13 and 14 east.

The type occupies high, level plateaus or gently sloping areas along the larger streams. On account of these positions and the loose, open structure of the subsoil the type is well drained.

The Norfolk fine sand is a sedimentary soil laid down in a sea during the latter part of the Eocene period. On some of the slopes the type has been formed by the deposition of material washed down from the higher lying soils.

The native forest growth consists of longleaf pine and various kinds of oaks, of which the black-jack, sand-jack, red, and post oak are the leading varieties.

The Norfolk fine sand is a typical trucking soil, being especially adapted to the production of light truck crops. It is early, easily handled, responds well to fertilization, and can usually be worked within a few hours after heavy rains. In the vicinity of Greenville

radishes are very successfully produced, netting the grower from \$200 to \$300 an acre. Strawberries are also grown to some extent, and are a profitable crop where facilities can be had for handling and marketing them.

Notwithstanding the adaptability of the Norfolk fine sand to the production of early truck crops, more than 90 per cent of the cultivated areas is devoted to cotton and corn. The yields of cotton range from one-fifth to one-half bale per acre, depending on the character of culture. Corn yields from 10 to 15 bushels per acre, with an average of about 12 bushels.

The plowing is usually done with a 1-horse plow and as a result is very shallow. The soil is badly in need of humus, especially where the land has been cropped for several seasons. To supply this, leguminous crops—such as cowpeas or velvet beans—should be grown and turned under as green manure.

The fertilizers most commonly used on the Norfolk fine sand are cotton seed, acid phosphate, and kainit, from 200 to 300 pounds being applied to the acre for cotton and a somewhat less quantity for corn. When radishes are grown a much larger application—from 1,500 to 2,000 pounds to the acre—has been found profitable.

About 75 per cent of the Norfolk fine sand in Butler County is under cultivation. The value ranges from \$3.50 to \$20 an acre, depending on location and improvements.

The results of mechanical analyses of the soil and subsoil of this type are shown in the following table:

Mechanical analyses of Norfolk fine sand.

| 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. | <i>Per cent.</i> |
| 16351..... | Soil..... | 0.3 | 2.3 | 5.8 | 36.1 | 33.0 | 17.4 | 4.2 |
| 16352..... | Subsoil..... | .1 | 1.9 | 5.3 | 35.9 | 33.6 | 16.0 | 6.9 |

NORFOLK FINE SANDY LOAM.

The soil of the Norfolk fine sandy loam consists of about 3 inches of dark-gray to light-brown loamy fine sand, resting on a stratum of gray fine sand from 15 to 20 inches deep. Below this depth the subsoil is a yellow sandy clay, which on the higher elevations extends to a depth of several feet. In the low-lying areas where drainage is poor the virgin soil is somewhat more loamy and the subsoil is frequently marked with gray.

The Norfolk fine sandy loam is found in all parts of the county, except in the northwestern corner, forming a large number of small bodies ranging from 10 acres to 1 or 2 square miles in extent. The largest and most numerous areas occur in the south-central part, in the vicinity of Bolling and Georgiana.

Excepting a few slightly rolling areas on the uplands, the topography of the Norfolk fine sandy loam is rather level. The type frequently occurs in narrow strips along the lower slopes of hills and along stream channels. In such cases it usually adjoins one of the low-lying types of the Myatt series, to which it seems to be closely related in structure, texture, and general appearance. The drainage of the upland areas is good, but the lower lying bodies receive much seepage water from higher lying areas and the drainage is frequently poor.

The Norfolk fine sandy loam is derived through the weathering of marine beds deposited in the Lignitic stage of the Eocene period.

The timber growth is red oak, white oak, hickory, and longleaf yellow pine on the upland areas, and white oak, gum, and loblolly pine on the lowland bodies of the type. Grasses would doubtless do well on these lower lying areas, and they should furnish an excellent range for cattle. The better drained areas are well adapted to the growing of late truck crops, and in certain sections of the South this soil is highly esteemed for the production of bright yellow tobacco.

