SOIL SURVEY OF NOXUBEE COUNTY, MISSISSIPPI.

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DESCRIPTION OF THE AREA.

Noxubee County is situated in the northeastern part of Mississippi, in the eastern tier of counties, bordering on the State of Alabama. To the north of Noxubee are Oktibbeha and Lowndes Counties; Pickens and Sumter Counties, Ala., form the eastern boundary; Kemper County extends along the entire southern border; and Winston is the adjoining county to the west. The county comprises an area of 692 square miles, or 442,880 acres.

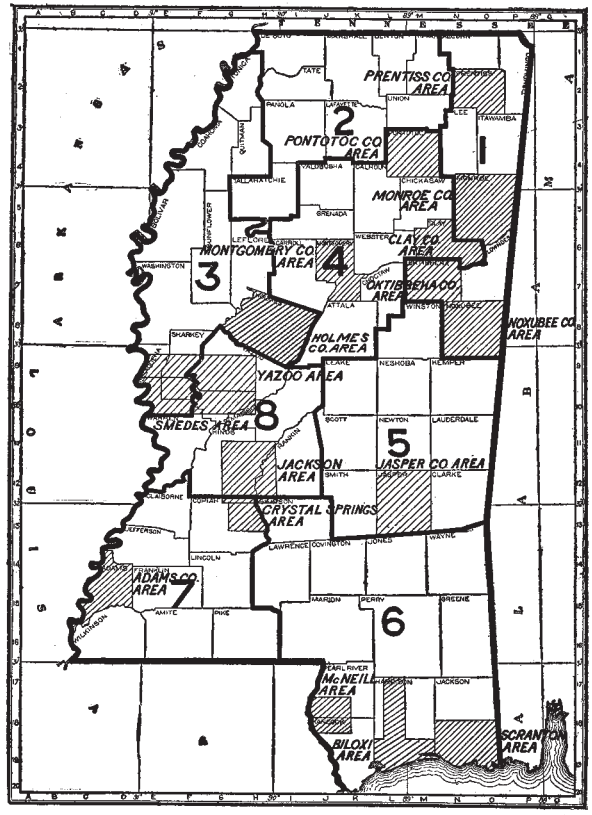

FIG. 20.—Sketch map showing location of the Noxubee County area, Mississippi.

The Coastal Plain is a belted region. Its physical features lie in relatively narrow belts of unequal length and of variable width approximately parallel to each other and to both boundaries of the Coastal Plain belt as a whole.

Noxubee County, Miss., includes portions of two of these belts, trending, in this part of the Coastal Plain, in a northeast and southwest direction. The Black Prairie belt occurs in the northeastern

part of the county, occupying approximately a third of its area. It is the region of Houston and Oktibbeha soils. Topographically it is an area of low relief, of gently undulating to gently rolling topography, with broad flat-bottomed stream valleys. The valley slopes are usually gentle, and in the few cases where they are steep they are low, usually less than 50 feet. This is a region where erosion has reached an advanced stage of development—the old age stage of the cycle, approaching the stage of a completed peneplain. Excepting the alluvial bottoms and brown "post oak" uplands, this area was treeless when first seen and occupied by white man.

The "Sandy land region" occupies the area of the county not occupied by the Black Prairie region. It differs from the latter in its soils and in being covered with timber. The main soil series of each area do not cross the boundary separating the two areas. Topographically the Sandy land region consists of two areas of different features. The easterly one, comprising the larger portion of the region, occupied by the Pheba, Susquehanna, and Norfolk soils, is, like the Prairie region, an area of low relief, gently undulating, rolling, or flat plains, lying at about the elevation of the Black Prairie. Through it also occur broad, flat alluvial belts, with soils that extend across the boundary into the Prairie region. This section of the Sandy land region is much the larger part, extending in a broad belt across the county from the northwestern corner to the southeastern corner. It is locally known as the "Flat-woods country." The westerly portion of the Sandy land region occupies the southwestern corner of the county. It is the area occupied mainly by Orangeburg and Guin soils. It is the roughest, highest part of the county, its higher portions lying as much as 150 feet above the general level of the flat-woods section. In consequence of this elevation it has been thoroughly dissected by the streams that drain it. It is the hilly section of the county. The highest and roughest portions are those occupied by the Guin soils.

The last division comprises the first and second bottoms of the streams. These bottoms comprise 22 per cent of the total area of the county and thus form an unusually important part of the survey.

The main streams are the Tombigbee and Noxubee Rivers. The former is navigable for a portion of the year, and the latter was used for traffic before the construction of the Mobile & Ohio Railroad. The Tombigbee borders the extreme northeastern portion of the county for a distance of only 2 miles, while the Noxubee flows diagonally across the county from northeast to southeast. The divide between these streams begins north of Brookville, where the Mobile & Ohio Railroad enters the county, and extends irregularly southeastward, passing 1 mile west of Deerbrook to Coles Store, through Mount Bethel Church to Dinsmore and Rock Hill Church. The watershed

of the Tombigbee is drained by Broken Pumpkin, Crow, Indian Camp, and Bogue Chitto Creeks, Cypress Branch, and numerous smaller branches. The remaining two-thirds of the county is drained by the Noxubee, which joins the Tombigbee in Sumter County, Ala. Flowing into the Noxubee from the south and west in order of occurrence are Oktoc Creek (this was formerly the course of the Noxubee before the present channel was established), Loakfoma, Lynn, Horse, Little Yellow, Yellow, Sun, Brown Branch, and Hashuqua and several others. Among the numerous tributaries from the north the more important are Coon, Earle, West Water, Joes, Horse Hunters, Plum, Tibby, Woodwards, and Jordan Creeks. The first settlers came to Noxubee County about 1830 and settled on the fertile bottoms and sandy "piny-woods land." The fertility of the Houston and Oktibbeha soils later attracted a wealthier class of planters, who often owned from 1,000 to 5,000 acres of land. The early settlers were chiefly of English descent, with a sprinkling of Scotch and Irish, the greater proportion coming from the older settled States of the South. At present, excluding the negro population, which is in the majority, probably 95 per cent of the people are of English descent. The population in 1900 was about 30,000, or nearly 43 to the square mile. The great majority live on farms, although there is a large acreage of undeveloped land and the county is capable of sustaining a much larger rural population than it has at present.

Macon, the county seat and largest town, has a population of 1,200. It has all the improvements of a city, including waterworks, sewerage, and electric lights. Brookville, near the northern boundary, is slightly smaller, and Shuqualak, near the southern edge, has an estimated population of 700. Among other towns may be named Mashulaville and Gholson to the southwest, Cooksville near the Alabama line, in the southeast portion, with Deerbrook, Cliftonville, Prairie Point, Bigbee Valley, and Ravine.

At present the industries are either agricultural or limited to supplying local demands. Valuable clays are used in making brick for the local market and a part of the output is shipped to points outside the county. Probably 40 per cent of the county is forested. The bottoms are nearly all in forest and there are a few areas of virgin timber, although extensive lumbering operations have removed much of the original growth.

Transportation is supplied by the Mobile & Ohio Railroad, which divides the county almost equally into an eastern and a western part. This road gives quick service to the markets of Birmingham, Memphis, and Cincinnati on the north and to Mobile and New Orleans to the south. The eastern part of the county is also within reach of the Alabama, Tennessee & Northern, a newly constructed railroad passing a few miles east of the State line. Traffic to the Gulf by way of the

Tombigbee River, formerly of great importance, has dwindled to almost nothing. The extreme western and southwestern parts of the county, and farthest from a railroad, are sparsely settled.

The wagon roads in the black land belt and other clayey sections of the county are excellent in summer but muddy in winter. In the southwestern portions there is an excess of sand and this makes hauling heavy in dry weather. The roads may be improved by surfacing with a mixture of sand and clay in the right proportions.

Water for domestic and commercial purposes is pure and easily obtained. The surface wells are good, excepting in the limestone belt, where the soluble limes render the water too "hard" for many uses and rather unpalatable. In this section recourse is had to artesian wells, which range in depth from 300 to 1,100 feet. These furnish ample supplies of water suitable for domestic use.

CLIMATE.

Noxubee County lies in the warm Temperate Zone. The summers are long and warm, though the heat is rarely excessive, rising above 100° F. but a few times in a decade. The mean summer temperature is 79° F. An average temperature of 40° F. shows the mild character of the winter season. The absolute minimum recorded in a period of 21 years was —6° F. in February. During the same period the minimum for December was 9° and for January 12° F. The ordinary winter weather is characterized by a temperature of 40° to 50° F., during the day, which may fall at night a few degrees below freezing. This gives occasional light frosts, thin ice, or quickly disappearing flurries of snow. The weather may then moderate, with no frost for several days or weeks, to be followed by general rains, clearing, and colder.

An ample rainfall is one of the salient features of the climate of Noxubee. Taking the records of the Weather Bureau station at Meridian, which represent fairly well the local conditions, there is a mean annual precipitation of 53.4 inches. The total precipitation for the driest year is 44.5 inches, and for the wettest 72 inches.

Of the annual rainfall 30 inches falls between the end of March and the beginning of November, but September, October, and November, the months of harvesting the important staples of the region, are normally the driest of the year. They are also the most pleasant. The winter rainfall averages 16.3 inches, and comes in the form of general rains from the southwest. These rains usually flood the bottoms several times, although the water generally subsides in time to permit plowing in March, and the bottom lands are planted as early as the drier upland soils in about three years out of five. On the uplands plowing may be carried on the year round.

The months of March, April, and May are favorable to early seeding. The average temperature of 64° F. and an average rainfall of 14 inches favor germination and rapid growth. At this time of year thunderstorms are frequent and the rainfall is in the form of heavy showers of short duration.

Prior to 1910 the earliest frost in the fall occurred on October 31, the latest in spring on April 10. During that year an unprecedentedly late frost came on April 25. The crops even with this shortened period had ample time to mature. The average date of the last frost in the spring at Meridian is March 26 and of the first in fall October 31. This gives a growing season of nearly eight months for the tenderest vegetation. The more resistant plants grow more or less even in winter, and the switch-cane pastures on the river bottoms remain green through this part of the year. The conditions should encourage the growing of oats, rye, vetch, and bur clover for winter pasturage.

The following table is compiled from records of the Weather Bureau at Meridian, Lauderdale County. The data are the best available to show the conditions in Noxubee County.