The chief crops grown are cotton and corn. The former yields from one-fourth to two-thirds of a bale, with an average of about one-third bale, and the latter from 15 to 25 bushels, with an average of about 18 bushels, per acre. In the vicinity of Bolling strawberries are grown on this type to a limited extent and are proving to be a profitable crop.

Owing to its wet condition in the spring the land is usually broken in high ridges for the purpose of eliminating soil moisture as much as possible. A better way to control this water would be by open ditches or tile drains. This would permit not only of level breaking in the spring, but also of subsequent shallow cultivation, thus conserving more of the moisture in the soil during the growing season, when it is most needed. The fertilizer practice on this type is usually the same as that on the other soils of the area, namely, the application of 200 to 300 pounds of mixed commercial fertilizers per acre.

Only a small part of the type is under cultivation. The price ranges from \$4 to \$25 an acre.

Below are given the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Norfolk 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. | <i>Per cent.</i> |
| 16353..... | Soil..... | 0.5 | 3.9 | 5.0 | 38.3 | 21.1 | 24.3 | 6.1 |
| 16354..... | Subsoil..... | .7 | 2.6 | 3.6 | 28.5 | 11.5 | 25.6 | 27.6 |

MYATT FINE SAND.

The Myatt fine sand consists of 6 to 10 inches of gray or drab fine sand occasionally mottled with brown or orange, underlain by a mottled gray and yellow silty fine sand extending to a depth of 20 inches. Below this the subsoil varies from a mottled gray and yellow silty fine sand to a silty clay of the same color. In low, wet areas, where large amounts of organic matter have accumulated, the surface soil has a decidedly black appearance. Nearly all of the Myatt fine sand is found in the southern half of the county along Pigeon, Persimmon, Panther, and Rocky creeks and their branches. The largest areas are found in the vicinity of Bolling and from 1 to 2 miles east of Georgiana.

The type occupies a somewhat more elevated position than the Myatt fine sandy loam, occurring as narrow ridges, many of which are too small to be mapped, along the banks of all the streams in the southern part of the county. These ridges are flanked by low-lying areas of Myatt fine sandy loam, which are in turn separated from the upland soils by other bodies of Myatt fine sand.

Because of its low-lying position the land is heavily taxed to dispose of all the drainage waters which collect upon it from the uplands. For this reason artificial drainage is not only beneficial, but in most cases is a necessity if the land is to be cultivated. During the greater portion of the year tile drains or blind ditches would prove sufficient, but in times of heavy rainfall open ditches are a necessity. To avoid the inconvenience in cultivation and the waste of space arising from so many open ditches, the most satisfactory method would probably be to have the main ditches open and the laterals tile or blind ditches. When thoroughly drained in this manner the soil would become loose and porous and therefore easily tilled.

The Myatt fine sand is alluvial in origin, having been formed by the deposition of sand particles carried in suspension by the streams. This sediment is derived chiefly from the surface soils of the Orangeburg and Susquehanna series in the upper courses of the streams.

Not more than 20 per cent of the Myatt fine sand is naturally well drained, of which only a small proportion is under cultivation. The greater part is still covered by a forest of loblolly and yellow pine, gum, magnolia, beech, and a dense growth of gallberry bushes.

On account of the wet condition of the land in spring it is usually thrown up in ridges to facilitate drying out before the preparation for planting begins. The soil responds readily to commercial fertilizer, the usual application being from 200 to 300 pounds to the acre. Since the cultivated areas are usually deficient in organic matter the soil would be greatly improved by the plowing under of leguminous crops as green manure. While not an early soil in its present condition, it could be greatly improved in this respect by thorough drainage.

When this is done truck and fruit should do well. At present nearly all the cultivated areas are planted to cotton and corn. The former yields from one-third to one-half bale and the latter from 10 to 20 bushels per acre.

The value of the land ranges from \$5 to \$7 an acre, depending on timber growth and market facilities.

The results of mechanical analyses of the soil and subsoil of this type are given in the following table:

Mechanical analyses of Myatt fine sand

| 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. | <i>Per cent.</i> |
| 16341..... | Soil..... | 0.2 | 0.7 | 1.8 | 27.7 | 47.1 | 16.5 | 5.8 |
| 16342..... | Subsoil..... | .2 | 1.0 | 2.3 | 30.5 | 46.9 | 11.6 | 7.2 |

MYATT FINE SANDY LOAM.

The soil of the Myatt fine sandy loam is a gray silty fine sand or fine sandy loam with an average depth of about 10 inches. The subsoil is a gray or drab heavy loam to silty clay which is occasionally mottled with yellow and red in the lower depths. When dry the surface is loose and easily cultivated, but it is apt to become quite sticky when thoroughly saturated. As a rule, the surface soil contains somewhat more organic material than is found in the other soils of the area, being sufficient in some of the wetter bodies to give the type a pronounced black appearance.

The Myatt fine sandy loam occurs as low, flat land from one-fifth mile to 2 miles in width along nearly all the streams in the southern half of the county. The most extensive bodies are found in the vicinity of Georgiana and Dunham along Persimmon, Rocky, Panther, and Long creeks. The type is also found in the southeast part of the county along Pigeon Creek and its larger tributaries. The Myatt fine sandy loam is an alluvial soil of recent origin laid down by the overflow waters of the streams along which it occurs.

A large proportion of the type is still covered by a native growth of gum, cypress, loblolly pine, beech, and magnolia. In its present wet condition it is a rather late soil, but if properly drained it would be well adapted to the production of small fruits and truck, as well as to a variety of grasses and forage crops.

Cotton and corn are grown on the type, the former yielding from one-fourth to 1 bale per acre, with an average of one-half bale, and the latter from 12 to 25 bushels per acre, with an average of about 16 bushels. On account of the wet condition of the land in spring ridge cultivation is used for both cotton and corn.

Located along streams and having a level topography, the drainage of the type is poor and much of it is subject to overflow. Artificial drainage, however, could be cheaply provided by the construction of open ditches and a few inexpensive dikes.

Probably not more than 1 or 2 per cent of the type is under cultivation and its value ranges from \$3.50 to \$7.50 an acre.

The average results of mechanical analyses of this soil type are given in the following table:

Mechanical analyses of Myatt 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. | <i>Per cent.</i> |
| 16343, 16346 . . | Soil..... | 0.4 | 0.7 | 1.7 | 19.2 | 20.3 | 49.7 | 7.9 |
| 16344, 16347 . . | Subsoil..... | .1 | .7 | .9 | 16.7 | 18.9 | 43.9 | 18.4 |
| 16345, 16348 . . | Lower subsoil.. | .1 | .4 | .9 | 13.8 | 18.5 | 43.3 | 22.4 |

HOUSTON CLAY.

The soil of the Houston clay consists of heavy clay loam or clay about 3 inches deep, varying in color from dark gray or drab to black. The subsoil is also a drab or black waxy clay resting on a bed of loose, rotten limestone at from 5 to 20 inches below the surface. As this limestone is approached the dark, sticky clay gives place to a white, chalky material, which when dry breaks down into an impalpable powder. When wet the material is extremely sticky and plastic. At about the second foot it begins to solidify and at 3 feet deep is usually a consolidated bed of limestone. Throughout the type frequent ridges are found strewn with fragments of the broken rock, which in places become so numerous as to interfere with cultivation.

The Houston clay is confined to a few square miles in the north-western corner of the county. Beginning well up on the steep slopes which border Wolf and Cedar creeks, the type extends down to the rich, alluvial soils in the bottoms. Usually after the first steep slopes of the gullied hillsides are passed, the land becomes more gently rolling and almost level areas are occasionally found.