Normal monthly, seasonal, and annual temperature and precipitation, at Meridian, Lauderdale County, Miss.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	49	76	9	5.1	2.7	3.3	0.2
January	46	79	12	5.0	5.0	2.4	0.3
February	48	80	6	6.2	13.3	7.6	1.4
Winter	48			16.3	21.0	13.3	1.9
March	56	85	17	5.8	4.4	4.5	T.
April	64	90	28	4.0	1.4	15.0	0.0
May	72	95	41	4.3	1.4	1.6	0.0
Spring	64			14.1	7.2	21.1	T.
June	78	98	46	5.5	3.2	20.1	0.0
July	80	104	59	5.3	6.7	3.1	0.0
August	79	100	49	4.4	4.6	2.3	0.0
Summer	79			15.2	14.5	25.3	0.0
September	74	96	39	3.0	0.1	2.5	0.0
October	63	90	29	1.8	1.0	5.2	0.0
November	54	82	18	3.0	0.7	4.4	T.
Fall	64			7.8	1.8	12.1	T.
Year	64	104	6	53.4	44.5	72.0	1.9

AGRICULTURE.

The area now included in Noxubee County was originally inhabited by the Choctaw Indians, and was ceded to the United States by the terms of the third Choctaw cession. Early settlements in this region were made near Cooksville, Mashulaville, and Lynn Creek, west of Brookville. Noxubee County was organized December 3, 1833, with Macon as the county seat. The immigrants came from near-by Southern States. They were attracted by a fertile soil, genial climate, and ease of water transportation. They first cleared the sandy lands, and raised cotton, corn, wheat, sheep, cattle, and hogs. Horses and mules were scarce, and oxen were used in clearing the forests and breaking the land. Later the boring of artesian wells on the black land opened this section for settlement, and its great fertility soon attracted wealthy planters, who developed large plantations, often several thousand acres in extent.

Early transportation was by wagon to Memphis, or by boat down the Noxubee or Tombigee to Mobile, where cotton was exchanged for the necessaries of home and plantation.

Since 1840 the black lands have been largely under cultivation. Corn was the main crop at first, because oats, wheat, and cotton tended to produce too much stalk and too little fruit, owing to the great productiveness of the virgin soil. Early tillage, according to present standards, was inefficient, although the soil gave reported yields of from 35 to 40 bushels of corn per acre.

On the "red post-oak" and "sandy post-oak" soils a greater diversity was maintained, and corn, wheat, rye, oats, and melons, with such fruits as the peach and apple, grew well. Wheat and corn were important crops until after the Civil War, when they were gradually displaced by cotton. The yields reported for antebellum days averaged higher than at present. But this should be attributed to the greater proportion of virgin soil under cultivation, for newly cleared areas produced no more then than does new ground at present. Formerly, whenever the productiveness of land declined it was thrown out of cultivation and new land substituted. The abandoned tracts were soon reforested and later recleared. The history of the black land differs from that of the other soils, the former having been in continuous cultivation for upward of 75 years with no rotation excepting alternations of cotton and corn.

For the last 30 years the acreage of corn has not greatly changed, although an increased acreage was planted during the year of the survey (1910). In 1879, according to the census of 1880, 50,964 acres were in corn and in 1899, 51,184. The average yield per acre was a fraction over 14 bushels in both 1879 and 1889, while in 1899 the census showed an average of 17 bushels, an increase which may have

been due entirely to a favorable season. Of the total area of 139,517 acres in crops, according to the census of 1900, 83,892 acres were in cotton. The yield per acre of cotton, according to the same authority, has been nearly stationary, the average for 1900 being 142 pounds of lint per acre, or less than one-third of a bale. At present there is a tendency toward diversification, as shown in the increased area in wheat and oats.

An erroneous impression prevails that the land is not suited to the production of wheat. Well-manured Oktibbeha clay gave a yield of 25 bushels of wheat per acre in 1910, which would indicate that this crop can be grown on the heavier well-drained soils of the county.

The great diversity of soils in Noxubee County, and especially the marked difference between the soils of the black prairie region and those of the sandy lands section, has caused the farmers to recognize the adaptation of soils to crops. The well-drained portions of the Susquehanna, Cahaba, Orangeburg, Norfolk, and Oktibbeha fine sandy loams are recognized as being adapted to melons, early vegetables, and certain bush and tree fruits, and as being warm, quick soils for cotton and corn. The heavier members of the above series are more especially adapted to such crops as corn, oats, wheat, sorghum, cowpeas, and forage crops. The various bottom-land types are used for cotton and corn, with the exception of the more calcareous bottom soils which are planted exclusively in corn. The Houston clay is known to produce good crops of cotton and corn, but seems to be best adapted to alfalfa and other crops for hay, among which Johnson grass is prominent.

The rotation of crops has received but little attention in the past, the aim having been to put in as much cotton as could be cultivated and to plant corn in the remaining fields. It is probable that much of the land has been in cotton at least 7 years out of every 10. There is, however, a growing tendency toward a more diversified farming, and with this change rotation of crops will follow as a matter of course.

The use of fertilizers has increased during the last 20 years, yet in 1900 only $4,220 were expended for this purpose. Fertilizers are generally applied to all sandy upland soils within easy hauling distance of the railroads. It is customary to use from 150 to 300 pounds per acre of a complete mixture for cotton. These fertilizers are usually of a rather low grade, averaging in analysis approximately 10–2–2 and costing about $20 a ton. No effort had been made to adapt the fertilizer to the soil or to the crops until within the last five years. Many farmers report good increases from raw cotton seed; others use acid phosphate alone or cottonseed meal and acid phosphate mixed. Stable manure and cottonseed meal never fail to give

profitable results, and they are not only of benefit to the crops to which they are applied, but to at least one or two succeeding ones.

Many of the soils are in need of organic matter and one of the best methods of improving their productiveness would be the keeping of live stock and applying the manure. The amount now produced is insignificant and recourse must be had to the turning under of green manuring crops such as soy beans and other legumes and the composting of pine straw and other vegetable matter.

Fertilizers are not ordinarily applied to the bottom lands. On the Cahaba, Bibb, and Ocklocknee fine sandy loams a high-grade complete fertilizer would no doubt be beneficial. On the Ocklocknee and Trinity clays if any fertilizer is needed it should be kainit to lessen the effects of rust, or phosphoric acid to hasten fruiting.

The application of lime to the soils is not general, but where it has been used it has proved profitable. Lime should be used whenever the soil is found to be acid.[1] It is especially valuable where the leguminous crops are to be grown. A gradual improvement in the method of tillage has taken place during the last decade. The old custom of planting corn or cotton between two upturned furrows has practically disappeared. At present much of the plowed land is bedded in the fall with a two-horse turning plow, the beds being slightly leveled before the spring planting. A few planters break the land in the fall and do not bed it, but leave it rough, thus getting greater benefit from the freezing. In the spring the land is bedded and planted as usual. On the bottoms good results have followed when the beds have been made wide enough for two rows, as such a method favors drainage.

In the northern half of the county much of the farm labor is performed by negro tenants, who work under the daily supervision of the owner or overseer; in the remainder the owners of the farms do most of the labor themselves. In the former section there are large plantations, often comprising 1,000 acres. In the sandy region they are smaller and there is doubtless a tendency toward smaller individual holdings, though a change in the classification of the census returns makes it impossible to determine just how great the change really is. In 1880 the average farm contained 180 acres; in 1890, 105 acres; in 1900, 72 acres.[2] The tilled land has increased from 160,962 acres in 1880 to 193,390 acres in 1900, which is an index of the progress being made by agriculture. Less than one-half the area of the county is improved agricultural land. In 1880, 39 per cent of the farms were operated by the owners, in 1890, 26 per cent, and in 1900, 15 per cent. From this it would appear that tenancy is on the

[1] In the adjoining counties of Sumter and Oktibbeha the farmers have established, on a cooperative plan, a plant to grind limestone for agricultural use.

[2] In 1900 each tenancy was considered a "farm."

increase, but the difference in classification of farms in the census also enters here to prevent definite conclusions.

There are two general systems of renting. When the tenant furnishes tools, horses, and seed he usually pays from $2 to $3 an acre per annum cash rent. Black lands already in alfalfa rent for from $10 to $15 an acre. The cash rent is often determined by the reputation of the soil for productiveness. Where the owner furnishes everything necessary to grow the crop, in addition to advancing supplies until the crop is sold, the usual rent is one-half of all products. There are many modifications of the above systems.

The tenant aims to raise enough corn for his one or two mules and puts the remainder of his land in cotton. Naturally he farms to secure immediate cash returns with a minimum of exertion, and as a consequence the producing capacity of the tenanted farms has been very much diminished. Many farmers furnish cowpea seed free to their tenants in their efforts to encourage the production of this soil-improving crop. The extension of this practice can not be too strongly urged.

The gradual abandonment of the diversified farming of antebellum days led to the general adoption of a system in which cotton is the predominant crop. With this decline in the raising of farm foodstuffs, there was a corresponding decrease in the number of home-raised hogs, mules, and other live stock.

At present it is estimated that $100,000 worth of corn and oats, about four-fifths of the meat consumed, and many carloads of mules are shipped to the county each year. In 1900 there were 51,184 acres of corn, yielding at the rate of 17 bushels per acre. If the average could be raised to 20 bushels per acre the county would be a seller instead of a buyer of corn. In earlier days there were some fine herds of pure-bred milch cows; and registered horses for racing and fancy driving were raised. The effects of these importations are seen in the grade animals now found over the county. Some farmers have imported Aberdeen-Angus sires and an improvement in beef breeds is under way. It has been the custom to pasture cattle the year through on the switch-cane bottoms of the larger streams. Pure-bred cattle are not adapted to this, and should have additional feed during the months of December, January, February, and March. Many farmers buy yearlings in the spring and pasture them till fall, when they are marketed, mostly in New Orleans, and as the average price paid for such stock is $4 to $8 per head and the purchase price is often doubled, the industry is profitable. The abundance of soils suited to pasturage and forage crops will tend to make beef production and dairying increasingly popular. Many northern farmers have found the soils and climate suited for dairying. With a good

season it is possible to raise two crops of ensilage corn annually, and 1 acre of productive soil has been found to be sufficient to support a cow.

The inferior razorback has been largely displaced by grade Berkshire, Poland China, or pure-bred Duroc-Jersey hogs. The last-named breed thrives on the Houston and Oktibbeha soils where in alfalfa or Bermuda grass, as this type of hog is most successful on those soils that give plenty of bulky forage.

Taken as a whole, the soils are well adapted to the production of an abundance of cheap feed, such as rape, velvet beans, soy beans, cowpeas, peanuts, turnips, sorghum, rutabagas, and alfalfa, and if stock were home fattened on these cheap feeds, supplemented by corn and, in the case of cattle, on cottonseed meal and hulls, greater weight and an improved quality of meat would be secured.