The Houston clay owes its formation to the weathering of the Cretaceous limestone, which it immediately overlies. About 80 per cent of the type in Butler County was originally covered by a valuable growth of red cedar, but most of this has already been removed and a young growth of the same species has since taken possession of the soil. The remaining 20 per cent is a level or gently rolling prairie, of which not more than 10 per cent is under cultivation.

The Houston clay is well adapted to grasses. During the last few years Johnson grass has been grown for hay and is proving to be a

valuable crop. Three cuttings are usually secured each season, yielding from one-half ton to 1 ton per acre at each cutting. The hay, which sells for about \$15 a ton baled, is considered more profitable on this soil than either cotton or corn. The great objection to this grass crop is that it spreads rapidly and is difficult to eradicate in case the land is needed for some cultivated crop. With the exception of a few small bodies of Meadow along Wolf and Cedar creeks the Houston clay is by far the best alfalfa soil in the county and could be made to produce this crop with profit. Both cotton and corn are grown to some extent, though they are said to rust badly after being cultivated a few years on this soil. From one-half to two-thirds of a bale of cotton and from 18 to 30 bushels of corn per acre are the usual yields.

The land is naturally strong and productive, yet, owing to distance from market facilities, its rough, stony surface, and the difficulty of securing labor, only a small percentage of it is under cultivation. The average price of the type is about \$10 an acre.

The results of mechanical analyses of fine-earth samples of the soil and subsoil of the Houston clay are given in the following table:

Mechanical analyses of Houston clay.

| 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. | <i>Per cent.</i> |
| 15507..... | Soil..... | 0.7 | 5.9 | 5.1 | 16.3 | 16.7 | 22.1 | 33.1 |
| 15508..... | Subsoil..... | .9 | 3.0 | 3.0 | 15.7 | 12.9 | 41.4 | 23.3 |

The following sample contained more than one-half of 1 per cent of calcium carbonate (CaCO₃): No. 15508, 0.68 per cent.

SUSQUEHANNA CLAY.

The Susquehanna clay consists of 1 to 5 inches of fine gray sand overlying stiff, red clay, which becomes mottled in the lower depths. The sandy covering is rarely more than 3 inches deep and in places is entirely absent. Owing to the plastic, waxy nature of the subsoil and its nearness to the surface, the type is very refractory and difficult to cultivate.

Only a few comparatively small areas of Susquehanna clay are found in Butler County. The principal areas occur north of Cedar Creek and in the central part of the county between Butlersprings and Bolling. The type is also found near Rhodes Siding, on the Alabama and Florida Railroad, and in the vicinity of Pigeon Creek and Oak Streak.

Except in the central and western parts of the county, where the type occupies level plateaus, the topography is rough and hilly. On the hilly areas the surface drainage is good, but the level bodies are frequently too wet for cultivation for several days after heavy rains.

The Susquehanna clay is of sedimentary origin, being derived from water deposits in the Eocene age at a time when the water was deep and quiet. The sandy covering represents a much more recent deposit, which in most places was considerably deeper than at the present time. The native vegetation is largely longleaf pine, red oak, white oak, and post oak.

Owing to the difficulties encountered in the cultivation of such a stiff, plastic clay, the type is not adapted to a wide range of crops. Grasses should do well if care be taken to get them established. Cotton and corn are the only crops grown, but both are said to rust when cultivated on the same land for two or three years in succession. Because of the tenacious character of the clay the land is difficult to plow, and the preparation for the seed as well as subsequent cultivation is not as thorough as it should be. For this reason the yields are low, which fact has given rise to the belief that the soil is naturally unproductive. Instances, however, are reported where gratifying results have been secured through thorough cultivation.

In many sections the land was originally occupied by valuable forests of pine. In most cases the larger timber has been removed and a dense second growth of longleaf pine has taken its place. These forests will soon become of value, and as there is still a large acreage of idle land in the county more desirable for cultivation, it is doubtless best to leave these wooded areas of Susquehanna clay in forest. Not more than 1 or 2 per cent of the entire type is under cultivation.

The value ranges from \$2.50 to \$12 an acre, depending on location and timber growth.

The results of mechanical analyses of the soil and subsoil of this type are given in the following table:

Mechanical analyses of Susquehanna clay.

| 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. | <i>Per cent.</i> |
| 15509..... | Soil..... | 0.8 | 2.5 | 3.8 | 44.8 | 8.7 | 13.4 | 25.8 |
| 15510..... | Subsoil..... | .3 | 1.4 | 1.9 | 22.3 | 6.2 | 11.4 | 56.5 |

SUSQUEHANNA FINE SANDY LOAM.

The Susquehanna fine sandy loam, from 5 to 15 inches, consists of gray or brown fine sand or light fine sandy loam, underlain at an average depth of about 10 inches by a stiff red clay, which is usually mottled with yellow and gray below the second foot. Much of the type rests on a bed of rotten limestone from 2 to 10 feet deep, of which fragments are frequently found scattered over the surface and mingled

with both soil and subsoil. These, together with the stiff plastic nature of the subsoil, make the type a rather difficult one to work.

The Susquehanna fine sandy loam is the most generally distributed soil in the county, occupying about 30 per cent of the total area. It occurs in all parts of the county, the largest bodies being found between Butlersprings and Georgiana, and to the east of Bolling. Areas are also found in the vicinity of Oaky Streak, Pigeon Creek, and in the northeast corner of the county.

A phase of the Susquehanna fine sandy loam consists of a gray fine sand 12 inches deep, underlain by reddish-yellow, stiff, waxy clay. Below this occurs a stiff, mottled red, yellow, and gray clay, which bakes and cracks when exposed to the sun. This phase is found in the vicinity of Georgiana in comparatively level tracts, and in appearance somewhat resembles the Norfolk fine sandy loam.

The surface features of the Susquehanna fine sandy loam are varied. In the vicinity of Wolf and Cedar creeks, where the streams have cut from 50 to 150 feet below the surrounding country, the topography is rough and broken. Rugged areas are also found in the southeastern part of the county in the vicinity of Oaky Streak and along the east bank of Pigeon Creek. The greater part of the type, however, is level or gently rolling.

As a rule the surface drainage is good, but the structure of the impervious clay subsoil is such that the absorption of water after heavy rains is usually very slow. For this reason ditching would be beneficial on the level areas. In the hilly section about Cedar Creek the subsoil contains a high percentage of mica and the steep slopes are badly gullied.

The Susquehanna fine sandy loam is a sedimentary soil derived from the weathering of marine deposits. In places the underlying beds of Cretaceous limestone come very near the surface and have contributed to some extent to the formation of the soil. The native vegetation is chiefly longleaf pine, red oak, white oak, and hickory.

The Susquehanna fine sandy loam if well drained is adapted to a wide range of crops. Cotton and corn, however, are the only crops grown, the former yielding from one-third to three-fourths bale, and the latter from 15 to 25 bushels per acre. The grasses and fruit should do well. The plowing is very shallow and ridge cultivation is practiced for both cotton and corn. Both of these practices favor washing and add to the natural tendency of the soil to dry out during the growing season. The greatest needs of the type are deeper plowing, more frequent and shallower cultivation, and the addition of humus to the soil.

Only commercial fertilizers are used, the most common being cotton seed, or cotton-seed meal, acid phosphate, and kainit. From 200 to 300 pounds per acre is the usual amount applied.

Only about 10 per cent of the Susquehanna fine sandy loam is under cultivation, a fact which is partially accounted for by the distance of the type from shipping points or markets. The value of land of this type ranges from \$5 to \$15 an acre.