As the bulk of hay needed for the county has heretofore been imported, it is encouraging to note that Johnson grass, Bermuda grass, lespedeza, and even red clover are practically indigenous to the Houston clay, while all excepting alfalfa and red clover do exceedingly well on many other soils, especially the Oktibbeha clay. With Johnson and Bermuda grass the land always becomes self-seeded. Of the former grass two cuttings of a ton each are easily harvested, for which, where the quality is good, from $10 to $16 a ton f. o. b. is readily secured. Bermuda on the Oktibbeha soils is not highly prized for hay, because it yields less than Johnson grass; but Bermuda grass has no equal in this climate as a soil binder on eroded slopes or as a permanent pasture grass. Lespedeza is an annual which reseeds itself and succeeds best on the Oktibbeha soils. It was formerly raised for the seed near Deerbrook and has proved its wide adaptability to varying soil conditions by spreading over the county until it is now found on nearly every type. On the Oktibbeha and Houston series, Johnson and Bermuda grass usually first appear as single tufts, around which the tenant cultivates, with no effort at destruction; gradual encroachment follows until the field is covered. On many farms between Macon and Cliftonville the spreading of these grasses has caused a change from cotton and corn farming to horse and cattle raising and dairying. These soils being the natural habitat of these grasses, eradication is difficult, but not impossible where sufficient horsepower is applied. One farmer reclaimed large tracts by plowing shallow with a steam plow in the fall, and following with a disk to cut and expose the roots to the killing action of frost. Oats were sown in the spring to complete the eradication by shading.

There is scarcity of home-grown fruit and vegetables. This is not due to a lack of soils adapted to their production, for there is sufficient diversity of types to produce many different fruit and truck crops suited to the climate. The local markets import many carloads

of perishable fruits and vegetables from other States, and there is opportunity for developing profitably these special crops. Two crops of Irish potatoes can be grown annually on the lighter loams and well-drained sandy loams of the area. The yields ordinarily range from 75 to 150 bushels per acre for the first crop; the second crop seldom exceeds 100 bushels. Sweet potatoes, particularly the Bunch yam, Pumpkin yam, and Dooley yam, do well, yielding from 150 to 250 bushels per acre and occasionally much more. Wherever observed such vegetables as cabbage, kale, spinach, cauliflower, rutabaga, peppers, collards, snap beans, Lima beans, English peas, radishes, turnips, tomatoes, lettuce, watermelons, cantaloupes, and parsnips seemed well adapted to the lighter sandy soils, and the heavier clay soils, when rendered flocculent by liming and the plentiful use of barnyard manure, also produce vegetables of good quality. Blackberries do well on nearly all soils that have sufficient drainage. A few farmers have grown strawberries successfully for home use and the local markets. Winter apples of good keeping quality can not be produced here, although summer, fall, and early winter apples, such as Henry Clay, Early Harvest, Wealthy, and Wilson succeed. For late maturity Commerce, Champion, Stayman's Winesap, Grimes Golden, King David, and Delicious have been recommended by the state experiment station. In former years extensive pear orchards were planted, but many of these have been ruined by blight. Orchards on eroded slopes have withstood blight fairly well. Peaches grow well, the average life of orchards even where neglected being 12 to 15 years. Healthy orchards were seen on the Houston chalk, as well as on the higher areas of the Cahaba fine sandy loam. The Orangeburg fine sandy loam is well drained and naturally adapted to the Elberta peach. The Guin stony sandy loam, as well as parts of the Orangeburg fine sandy loam type, have an elevation of nearly 500 feet above sea level, which increases their value as fruit soils. With adequate transportation facilities the commercial growing of peaches could be profitably undertaken.

Sugar cane is raised on every type of soil excepting the Ocklocknee, Trinity, and Houston clays. Enough is produced for home use and local markets. It is planted usually on sandy bottom land, and is always fertilized. On heavy black soils or where manured too heavily it has a dark color and an undesirable flavor. From 150 to 400 gallons of sirup per acre are obtained. As the soil controls the flavor, color, and keeping qualities, a light-colored sandy soil is generally selected for this crop.

In the diversification of agriculture the question of labor is important. In Noxubee County the labor is almost exclusively colored, but owing to the distance from industrial centers it is more dependable than in many sections. A common method of employment

is by the year. The laborer receives from $12 to $14 a month, with a cabin, firewood, pasture for a cow, and a stipulated quantity of provisions from the plantation commissary. The daily wage ranges from 50 cents to $1 in cotton-chopping season. Negro women are employed also in the field, receiving from 40 to 60 cents a day, depending on the season and nature of the labor. From 50 to 75 cents per 100 pounds of seed cotton is paid for cotton picking.

All land values are increasing. In many portions $10 an acre can now be secured for land that could have been bought for one-fourth to one-half that amount ten years ago. In the "black-land" belt lands are increasing even more rapidly in value, and large purchases are being made by residents from northern States anxious to engage in general farming, with alfalfa as the important crop.

In considering the changes needed to increase the agricultural output of the county the improvement of work stock and the introduction of better types of farm machinery are important steps. Heavier teams and stronger, larger plows are needed before it will be possible to turn the heavy black prairie land to the depth of 5 or 7 inches. The restoration of humus, according to plans outlined elsewhere, is also imperative, and the drainage of a large proportion of the soils is absolutely essential. All these improvements will tend to lessen the damaging effects of seasonal extremes of moisture. In the introduction of modern implements those adapted to shallow surface cultivation of the intertillage crops should be substituted where practicable for the small turning plow at present used for every operation.

The presence of the boll weevil in counties bordering Noxubee has caused much discussion and no little anxiety among the planters. It is believed, judging by experience elsewhere in infested regions, that no permanent agricultural depression need be feared, provided care be taken to follow the plan of combating the weevil adopted in other localities in the State. Important points are the planting of early maturing varieties in widely spaced rows and the limiting of the acreage to wheat can be cultivated every four to six days. Since the early ripening of a profitable crop of cotton is in the main a soil problem, great care must be taken in the selection and proper management of the various soil types. The sandy soils will give best results. Wet alluvial bottom soils give a heavy weed growth and slow fruiting. Better drainage and addition of phosphoric acid to hasten maturity are advisable on such lands. Overflow lands are apt to be wet and soggy, causing coldness in the spring; hence cotton grows slowly at a season when rapid growth is essential. For the same reason wet uplands, cloddy, intractable clays, and soils that have been temporarily impoverished by poor management should be utilized for other crops.

The importance of adopting all means of agricultural betterment, including the use of modern tillage implements, the terracing of the steeper slopes, deeper plowing, the growing of home supplies, the utilization of waste land, in which a practical system of forestry should enter, seed selection, studies in the economical use of fertilizer, the adaptation of soils to crops and crops to soil, and the general diversification of crops was never more apparent than at present, when the county is entering on a new era of agricultural prosperity.

A conservative estimate would show three-fourths of the farming lands of the county more or less in need of drainage. This condition is most marked in the bottom lands subject to annual overflow, but is by no means confined to this section. Many farms are so situated that their drainage may be perfected by individual effort, but in other cases, especially in case of the overflow areas, cooperation between landowners and the State will be necessary. Floods will have to be controlled by levees; large drainage canals will need to be dredged; and other works involving the exercise of engineering skill and the expenditure of large sums of money will have to be entered upon. Until these general improvements are brought about, there will continue to be much waste of labor and money in the cultivation of some of the naturally most productive soils of the county.

SOILS.

Noxubee County lies entirely within that broad physiographic division known as the Gulf Coastal Plain. The area was once covered by an extension of the Gulf of Mexico, and during this period and later the varied soil-forming materials were laid down. The unconsolidated sediments were separated by the assorting action of water into the various textural grades, the finer particles being deposited in deep water and the sandy material in shallow water, where the currents had greater velocity and the force of waves and tides had more influence. The result of these varied conditions was the development of several geological formations, which, since their emergence, have been changed somewhat by weathering, by plant and animal life, by erosion, and by differences in drainage. These interacting factors have given a variety of soils.

The geological formations of the county, not including the stream terraces and alluvium, consist of two series of deposits differing in altitude, character, and age. The older series consist of a succession of sedimentary formations dipping gently westward. They outcrop therefore in a series of northwest-southeast belts—the oldest formation forming the most easterly, the youngest the most westerly belt. After this series of formations had been laid down, uplifted, and eroded, the other series, consisting of two members, was laid over it

in somewhat blanket form. The older of these two seems to have been subjected to erosion before the younger was deposited. Erosion has been very active since this latter event, so that both these young formations have been removed from wide areas of the county. In fact, the effect of this erosion has been so great that it is not possible at the present time to say that any one of the soils described in this report has been derived exclusively from either of these formations. It seems probable that the soils of the county have so close a relation to the underlying, older formations and so problematic a relation to the later formations that they can be considered mainly as the products of weathering acting on the older formations. The portion of the county where the derivation of the soils from the younger formations, especially from the older members, seems possible is the extreme southwestern corner, where the Orangeburg and Guin soils occur. Even here, however, it has not been shown that these soils could not have been derived from the underlying member of the older series.

The older series consists of the following formations:

The Selma chalk, the oldest formation, ranging in thickness from 300 to 900 feet, is a soft, impure, fine-grained limestone deposited during the Cretaceous age. The unaltered rock has a delicate bluish tint, which, in the slightly weathered surficial portion, has assumed a yellowish color in places, owing, at least in part, to the oxidation products of the included iron pyrites concretions. The further weathering of the rock has given rise to the Houston chalk and Houston clay, the nearly black color of the latter being the result of the decomposition of organic matter under humid conditions and in the presence of lime.

The next higher formation is the Ripley. It consists of limestone and soft, fine-grained sandstone. On account of its occurrence in only a few places it is practically a negligible quantity as a soil maker in Mississippi.

Above the Ripley comes the Midway formation. It consists mainly of beds of clay and outcrops in a broad belt known locally as the Flat woods. It is the belt of Pheba, Susquehanna, and Lufkin soils.

In the southwestern corner of the county the Wilcox formation underlies the country. It consists of a series of alternating sands and clays, with occasional beds of lignite. This is the portion of the county that has suffered the least erosion and is the portion therefore most likely to contain remnants of the later series of formations.

The lower of these formations, the Lafayette, consists mainly of reddish and grayish sands. It seems to have been a factor of some importance in the formation of the Orangeburg soils.

The younger of the later formations, the Columbia loam or Yellow loam, does not seem to occur unmodified in any portion of the county.

It was originally a thin mantle and has been eroded away or mixed with other material. It has doubtless contributed somewhat to the formation of some of the soils, but has been the main source of material in none.

The upland soils of the county, therefore, seem to have been derived mainly from the older formations—the Selma chalk, the Midway, and the Wilcox formations.

On the higher lying terraces or second bottoms of the streams occur two soil series—the Cahaba, characterized by a gray surface soil and brownish to reddish friable subsoil, and the Kalmia, having similar surface soils, but lighter colored and mottled subsoils, the results of poor drainage. These soils represent second bottom or stream terrace material, possibly Pleistocene, which was laid down when the waters of streams flowed at higher levels than at present.