The average results of mechanical analyses of samples of the soil and subsoil are given in the following table:

Mechanical analyses of Susquehanna 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. | <i>Per cent.</i> |
| 16371, 16373..... | Soil..... | 0.4 | 1.7 | 1.7 | 29.2 | 39.8 | 21.1 | 6.0 |
| 16372, 16374..... | Subsoil..... | .1 | .3 | .3 | 10.7 | 21.3 | 17.6 | 49.3 |

OCKLOCKNEE CLAY.

The Ocklocknee clay consists of 2 to 6 inches of gray or mottled gray and orange silt loam, resting on a subsoil of mottled gray and yellow clay. When wet the soil is sticky and plastic, but it becomes hard and compact when exposed to the sun.

The type is unimportant in Butler County, being found only in small areas on the lowlands near the southern county line. Only four small bodies occurring as narrow strips along Pigeon Creek appear on the map. Other areas of a few acres in extent may be found along nearly all the larger streams in the southern part of the county.

The Ocklocknee clay occupies the lowest position in the bottom and is subject to frequent overflow. It is covered by a dense growth of loblolly pine, white oak, cypress, gum, and magnolia. In its present condition the land has a low agricultural value. It is held at from \$2.50 to \$5 an acre, depending entirely on the timber growth.

The results of mechanical analyses of the soil and subsoil of the type are given in the following table:

Mechanical analyses of Ocklocknee clay.

| 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. | <i>Per cent.</i> |
| 16337..... | Soil..... | 0.0 | 1.0 | 0.4 | 9.5 | 5.9 | 50.5 | 32.3 |
| 16338..... | Subsoil..... | .2 | .3 | .4 | 7.3 | 9.3 | 33.5 | 48.5 |

MEADOW.

The Meadow in this county consists of low-lying areas in which textural variations occur so frequently that detailed classification is impracticable. The texture of the soil varies from light fine sandy loam to the heaviest clays of the area.

The most important phase consists of heavy black clay, 3 feet or more in depth, which occurs in the northwest corner of the county in a number of small areas throughout the bottoms of Cedar, Wolf, Muscle, and Saddlers creeks. Alongside of these clays are found soils varying from sand to heavy silt loam, though no soil of uniform texture occupies sufficient area to appear separately on the map.

The other phases of Meadow consist of light-colored sands several feet deep, containing varying amounts of silt and clay. The largest bodies occur along Pigeon, Three Run, Halls, Persimmon, Mill, Breastwork, and Pine Barren creeks.

Owing to the level topography and low position along the streams, the soil is subject to overflow at all seasons of the year. The water, however, rarely covers it more than two or three days at a time and, as a rule, cultivation is possible without artificial drainage, though ditching would be beneficial on the lower areas. On the heavy phase along Cedar Creek much of the land has been protected from overflow by the construction of ditches and dikes, and where this has been done its value has been greatly increased.

Meadow is an alluvial soil deposited by the streams in times of overflow. Along Cedar, Wolf, and Muscle creeks the soil is composed of fine material washed down from the highlands of Houston clay. In the eastern and central parts of the county it consists of sands and silts washed from the adjoining sandy types. Where uncultivated, the soil is occupied by bay, gum, cypress, beech, loblolly pine, white oak, and holly.

Owing to the wide range of textural conditions, the areas are adapted to a large variety of crops. For the production of cotton, corn, sugar cane, and grasses the Meadow is unsurpassed by any soil in the county. If properly drained, it would be in many cases an excellent soil for alfalfa, though this crop as yet has not been introduced.

The yields of cotton range from one-third bale to $1\frac{1}{4}$ bales per acre, with an average of about three-fourths bale; corn from 20 to 35 bushels, with an average of 30 bushels, and when sugar cane is grown from 250 to 500 gallons of sirup per acre are produced. As the land is naturally productive, only small quantities of commercial fertilizers are used.

In the northwestern part of the county, where the land is heavy, about 90 per cent of the Meadow is under cultivation, and its value ranges from \$10 to \$30 an acre. On the sandy phase a much smaller proportion has been cleared, and such land commands only from \$5 to \$10 an acre.