The remaining soil series are of recent origin and are still in process of formation. They occupy first bottoms of the streams subject to frequent overflow and have been grouped in the Trinity, Ocklocknee, and Bibb series. In a few bends of the Noxubee and other large streams the sandy deposits have largely the nature of Riverwash, and as these limited patches and strips are subject to annual modification in size and surface characteristics no attempt was made at differentiation. Portions of many of the above-named alluvial types were inaccessible at the time of survey, and in some cases the boundaries were of necessity arbitrarily drawn.

Aside from the disadvantages of overflows, the bottom-land soils are very productive and highly prized. A large proportion of the bottoms is forested with such hardwoods as oak and gum, as well as with pine. These forests are being exploited by large lumber companies and it is probable that the area of the alluvial soils under cultivation will be largely increased in the future.

Twenty-three distinct soil types representing 13 series were mapped. These occur either as (1) material derived in place from the six geological formations, (2) as reworked material of Pleistocene origin on the second bottoms, and (3) as first-bottom soils still in active process of formation.

In topographic features the soils range from the level areas of the Lufkin, through the broad undulating prairies of the Houston and Oktibbeha series to the hilly, gullied portions of the Guin and Orangeburg soils. Texturally the soils vary from the loose, incoherent Cahaba fine sand to the heavy, plastic Trinity, Ocklocknee, Houston, Oktibbeha, Pheba, and Susquehanna clays. The coloration is equally varied and marked, and gradations from the black of the Trinity to the grayish white of the Lufkin or Bibb are in sharp contrast to the red of the Orangeburg or yellow of the Norfolk.

The following table gives the name and extent of each soil mapped in the county:

Areas of different soils.

Soils.	Acres.	Per cent.	Soils.	Acres.	Per cent.
Oktibbeha clay	74,304	17.3	Pheba silt loam	10,880	2.4
Erosion phase [1]	2,304		Houston chalk	8,448	1.9
Houston clay	64,896	14.7	Guin stony sandy loam	8,320	1.9
Ocklocknee clay	53,376	12.1	Lufkin fine sandy loam	6,848	1.5
Norfolk fine sandy loam	38,912	8.8	Bibb fine sandy loam	5,952	1.3
Pheba clay	35,200	8.0	Lufkin clay	5,376	1.2
Orangeburg fine sandy loam	26,496	6.0	Susquehanna clay	3,200	.7
Trinity clay	23,168	5.2	Kalmia fine sandy loam	1,920	.4
Oktibbeha fine sandy loam	18,880	4.3	Norfolk silt loam	1,408	.3
Pheba fine sandy loam	13,696	3.1	Cahaba clay	1,344	.3
Ocklocknee fine sandy loam	13,696	3.1	Cahaba fine sand	896	.2
Susquehanna fine sandy loam	12,224	2.8			
Cahaba fine sandy loam	11,136	2.5	Total	442,880	

[1] Includes some Houston clay, Houston chalk, and Susquehanna clay.

HOUSTON CLAY.

The soil of the Houston clay, to a depth of 6 to 8 inches, consists of a grayish-brown or dark-brown to nearly black clay to silty clay of a crumbly, friable structure. It is generally calcareous, and frequently contains small concretions of lime carbonate and small iron concretions, the latter especially in wet locations. There are also noticeable amounts of fossil shells irregularly scattered through the soil mass. When wet the soil is extremely tenacious. Clods turned in plowing usually slake to a mealy consistency on drying.

The subsoil varies from a light-brown, plastic, tenacious clay to a gray or in places a pale-olive stiff silty clay. Where the lime content is low there may be occasional brown or reddish-brown mottlings. The latter coloring probably represents a mixture of the materials giving the Oktibbeha soils with those from which the Houston is derived.

The boundaries between members of the Houston and Oktibbeha and Susquehanna series may be sharply defined, while, on the other hand, there may be a gradational zone embracing characteristics common to both these series, such areas being designated by the farmers as "mixed post-oak land." In the northeast corner of the county, in the Tombigbee Valley beyond Cliftonville, there occur areas of gray land, carrying on the surface angular chunks of limestone. This is much purer than the ordinary Selma chalk, often analyzing 90 or 95 per cent of lime carbonate. The soil derived from it is slightly less adhesive when wet, and in drying more apt to bake and crust than the typical Houston clay.

The topography of areas of the Houston clay consists of broad-crested ridges with sides gently sloping down to wide stream bottoms. The type is hilly only in those restricted areas where severe erosion has left hillocks usually composed of more resistant limestone. On these hills and steeper valley slopes the white rotten limestone outcrops, and the soil covering is either very thin or lacking. Where of sufficient size such areas have been mapped as Houston chalk. Owing to the gently sloping topography the Houston clay has good surface drainage. In fields long sodded to Bermuda or Johnson grass the run-off and evaporation of surface waters is less rapid. Also, on the lower slopes next to streams water sometimes seeps from the higher areas.

This soil is found chiefly in the northern third of the county, where it occurs closely associated with the Oktibbeha clay. Detached areas occur west of the Mobile & Ohio Railroad and also in the southeastern part of the county south of Cooksville. The greater part of it is situated within easy hauling distance of Macon, Brookville, or other railroad stations to the east in Pickens County.

The Houston clay, locally termed "black prairie," is derived from the Selma chalk formation, a very soft, bluish, impure, or argillaceous limestone. This formation, which gives rise to similar soils in Lowndes, Clay, Oktibbeha, and Monroe Counties, in Mississippi, and the adjoining county of Sumter, in Alabama, was deposited during the Cretaceous epoch. The formation is usually seen in a broken, weathered condition.

The typical Houston clay is a prairie soil and supports little native timber. On the limy knolls cedars thrive, while cottonwood marks the courses of the smaller streams. Bois d'arc (Osage orange) hedges, which were extensively planted in antebellum days, have grown so that many of the roads resemble shaded avenues. The prairie was originally covered with a rank growth of sedges and native grasses interspersed with thickets of wild plum. At present Johnson grass and melilotus are very common on the type.

The Houston clay supports a prosperous farming community and wherever found is noted for its lasting productivity. Near Deerbrook this soil has been in continuous cultivation for nearly 80 years and still produces an average of one-third bale of cotton and 20 bushels of corn per acre. This record is all the more remarkable when it is considered that these have been the only crops grown and that no fertilizers have been applied or organic matter, excepting the stalks of cotton and corn, restored to the soil.

In the diversification of the crops of Noxubee County the Houston clay assumes particular importance on account of its remarkable natural adaptation to alfalfa. During the last few years this crop has been extensively tried on this soil. The results indicate that a

large proportion of the type can be very profitably used for alfalfa culture. The preparation of the soil for alfalfa requires care and considerable labor. The land should be broken in the fall as deeply as possible, then harrowed, and sown to oats. The following spring, after the oats are harvested, the land should be thoroughly disked and sowed to soy beans or cowpeas. The pods may be picked, but the vines, when dry, should be plowed under deeply with a turning plow. By this time the soil will be in good physical condition for fall-sown alfalfa. However, as the spring-sown crop is more apt to prosper, it will be better to sow oats again, which may be used as winter pasture. In the spring the land should be plowed deeply, turning the oats well under and harrowing to fine tilth. Upon this bed 25 to 30 pounds of alfalfa seed per acre should be sown. The proper time for seeding is from about the middle of March to early in April, according to the season. As a precautionary measure it will be well to inoculate the seed with the necessary bacteria or to scatter over the seed bed soil from an old alfalfa field, which will accomplish the same end. The cost of seeding ranges from $7 to $10 an acre.

When weeds and grass encroach upon alfalfa fields and cause a decided reduction in the yield, they should be plowed and used for cotton and corn. The improvement in productiveness of such fields will be very marked, but after a season or two of tilled crops the field should be put back in alfalfa, following the plan already outlined.

Although some have not met with success in the production of alfalfa on the Houston clay, it is probable that their failure has been due in large measure to lack of care in preparing the soil and not in the character of the soil itself. Alfalfa must have a limy, well-drained soil, not subject to overflow of more than 48 hours' duration, requirements generally met by the Houston clay, but in addition the seed bed must be well prepared and free from weed seed. When a good stand is once established under such conditions, the fields remain productive for a long time.

Failures of alfalfa to catch on some fields may be due to lack of lime in the surface soil, and where this is apparent applications of the lime rock, easily secured from the weathered exposures, will be found beneficial. The average of four analyses[1] of Selma chalk in Noxubee County shows 87 per cent of lime carbonate, enough to render its use profitable. This has been shown in actual practice.

By growing alfalfa as the basis of producing beef, pork, and dairy products there is an excellent opportunity for a profitable change in the present system of farming. Other crops to which the soil is very well suited, such as vetch, soy beans, cowpeas, velvet beans, bur clover, melilotus, oats, rape, peanuts, and corn (for both

[1] Report on Cement Clays, by A. F. Crider, Miss. Geol. Survey, 1907.

grain and ensilage), should also be grown in conjunction with stock raising or dairying. Where it is not desired to grow alfalfa, the rotation recommended for the Oktibbeha clay may be followed.

Although no other soil in the county can compare with the Houston clay as regards the maintenance of profitable yields of cotton and corn under continuous culture and without proper rotation of crops and fertilization, much of the type is at present in relatively poor physical condition. Such areas may be told by their lighter color, by the more adhesive, tougher structure, and by the absence of that peculiar crumbly condition that marks the soil in its best development. The loss of organic matter and plowing the soil when too wet are two of the main causes of impaired physical condition. The remedies are obvious. The first deficiency will be met fully by growing the leguminous crops and turning them under as green manures, or it will be met partially by substituting a rotation of crops for the present continuous cotton and corn cropping. Under existing conditions of climate and drainage it is doubtless difficult always to avoid stirring this clay soil when not in just the proper condition as regards moisture, but the injury done to the soil in such cases should be kept constantly in mind and guarded against wherever practicable. The use of the ordinary commercial fertilizers has so far been unsatisfactory in building up the productiveness of the Houston clay. Stable manure gives gratifying results, but owing to its limited supply recourse must be had to green manuring.

The Houston clay sells for $25 to $30 an acre, or with a good stand of alfalfa for $40 an acre.

HOUSTON CHALK.

The Houston chalk includes outcrops of the Selma chalk and areas of shallow, light-colored soil with the chalky limestone near the surface. In the central part of the county the material consists largely of disintegrated rock; in other sections it may be a grayish to whitish chalky loam for 12 inches, resting directly upon the rotten limestone. A second phase changes abruptly at about 10 inches to a heavy white or yellowish white clay, which at 24 to 36 inches changes to the unweathered bluish limestone.

Isolated patches of the Oktibbeha clay are of common occurrence in connection with outcrops of the chalky material, especially near the Kemper County line in the southeast part of the county. Erosion has exposed the chalk on the slopes along many of the streams and the soil removed has in many cases been washed to the base of the hill to form narrow areas of gray limy soil which when large enough to map were included with the Trinity clay. The areas are usually too narrow to be shown on the map.