SUMMARY.

Though the majority of the farmers of Butler County still follow the one-crop system, the recent introduction of trucking has brought about a great diversification of crops in some sections and is having a general salutary effect on the agriculture of the county. The truck grown is of splendid quality and brings good prices in the northern markets.

A closer study should be made of the adaptation of soils to crops. Plowing should be deeper and cultivation more frequent and shallower. Organic matter should be added to the soils and more leguminous crops should be grown and turned under with this end in view. Cotton seed, instead of being sold and removed from the farm, should be returned to the land as a fertilizer.

The value of most of the farm lands in the county ranges from \$4 to \$10 an acre, though a few of the most desirable farms near Greenville and Forest Home are held as high as \$100 an acre.

To prevent erosion of lands most subject to this waste, the plowing of some fields should be discontinued and the lands should be seeded down and used for pasture. In such case more stock should be kept.

The soils of Butler County are varied. Sixteen distinct types were recognized and mapped.

The Orangeburg fine sandy loam is considered one of the most desirable soils in the county. It is early and productive, and responds well to good cultivation and fertilization. It is especially adapted to peaches, berries, radishes, onions, Irish potatoes, and a high grade of Cuban filler tobacco.

The Susquehanna fine sandy loam, the most extensive type in the county, is adapted to a wide range of crops, chief among which are cotton, corn, grasses, and fruit.

The Norfolk fine sandy loam is adapted to late truck and probably to bright yellow tobacco. Grasses also do well on the low areas, which should furnish excellent pasturage. Some of the low areas would be benefited by artificial drainage.

The Norfolk fine sand is a typical trucking soil, being especially adapted to the lighter truck crops. The soil is in need of humus, which should be supplied by the turning under of leguminous crops.

The Norfolk sand is a deep, coarse-textured sand, occurring chiefly in the northwest part of the county. Where favorably located as regards markets, it is adapted to melons, truck, and small fruits.

The Orangeburg fine sand is a loose, incoherent sand, adapted to peaches, melons, tomatoes, and other early truck, as well as the staple crops of the area. The soil is somewhat deficient in organic matter, but retains moisture fairly well. Green manuring would greatly increase its productiveness.

The Orangeburg sand is only moderately productive. It is well adapted to peaches, berries, melons, all early truck, and cigar-filler tobacco.

The Orangeburg sandy loam is a coarse-textured soil, but if well fertilized is productive and adapted to a variety of crops. Peaches, small fruit, and early truck should prove profitable on the portions of this type lying near a shipping point or close to local markets.

The Orangeburg clay is of small extent in Butler County. It is well adapted to cotton, corn, peaches, pears, and small fruits, and is one of the best soils in the county for the production of a high-grade cigar-filler tobacco. The soil dries out quickly, and needs organic matter and deeper plowing to conserve moisture.

The Houston clay, the heaviest soil in the county, is well adapted to tame grasses and, with the exception of a few small bodies of Meadow along Wolf and Cedar creeks, it is by far the best alfalfa soil in the county. This crop should be introduced by farmers owning this type of soil.

The Susquehanna clay is a stiff, refractory soil of comparatively small extent. It is adapted to grasses and stock raising. Much of the type supports valuable young forests of second-growth longleaf pine, which in most cases should be allowed to mature.

The Myatt fine sandy loam in its present wet condition is a rather late soil, but if properly drained would be adapted to small fruits and truck, as well as a variety of grasses and forage crops.

The Myatt fine sand is a poorly drained soil occurring along streams. If artificially drained, it would be adapted to truck and small fruit.

Meadow is a soil of varying texture found as low, narrow strips along streams. The type is subject to overflow, and is very little cultivated. When drained and protected from floods, it is a valuable soil for the production of cotton, corn, sugar cane, and grasses. On the heavy phase in the northwest corner of the county alfalfa should be introduced.

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