The Houston chalk occurs along the stream slopes and in other hilly sections of the county. There are no large areas and at present few areas are cultivated. Crops are apt to suffer from drought, except where the chalk is well weathered and the distance to the disintegrated rock is 2 feet or more. Here ordinary farm crops succeed very well. The shallow phases are well adapted to melilotus and lespedeza, and in cases where the surface soil is too thin for successful cultivation to ordinary crops a fertile soil may be built up by seeding these legumes and plowing under for a few seasons. Those areas having at least 12 inches of soil will grow Johnson grass. Owing to the droughty character of such areas the second crop may sometimes prove a failure in dry seasons. On the whole the type is better adapted to pasture than to cultivation, especially in view of the active erosion.

With a continuance of the present cultural system areas which are now tillable will eventually become barren wastes. This fact suggests the necessity for careful cultivation in order to prevent the washing away of the small amount of soil already accumulated. The type at present has a low agricultural value and is generally sold in connection with other more valuable soils.

TRINITY CLAY.

The surface soil of the Trinity clay, to an average depth of 8 inches, consists of a dark-gray to black clay or very heavy clay loam. The higher areas lying adjacent to the eroded slopes of the Houston chalk usually carry an excess of limy particles washed from that soil and sufficient to give a grayish cast to the surface. The texture of the subsoil is about the same as that of the soil, the main difference being in color, which is a lighter brown, and in plasticity, which increases with depth. In areas insufficiently drained the subsoil is usually gray. The Trinity clay is a tenacious soil which, because of its high clay content, cracks in dry seasons. In newly cleared areas with a great abundance of organic matter the cracking is least pronounced and the soil has a favorable crumbly structure. It is uniformly darker in color than the Houston clay, a condition due to its alluvial origin and consequent higher content of organic matter.

There are many areas bordering incipient drainage ways and intermittent branches too small to be mapped. In these the soil is a mixture of colluvial and alluvial material washed from the adjacent slopes of the Houston clay. These accumulations have been built up largely since cultivation began, and represent mainly washings from the adjacent cultivated fields. The surface here is usually a black clay 2 feet or more in depth. In other locations where the type is influenced by adjacent areas of Ocklocknee clay or of types of the Susquehanna series the soil gradually loses its dark-brown color and limy characteristics.

The Trinity clay is extensively developed along the first bottoms of the streams of the northeastern part of the county. It is formed from materials washed from the Houston clay and Houston chalk laid down by the streams on their flood plains or accumulated as colluvial material in narrow strips along the foot of slopes and in drainage-way depressions. Owing to the clean cultivation and consequent erosion of the Houston clay, the acreage of this type of bottom land is gradually increasing.

As in case of the Houston clay, this type must be plowed under favorable moisture conditions in order to secure a pulverulent seed bed. Fall plowing is always advisable, for the reason that the annual overflows combined with freezing secure excellent physical condition for the spring seeding.

When well drained and not subject to excessive overflow the Trinity clay is one of the most highly prized soils in the area. Where late rains delay or prevent cotton planting, it may be sown to corn as late as June, and a good crop secured. Cotton and corn are the main crops, though the former does not do well on the gray colluvial phase, because of injury by rust. In newly cleared areas excessive growth may take place and a part of the crop may fail to ripen before frost. No fertilizers are applied to the crops on this type, though it is likely that applications of phosphate would hasten maturity, and that kainit would lessen the ravages of the rust.

The methods of cultivation are similar to those used on the Ocklocknee clay, and the recommendations for improving the methods of culture given for that soil apply with equal force to the Trinity clay. In certain areas where the soil has been under cultivation to cotton and corn for 75 years the yields have decreased somewhat. Rotation would do much to improve these areas. On Ocklocknee soils where yields had declined, the fields have been restored to their former productiveness by growing an occasional crop of oats sown after the corn is removed.

Corn produces from 20 to 40 bushels per acre, with yields as high as 80 bushels where drainage, deep plowing, and rotation are practiced. Cotton may produce a bale per acre, with an average of one-half to three-fourths bale. Johnson grass and Bermuda grass make a good growth, the former yielding from 2 to 4 tons of hay per acre, while sorghum and sugar cane grow well. The sirup, however, is darker and stronger than that grown on the lighter sandy uplands. Wherever observed alfalfa is doing well, provided the drainage is adequate.

The great needs of this soil are the removal of excess water, deeper plowing, and rotation of crops. The price of land of this type of soil ranges from $25 to $30 an acre.

OKTIBBEHA CLAY.

The surface soil to an average depth of 8 inches consists of a brown to reddish-brown silty clay, normally of a fairly friable structure. Occasional patches of a few acres may be silty or sandy, especially along the contact of the more sandy types; and areas bordering on the Houston clay gradually become darker, in which case boundaries are somewhat arbitrarily drawn. These narrow strips, representing zones of gradations, are called "mixed post-oak land."

The subsoil to a depth of 36 inches is a heavy, plastic brown clay mottled with red, yellow, and steel gray. On high knolls or areas bordering the Susquehanna series the red mottling is more conspicuous. The subsoil becomes increasingly gray with depth, owing to the decreasing influences of oxidation, aeration, etc., and at from 6 to 18 feet rests directly on the Selma chalk. On slopes the soil may be so thin as to allow the white chalk to outcrop as white patches. The type, in part at least, is slightly calcareous, and it is generally considered as containing more lime than the other upland soils of the region, except those derived from the Selma chalk. The Oktibbeha clay is quite uniform over considerable areas.

Excepting certain flat-woods areas, where water may accumulate after rains, the greater proportion of the type has adequate surface drainage. The subsoil drainage is usually sufficient, with exceptions in flat areas and incipient drainage ways. As the type is a heavy clay, it absorbs water rather slowly and gives up moisture gradually. The absorptive capacity has been lessened in many poorly managed fields where the vegetable matter usually found in newly cleared lands has been depleted. Deep cracks often form in this soil during drought.

The Oktibbeha clay occurs closely associated with soils of the Houston series and is well developed upon the broad crests of the interstream areas in the central and northern portions of the county.

As a rule the type varies from areas having a very gently rolling surface to broad, flat divides of plateaulike uplands. It also occurs occasionally on slopes, sometimes extending down to stream channels.

The boundaries of the Oktibbeha clay in regions of limestone soils may be easily traced by the growth of hardwoods indigenous to the type. Post oak is the predominant growth, on which account the soil is called "post-oak land." A sprinkling of other oaks, hickory, and a little maple, persimmon, and pine are seen. On the depressed areas black and sweet gum, water oak, and pin oak flourish, while on the white limy hills, with a few inches of clay covering, cedar is plentiful.

A large proportion of this soil has been in cultivation for 50 or 60 years, and the area farmed is gradually being increased. The early

yields of wheat, rye, oats, corn, and cotton were about the same as obtained at present on newly cleared Oktibbeha clay fields. In general the methods of cultivation have been such that the yields given by newly cleared land are soon reduced. At present one-fourth to one-half bale of cotton, 15 to 25 bushels of corn per acre, or two cuttings of Johnson grass, averaging a ton each per acre, are secured. The hay sells readily for $10 to $14 a ton. During the survey several fields of wheat were seen that would produce nearly 25 bushels per acre. The acreage of wheat and oats is on the increase, the latter often yielding 25 or more bushels per acre without the use of fertilizers. Northeast of Macon extensive Bermuda pastures afford excellent grazing for large herds of dairy and beef cattle and horses. Here also many acres of Johnson grass are cut for hay.

Near X Prairie on the plantation of R. Brewer a field of alfalfa was seen. It has also been grown on this soil by a few other farmers.

Alfalfa, as stated elsewhere, demands an alkaline or neutral well-drained, fertile soil, and it is believed that by care in selecting well-drained areas and in bringing the soil into the best possible condition the Oktibbeha clay can be used profitably for the production of this valuable legume. Over much of the type in its present condition, however, alfalfa should not be tried.

Sorghum is an excellent crop for winter feed and is well adapted to this heavy soil. If sown thickly and mixed with cowpeas its value as forage is increased.

Among the many necessary changes in the present methods of managing the soil, deeper plowing, drainage, and liming are important. These would improve the physical condition of much of the soil and would be especially beneficial in case of the more nearly level areas. The addition of organic matter is also indicated by the present generally low yields. This improvement may be readily made by rotating crops. The following rotation or one following along the same general line would build up the soil and undoubtedly prove a profitable way of utilizing such land: First year corn, which may be removed and fall oats sown. In the spring the application of a complete fertilizer, one analyzing about 10 per cent phosphoric acid, 3 per cent nitrogen, and 4 per cent potash is advisable. After the harvest in June the land should be plowed, thoroughly pulverized, and early cowpeas, such as Whippoorwill, or soy beans or peanuts sown in drills. With the removal of these the land should be well disked and oats or rye sown for pasture or as a winter cover crop. The following spring the land should be plowed deeply and planted to cotton. The stalks should be broken down with a stalk cutter and plowed under deeply or burned (under boll-weevil conditions) and oats again sowed as soon as the cotton is picked. Corn should follow

with rows wide enough to permit the sowing of some legume when the crop is laid by.

The above rotation allows four ripened crops in three years and also cover crops for pasture and soil renovation. This rotation, with local modifications to suit individual needs, has been tried by a few farmers in the county and they have doubled their yields after a few years of such soil treatment.

The type sells for about $20 to $25 an acre, with a ready demand and prices increasing.

Oktibbeha clay, erosion phase.—In certain parts of the county where the surface of the Selma chalk is quite uneven the resultant washing and gullying has given a remarkable diversity of soils within short distances. It sometimes happens that a small area will show distinct patches of Houston chalk, Houston clay, and Susquehanna clay. Owing to the complexity of such occurrences it was impossible to map these several types on the scale used, and they were accordingly grouped under the name Oktibbeha clay, erosion phase. The texture of these areas is predominantly nearly a clay.

The drainage of the erosion phase of the Oktibbeha clay is uniformly good. The surface varies from rolling, west of Brookville, to steep, broken, and blufflike along Running Water Creek toward Shuqualak. Near Brookville this phase of the type is easily cultivated and produces good average yields. In other portions of the county, however, it is only cultivated in the lower areas and valleys, the hills being left in forest and pasture. The native vegetation and crop adaptations vary with the soil. This phase is sometimes called "Calico prairie," a term which aptly describes the surface appearance, which ranges from bright red to black or white. Land of this character can be bought at prices ranging from $3 to $10 an acre, depending on the state of improvement or value of standing timber.

The following table gives the results of mechanical analyses of samples of the typical soil and subsoil of the Oktibbeha 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.*	*Per cent.*
23892	Soil	2.0	3.3	1.8	2.2	8.3	51.4	28.0
23893	Subsoil	.6	.9	.6	1.1	7.3	36.7	52.5

OKTIBBEHA FINE SANDY LOAM.

To an average depth of 5 to 10 inches the Oktibbeha fine sandy loam consists of a gray or brownish-gray fine sandy loam. This grades into a reddish subsoil, which becomes heavier with depth until at 20 to 30 inches it is a heavy loam or fine sandy clay loam

mottled with red, yellow, and gray. In cuts the substratum is seen to be a heavy clay at a depth of about 5 or 6 feet. The soil is very friable and in newly cleared fields has enough humus to give it a dark-gray color. Under the prevailing system of cultivation the soil gradually loses its dark color with loss of organic matter and becomes redder. The mellowness noticed in the virgin soil also decreases.

Both the soil and subsoil are well drained and absorbent, the only exceptions being the small strips bordering stream bottoms. These areas usually have a gray subsoil mottled with yellow and contain many iron concretions. The type withstands drought well and is more independent of moisture conditions than some of the heavier soils.

The Oktibbeha fine sandy loam has rather a small area in Noxubee County. It is usually found on rolling hills and valley slopes. In the northern part of the county this formation is encountered usually at a depth of a few feet. The type differs largely from the Susquehanna fine sandy loam in having a lighter red subsoil, less mottled, and less plastic. In a few places the type is somewhat calcareous and has a dark surface soil, owing to an admixture of Houston material.

The native vegetation consists largely of oak and cedar, with some wild plum. Most of the type, however, is under cultivation. It responds readily to fertilization and produces, on the average, about one-fourth bale of cotton and 12 bushels of corn per acre. With intensive cultivation and rotations similar to those outlined for the Oktibbeha clay the above yields could easily be doubled. In addition to the staple crops the type is well adapted to the production of watermelons and peanuts. Land of this type of soil sells for $10 and $15 an acre, depending on location, improvements, and value of other soils held in connection with it.

PHEBA FINE SANDY LOAM.

The soil of the Pheba fine sandy loam consists of a gray to light-brown fine sandy loam, underlain at about 6 to 10 inches by yellowish-brown heavier material, which gradually passes into fine sandy clay to silty clay below. The lower subsoil is usually mottled with reddish, yellowish, and gray colors. A heavy clay substratum is encountered at about 3 to 6 feet. In appearance the type is quite like the Oktibbeha fine sandy loam, but it probably is less calcareous and less productive.

The surface configuration is flat to gently rolling or undulating. Surface drainage in many places is deficient owing to the slight slope.

The Pheba fine sandy loam is confined to the western part of the county, outside of the Selma chalk belt. It is developed in the Mid-

way formation and the substratum probably consists mainly of material belonging to the clays of that formation. The character of the soil suggests a possible derivation from the Yellow Loam formation. It is confined to that part of the county to the west of the Noxubee River from the northern county line to the Mobile & Ohio Railroad bridge. Below this point the type is developed only to the west of the railroad. It occurs in large but widely separated areas, as well as in small patches.

Naturally the soil is of rather moderate productiveness, but by growing the leguminous crops in rotation with the common crops of this region and by incorporating vegetable matter with the soil, as can be done to good advantage by plowing under crops like cowpeas and rye, it can be made very fair farming land. Commercial fertilizers will be needed as with other sandy upland soils of the county, but not too much dependence should be placed upon this method of increasing yields. Fall plowing followed by winter oats or rye or other winter crops can not but improve the land.

Cotton, corn, peanuts, oats, rye, cowpeas, soy beans, sorghum, and a number of other crops can be successfully grown. A large proportion of the type is forested.

PHEBA SILT LOAM.

To an average depth of about 7 inches the Pheba silt loam is a brown to grayish-brown very fine sandy loam to silt loam. This grades into a mottled yellowish-red or reddish-yellow clay loam to silty clay, which at 30 inches becomes gray mottled with yellow. The subsoil does not become excessively heavy within the 3-foot profile, though it is often a heavy clay at 5 or 6 feet.

The surface of the Pheba silt loam is moderately rolling, which gives the type good surface drainage. Subdrainage is often deficient. The type occurs in the western part of the area where it overlies the clays of the Midway formation. It is believed the soil contains more or less material of the yellow loam formation.

At present little of this soil is under cultivation. The areas are for the most part in forest, consisting of pine and oak, with gum and water oak on the lower-lying areas. It is a fine-textured soil and tends to become compact, which condition, together with an unfavorable subsoil, especially in the low places, will call for extreme care in cultivation. Heavy liming (1 to 2 tons burnt lime per acre) and the incorporation of vegetable manures are necessary. Probably fertilizers relatively high in phosphoric acid would hasten plant development on this cold-natured soil.

The average yields are one-fifth bale of cotton and about 10 bushels of corn per acre.

PHEBA CLAY.

The soil of the Pheba clay consists of a light-brown clay or silty clay averaging about 8 inches in depth. Occasionally there is a shallow mantle of fine sandy material. The subsoil is a rather plastic brownish or yellowish clay, mottled, especially in the lower portion, with gray. In color, texture, and structure the type closely resembles the Oktibbeha clay, but it is less limy and not so productive, and also differs from the Oktibbeha in that it overlies not the Selma chalk, but the clays of the Midway formation.

The Pheba clay is developed in the western portion of the county, its eastern limits being marked by the Mobile & Ohio Railroad from the southern county line to the Noxubee River bridge, thence northward by the Noxubee River. Overlying the Midway clays at least the subsoil of the type is very probably derived from these clays, but a portion of the soil may consist of Yellow Loam material.

The surface is mainly flat to undulating, the drainage often being deficient owing to lack of slope and drainage ways. Ditching would be decidedly advantageous over nearly all of the flatter areas. Most of the type is forested with oak, pine, and gum. The soil is improved by fall plowing, followed with winter cover crops, such as rye or oats. Leguminous crops should be grown in rotation with other crops, and occasionally a growth of cowpeas or some other legume should be plowed under to improve the tilth. An application of a ton of burnt lime per acre or 2 tons of raw limestone undoubtedly would prove very beneficial. This can easily be made a good grass and wheat soil, while cotton, corn, cowpeas, and oats can be counted upon as fair producers.

SUSQUEHANNA CLAY.

The soil of the Susquehanna clay consists of 2 to 6 inches of reddish-brown, tenacious, plastic clay loam. The subsoil is a plastic, stiff, mottled red and brown clay. Below 2 feet, where weathering agencies have little chance to exercise any influence, the material becomes increasingly gray. In locations not susceptible to active erosion there is a small amount of sand on the surface. In other places the type resembles "gall" spots and has little agricultural value. Unless plowed under proper moisture conditions this soil is likely to clod and become difficult to till.

A hilly topography gives good drainage, but the soil is not very absorbent and consequently the surface washes badly. This is indeed an erosional type, originating where areas of Susquehanna fine sandy loam have had the surface covering in whole or in part removed. It is derived from the heavy clays overlying the Selma chalk. Only small areas of Susquehanna clay occur in the county. They are found on isolated knolls in the northern section. Very often the dis-

integrated Selma chalk outcrops and the depth of the soil section overlying the limestone was nowhere observed to be over 6 feet.

The tree growth consists of blackjack and post oak, with cedar also where the Houston chalk approaches the surface.

As the type is not generally in cultivation, crop yields are difficult to obtain. It is safe to say they are low. Cotton probably will average one-fourth bale and corn from 7 to 10 bushels to the acre. With better modern systems of management, including the application of burnt lime or the finely disintegrated limestone the type could be made a profitable crop producer. At present the greater part of the type should be kept in forest. The average value is probably $5 an acre.

SUSQUEHANNA FINE SANDY LOAM.

The soil of the Susquehanna fine sandy loam is a gray fine sandy loam with an average depth of about 10 inches, the depth varying from 3 to 12 inches according to the degree of erosion. Beneath the surface layer and extending to a depth of 36 inches or more is found a plastic heavy red clay, mottled with gray. The mottling increases with depth, owing to the decreasing effect of the agencies of aeration and oxidation.

Areas of this soil are distributed throughout the northern part of the county. They occur generally as the highest land directly overlying the Selma chalk and usually border areas of Houston or Oktibbeha soils. They have a hilly to rolling topography. The type is mainly derived from clays overlying the Selma chalk, although some doubtful areas are possibly influenced by the Yellow Loam.

The native trees consisted of pine, cedar, and oak, but much of the forest has been removed. Considerable areas are still in forest or Bermuda pasture. At present profitable yields of watermelons, Irish and sweet potatoes, cotton, sugar cane, and corn are produced. Winter oats give fair results. From 75 to 125 bushels of Irish and from 150 to 300 bushels per acre of sweet potatoes are secured. Kieffer and Garber pears give very satisfactory results, being quite resistant to blight.

This soil, like the others so far described, is greatly in need of deeper plowing and the rotation of crops, including cowpeas, rye, or similar crops, to supply organic matter. It responds readily to farm manures, cottonseed meal, and commercial fertilizers. The type sells for $8 to $15 an acre.

ORANGEBURG FINE SANDY LOAM.

To an average depth of 12 inches the Orangeburg fine sandy loam is a light brownish or grayish loamy fine sand to light fine sandy

loam. The depth of the soil varies greatly with the degree of slope and amount of erosion. In limited areas where the surface soil was entirely removed, there may be heavy red "gall spots," representing exposures of the subsoil, while on steep wooded slopes too small to be mapped there may be a surface covering of sand 2 feet or more in thickness. On some of the hill areas there may be found platelike fragments of cemented ferruginous conglomerate or sandstones. Iron concretions are often found scattered over the surface, especially where the drainage is poor. The subsoil to 36 inches is a red, friable, incoherent fine sandy clay. The change from soil to subsoil is gradual and is marked by a decrease of sand content, an increase of the finer soil particles and a redder color. The type grades into the Norfolk and Guin soils.

The drainage of the Orangeburg fine sandy loam is uniformly good, being aided by the granular structure of the subsoil. The type presents some of the most remarkable cases of erosion to be seen in the county. Near Gholson vertical cliffs sometimes nearly 100 feet high are occasionally seen. The peculiar structure of the subsoil is thought to be the cause of this perpendicular cutting. The main part of the type is nearly level to gently rolling and good farming land; the eroded areas are worthless for agriculture and are in forest.

With the exception of one small body near Allgoods Mill and another near the Tombigbee River, none of the Orangeburg fine sandy loam is found in the northern part of the county. It is supposed to have once covered the whole of the county, being much thinner in the northern part, where erosion has almost entirely removed it.

The type supports a mixed growth of pine and oak, and is often termed "piny-woods land." It is derived from the Wilcox formation with an undetermined amount of influence from the Lafayette.

The average yields are one-fourth bale of cotton and 10 to 15 bushels of corn per acre. In newly cleared fields the soil is browner, owing to a greater content of organic matter, and the yields are much greater than in fields where the organic matter has been depleted. Much valuable timber has been deadened on this soil by girdling as a substitute method of clearing. In a few years many steep slopes which should never have been cleared will be hopelessly gullied and left to reforest themselves.

The type where not badly eroded or too sloping is well adapted to the production of melons, vegetables, and sweet and Irish potatoes, as well as to the staple crops. It is easily tilled and very responsive to deep plowing, rotation, the use of fertilizers, and the incorporation of vegetable matter. At present much of the type is nonagricultural

land, and with the continuance of erosion valuable farms are being ruined by gullies and added to the nonproductive area from year to year. This destructive erosion can be prevented by terracing and the use of cover crops, by deep plowing, and by careful choice of the areas to be cleared and farmed.

A valuable characteristic of this type is its natural adaptation to various kinds of fruit. It is an especially good soil for peach growing. In counties farther south, Lauderdale for example, commercial orchards are now shipping peaches of good color and excellent flavor to the northern markets. The Elberta is the most popular variety. In the southern part of the county thrifty fruit trees were seen and the fruit was of fine quality. With easier access to shipping points this type could be planted to commercial orchards very successfully.

The Orangeburg fine sandy loam sells for $10 to $15 an acre, depending on location and condition as regards erosion. Steep, broken areas well timbered bring from $5 to $10 an acre.

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

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.*	*Per cent.*
23896	Soil	3.4	12.1	13.2	22.2	15.0	24.6	9.5
23897	Subsoil	1.3	9.2	11.2	23.0	7.7	24.8	22.2

GUIN STONY SANDY LOAM.

The surface soil of the Guin stony sandy loam ranges from a gray sand to a light sandy loam, carrying a variable quantity of iron concretions and sandstone fragments from about one-fourth inch to 10 feet in diameter. The soil grades into the reddish-brown sandy clay subsoil at a depth of 8 to 10 inches. The percentage of iron concretions and stone fragments is less in the subsoil than in the soil and diminishes as the depth increases. On the slopes of the steep hills the type is not uniform, owing to the occurrence of patches of Orangeburg and Susquehanna fine sandy loams. These range from areas containing a few square yards to areas of 5 acres or more.

The topography is mainly hilly and broken, being found only on the slopes of very high hills. Erosion has been extremely severe, giving a rough surface and making much of the type unsuited to tillage. Many deep vertical gullies are found in parts of the type. In places the stone on the surface has checked erosion to a certain extent. Many streams head in the Guin stony sandy loam, where

seepage springs are common. On the whole the drainage is excessive. The greater part of this type is found in the southwestern portion of Noxubee County, bordering on Kemper and Winston Counties.

The principal timber growth consists of pine and scrub oak. A number of native grasses do well and afford fair pasturage. In places where the slopes are not too steep and where the surface has been cleared of forest and stones, cotton, corn, and peas are often grown. The ordinary yield of corn is from 5 to 8 bushels and of cotton from one-tenth to one-sixth bale per acre. A large part of the type, on account of the rough topography and the presence of stones, is not suited to agriculture and should be devoted to pasturage and forestry. There is, however, a considerable acreage included in this type which by liberal incorporation of vegetable matter, like cowpea vines, and careful management to prevent washing could be made fairly good farming land.

NORFOLK SILT LOAM.

The surface 8 inches of the Norfolk silt loam is a brownish-yellow to grayish-yellow silt loam carrying occasional iron concretions, especially in the wetter places. The subsoil is a yellow, slightly plastic, compact silt loam or silty clay loam. In limited areas the yellow subsoil may not appear until a depth of 20 inches is reached. Faint mottling with grayish colors is sometimes seen in the lower subsoil.

The Norfolk silt loam occupies nearly level to gently rolling areas and is developed in the northwestern part of the county. Apparently it is often a transitional type between the Norfolk fine sandy loam and Oktibbeha clay, in which case it occupies narrow areas usually classed with either one or the other of the types mentioned, according to the preponderating characteristics. The original forest covering did not differ markedly from that found on the Oktibbeha clay or the Pheba silt loam.

The usual crops are cotton and corn, with sufficient sweet and Irish potatoes for home use. The type is very well adapted to these crops and to forage crops and grass. The soil is in need of liberal additions of organic manures, such as cowpeas or rye plowed under. Deep fall plowing with winter cover crops would assist greatly in bringing the land up to a much better state of productiveness. With proper handling, including the establishment of proper drainage in the flat areas, and with applications of moderate amounts of fertilizers, especially those relatively high in phosphoric acid, much better yields of corn, oats, and forage crops could be secured than on the Norfolk fine sandy loam.

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

Mechanical analyses of Norfolk silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
23884	Soil	0.3	4.7	7.6	18.4	6.0	53.8	8.8
23885	Subsoil	.4	3.1	5.7	14.6	4.3	54.6	17.0

NORFOLK FINE SANDY LOAM.

To an average depth of 6 or 8 inches the Norfolk fine sandy loam consists of a gray loamy fine sand to light fine sandy loam, markedly deficient in organic matter. The subsoil is a yellow fine sandy loam that gradually passes into fine sandy clay. On eroded slopes the yellowish or brownish-yellow subsoil is exposed in places. A loose mellow nature and high percentage of sand make plowing easy and possible under a wide range of moisture conditions. The type as a rule is well drained, except in some of the lower lying areas near streams.

The soil of a phase of this type consists of an incoherent fine sand to loamy fine sand, underlain at about 24 inches by a yellow fine sandy loam, which in turn rests at a depth of 5 or 6 feet on a substratum of heavy sandy clay. The agricultural value of this phase is about the same as that of the typical soil.

The Norfolk fine sandy loam occurs in extensive bodies over the southern and western portions of the county. There are also many small areas some of which could not be mapped on the scale used. The topography varies from nearly level to gently rolling or moderately steep on stream slopes.

The tree growth consists chiefly of pine, several species of oak, and gum. On the lower areas are found principally water oak, pin oak, black and sweet gum, and pine.

This type is one of the popular soils of the area, although much of it is yet in forest. It is commonly styled "Piny-woods land." When first cleared and cultivated the surface soil is a dark gray, owing to the presence of organic material. Under cultivation the amount of organic matter in the surface soil is gradually diminished and the color becomes lighter, the structure less favorable, and the yields lower, unless occasional additions of vegetable manures are made. On account of its favorable location, topography, natural drainage, and wide range of crop adaptation, including soil-improving crops like the legumes, the type can easily be built up to produce profitable yields. It is well adapted to the staple crops of the region,

as well as to garden and truck crops, including watermelons. Cowpeas, peanuts, and soy beans do well. When supplied with organic matter, yields of three-fourths of a bale of cotton are not uncommon. At present, however, about one-fifth to one-fourth bale and from 8 to 12 bushels of corn represent the ordinary yields per acre. Commercial fertilizers are coming more and more into use. While no especial effort is made to apply them in accordance with the varying needs of the soil and crop as determined by experience, good results are the rule.

The type is held at something like $8 to $15 an acre, depending on location and improvement.

LUFKIN CLAY.

The soil of the Lufkin clay is a dark-gray or drab silty clay averaging about 5 inches in depth. The upper subsoil is a drab or gray to grayish-brown heavy clay, which at an average depth of 15 inches becomes a gray plastic tenacious clay containing very little sand. The above description applies to the typical areas south of Shuqualak. Other limited areas which seem to represent poorly drained bodies of the Pheba clay have a darker gray subsoil sparingly mottled with shades of yellow and brown.

In the flat-woods areas southwest of Macon the Lufkin clay has poor drainage, and water often stands upon the surface until removed by evaporation. In other areas the surface is well drained, but the subsoil, owing to the impervious, compact nature of the material, is in a wet condition much of the time.

The greater part of the Lufkin clay is covered with oak forest, which gives it the chief value at present. Where cut over the present growth consists of scrubby blackjack oak, post oak, and some white oak, together with old-field pine. A small proportion of the type is under cultivation, but it is a difficult soil to till, as it must be worked when the moisture content is rather low or it will bake and clod. The deficient drainage induces acidity and other unsanitary soil conditions that lower the yields. To remedy these conditions drainage must be resorted to, in conjunction with heavy applications of lime to overcome acidity and to increase the friability of the soil. A liberal application, say 25 wagonloads, of raw lime or 2 tons of burnt lime (slaked), which may be burned in homemade kilns, will meet present requirements. The type is also in need of humus, which should be supplied by turning under green manuring crops, according to methods already suggested for other clay soils.

The flattest areas should be plowed with furrows sloping to the water courses. Each year from four to six furrows on a side should be thrown toward a common center, which will give a space 8 to 10

feet wide, on which two rows of cotton or corn may be planted. A continuation of this practice for a few years will give ridged fields with improved local drainage.

Crop yields are subject to considerable fluctuations, depending on the season. A fair average for cotton is one-fourth bale and for corn 8 bushels per acre. The type sells for slightly less than the Oktibbeha clay.

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

Mechanical analyses of Lufkin 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.*	*Per cent.*
23878	Soil	1.2	4.8	3.7	7.8	4.9	46.2	31.1
23879	Subsoil	1.0	3.2	2.7	6.1	4.2	41.3	41.2

LUFKIN FINE SANDY LOAM.

The soil of the Lufkin fine sandy loam is a gray to white loamy fine sand, overlying a whitish light fine sandy loam which extends to a depth of about 12 inches. The subsoil is a mottled pale yellow and gray fine sandy loam to fine sandy clay, having a high silt content, which tends to render the passage of soil water difficult. Scattered over the surface are small iron concretions about the size of buckshot, the quantity varying from a minimum over the better drained areas to large in poorly drained areas.

In boring it was generally observed that the poorly drained areas generally possessed a close-grained, compact layer in the upper subsoil that could be classed as hardpan. This layer where most pronounced appeared to be caused by a partial cementation of the soil materials, though in less pronounced cases it was simply the result of the compact structure of the silt and sand grains. This impervious structure of the subsoil makes the type inferior to the Norfolk fine sandy loam, with which it is closely associated. Some of the narrow strips paralleling the stream courses are very similar to the Myatt soil.

The Lufkin fine sandy loam has a gently sloping surface, which would normally give adequate drainage at least to the upland areas were it not for the impervious hardpan stratum. As it is, the downward passage of water is obstructed and the soil is often in a waterlogged condition.

Like the Lufkin clay, this type is only of small extent. The main areas are found in the southeastern part of the county, southeast of Shuqualak and in the vicinity of Paulette. The type owes its origin

largely to the weathering of the clays of the Wilcox formations, with probably some admixture of the Yellow Loam and the Lafayette materials.

More hardwood trees, especially water and pin oaks, are seen on this type than on the Norfolk soils. Broom sedge and lespedeza are very common in uncultivated fields. A number of water-loving sedges flourish in the poorer drained situations. Because of the excessive rainfall of 1908 and 1909 much of the type is at present uncultivated.

The Lufkin fine sandy loam can be tilled under a much wider range of moisture conditions than the clay member of the series. In favorable seasons one-fourth bale of cotton and 5 to 10 bushels of corn per acre may be secured. In a dry season the hard subsurface layer interferes with the upward passage of water by capillarity, and crops in this way are caused to suffer from lack of moisture at times when they are still flourishing on types of better capillarity. The organic matter content should be increased by turning under crops like cowpeas.

Carpet grass (*Paspalum compressum*), as well as a larger grass known popularly as "water grass," afford good grazing, especially on poorer drained areas.

Land of this type of soil has a low value; probably not over $5 or $6 an acre.

OCKLOCKNEE CLAY.

The surface soil of the Ocklocknee clay consists of a light-brown to brown clay to silty clay loam, from 6 to 8 inches deep. The subsoil is a light-brown rather plastic silty clay mottled with gray and rusty or reddish brown. The gray color becomes more prominent in the lower subsoil. The type is subject to some variation in color and texture, caused by such local modifying agencies as changes in direction and velocity of the stream currents and the texture of adjacent upland soils. Because of the inaccessibility of many of the bottoms at the time of making the survey, some of the boundaries on this and other bottom-land types were of necessity arbitrarily drawn.

Where the bottoms are influenced by wash from the Selma chalk or Houston clay, the line of separation between this type and the Trinity clay is often difficult to determine, and some areas mapped as Ocklocknee undoubtedly are Trinity, but, on the whole, the boundaries drawn closely mark the proper division.

The Ocklocknee clay is found on the first bottoms of a majority of the streams in the area. On many small intermittent branches the areas are too small to be mapped. In many cases the type is intersected by old stream channels and cut-offs, which are often filled

with water. Howard and Carpenters Lakes are well-known examples of occurrences of this kind. The soil is of alluvial origin, consisting of material washed mainly from the noncalcareous soils of the drainage basins.

The characteristic topography is flat. Much of the type, however, has fairly good surface drainage, owing to the numerous drainageway depressions. On much of the type the spring overflows usually recede in time to permit the planting of farm crops. Only a small proportion of the type is at present farmed, the remainder is heavily forested with post oak, water oak, pin oak, cottonwood, and black and sweet gum, with cypress in the sloughs.

The Ocklocknee clay has always been valued as pasture land, and on areas where the cane grows thickly it has been the practice to pasture cows 12 months in the year. A number of wild grasses also do well and afford good grazing. The yields of cotton and corn are slightly lower than on the Trinity clay. No fertilizers are ordinarily used. In some cases additional vegetable matter should be incorporated in the soil, especially on the higher lying outer margins of the type where the subsoil often has a mottling of red. Occasionally the soil appears to be acid, and here lime or limestone, which can be easily secured from the outcrops of rotten limestone formation, should be applied.

Fall plowing of this type has been practiced considerably in recent years, and the results encourage the practice. Owing to compacting by the winter rains and overflows the land should be plowed again in the spring before planting. At the second plowing the present practice is to break the ground about 2 inches deep, throwing two furrows together and planting the corn or cotton on the bed.

One of the most successful farmers in the county has practiced making the beds wide enough for two rows of corn, thus giving better drainage. The practice has much to commend it.

On the blacker areas an excess of nitrogen may cause too great a growth of weed, in which case the fruit will not all ripen. Cotton also has a greater tendency to rust on such areas than on the upland soils. An application of acid phosphate tends to hasten maturity and rust can be prevented or the damage minimized by kainit applied at the rate of 300 pounds per acre about two weeks before the rust usually appears.

Land of this type of soil is valued at from $5 to $20 an acre when well timbered and from $20 to $30 when well drained and cleared.

OCKLOCKNEE FINE SANDY LOAM.

The Ocklocknee fine sandy loam, as is often the case in bottom-land types, is a type of considerable textural variation. The prevailing soil to a depth of 8 to 10 inches is a light-brown to brown fine sandy loam or, in places, a loamy fine sand. Often it is quite silty. The

subsoil is usually a gray silty clay, although in the southern part of the county, where the material is washed exclusively from the Orangeburg and Guin soils, it is in places a dull reddish color. On the whole, the color of the entire soil section is lighter than in case of the Ocklocknee clay.

The Ocklocknee fine sandy loam is found in its best development in the first bottoms of the Tombigbee or Noxubee Rivers. It consists of alluvial material derived principally from the sandy upland soils of the region. It is still in process of formation and annual modifications, caused by overflow, give considerable variation in the surface soil, which is changing from year to year as sandy or heavier deposits are laid down by the flood waters.

At present much of the type is almost inaccessible, being heavily forested with gum or oak, or covered with dense canebrakes. No large areas are under cultivation. Cotton, under favorable moisture conditions, yields one-fifth to one-fourth bale and corn from 7 to 10 bushels per acre. The fact that the water table is always within a few feet of the surface insures sufficient moisture, especially for deep-rooted crops like corn, even during dry spells. In common with all other bottom lands the yields are more dependent upon favorable seasons than upon the inherent productive power of the soil. The greatest drawback to successful farming is the frequency of overflow.

The favorable texture and abundant water supply make the soil well suited to sugar cane.

The limited area, together with the fact that this soil is always sold in connection with other types, renders it difficult to estimate its value. When well tilled, however, the "sandy bottoms" can be cultivated under a wide range of moisture conditions, and while not as productive as the Ocklocknee clay they are easily worked and a valuable type of farming land.

CAHABA CLAY.

The surface 6 inches of this the heaviest member of the Cahaba series is a light-brown friable clay. The soil becomes lighter colored with cultivation, owing to the oxidation of organic matter and the mixing of lighter colored subsurface soil. The subsoil is a light-brown clay faintly mottled with gray and red. In areas of insufficient drainage the gray color predominates.

The Cahaba clay is developed on the second bottoms of the Tombigbee River, along the lower course of the Noxubee River, and bordering a few larger creeks. Most of the type is rarely overflowed and the highest portions never. The material consists of alluvium which was laid down largely when the stream flowed at higher levels.

A fair proportion of the type is in forest of pine, gum, and oak. There are some excellent areas in cotton and corn. The type is well adapted to grass. The drainage varies from fair to good, according

to slope and elevation above the streams. Some depressions are poorly drained, but the soil here is not typically developed. The texture of the soil can be made more granular and open by addition of vegetable matter in the form of stable manure or green manure.

This is a productive soil yielding under ordinary methods a half bale of cotton and from 15 to 25 bushels of corn per acre. A rental of $2.50 to $3 an acre is asked, and the selling price ranges from about $10 to $15 an acre.

CAHABA FINE SANDY LOAM.

The soil of the Cahaba fine sandy loam is usually a gray fine sand or loamy fine sand to light fine sandy loam, averaging 6 inches in depth. This is underlain to a depth of 18 inches by brown fine sandy loam. From 18 to 36 inches it consists of a brown or reddish-brown friable material varying from fine sandy clay to silty clay loam. The brownish color of the subsoil is very uniform and there is very little mottling, although undrained portions are somewhat grayer. Cultivation is easy and may be carried on under a wide range of moisture conditions. The type is nearly level to slightly rolling and occupies high bottoms, which are seldom overflowed, and the second bottoms of the main streams of the county. The drainage is uniformly good, and in some cases so complete that crops often suffer from drought. The origin is the same as in case of the other members of the series.

A fair proportion of this soil is at present under cultivation, but much of it is forested to water oak, pin oak, and sweet gum, with a scattering of pine. On the higher knolls peaches and apples grow well. The yields of the staples under the ordinary methods are about one bale of cotton for every 5 or 6 acres and 7 bushels of corn per acre. Irish and sweet potatoes and garden vegetables do fairly well.

The soil seems never to have had sufficient humus, and in order to provide the needed amount crops like cowpeas should be included in rotations with the staple crops. The vines should be plowed under in those areas having a loose, light-colored soil. Peanuts and soy beans do very well and help to build up the land.

The unfavorable growth made by corn in some instances indicate an unfavorable soil condition. It is believed that liberal incorporation of vegetable matter followed by an application of 1 ton of burned lime per acre would do much to correct such unfavorable properties.

The greater part of the Cahaba fine sandy loam is uncultivated and supports a growth of forest consisting principally of gum and pine. The type is capable of better yields than are being secured. It responds readily to fertilization. Watermelons, sugar cane, peanuts, and forage crops should be grown more extensively.

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

Mechanical analyses of Cahaba fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
23862	Soil	0.0	0.4	4.0	65.1	13.0	12.3	4.9
23863	Subsoil	.0	.4	2.8	23.4	12.6	27.4	33.1

CAHABA FINE SAND.

The Cahaba fine sand consists of a loose brown incoherent fine sand to loamy fine sand, 36 inches deep. In a few places a light sandy loam subsoil is reached at 30 inches. Usually, however, the type consists of 3 feet or more of sand, underlain by a sandy loam or sandy clay.

This is naturally a well-drained or even excessively drained soil. It is sparingly developed in the northwestern part of the county on the nearly level high bottoms and second bottoms of the Tombigbee River. It represents material deposited by the river when flowing at a higher level than at present. Much of it is never overflowed, although some parts are covered by very high water, like the heavy overflow of 1892.

A part of the Cahaba fine sand is under cultivation, the remainder being covered by a growth of pine and gum. The fields receive the ordinary cultivation given other soils, and in good seasons produce scanty crops of cotton and corn. In dry years crop failures are common, but with sufficient moisture yields of one-seventh to one-fifth bale of cotton and about five bushels of corn are secured.

Without doubt this type could best be used in the production of peanuts and watermelons. The same general plan of renovation as given for the Cahaba fine sandy loam, especially the liberal addition of vegetable matter would render this type less subject to drought and more productive. The present value of land of this character ranges from $5 to $8 an acre, depending mainly on the quality of timber it supports.

BIBB FINE SANDY LOAM.

The Bibb fine sandy loam consists of a light-gray to white fine sand or light fine sandy loam, with an average depth of 6 inches, underlain by a grayish fine sandy loam to fine sandy clay mottled with yellow. In many low-lying areas there has been a local accumulation of organic matter which gives a brownish color to the soil. This, however, soon disappears under cultivation. The subsoil is somewhat variable in texture and color, owing to deposition by water and difference in the drainage conditions, which are mainly

imperfect. In some places the subsoil is a gray silty clay and elsewhere a fine sandy clay.

This type has a small development in the area, occurring on the Noxubee River and other streams which flow through the sandy members of the Norfolk, Orangeburg, and Oktibbeha soils. The entire type is subject to overflow, and it is normally flooded several times each year.

The timber growth consists of water and pin oak and sweet gum. In certain of the sloughs or abandoned stream courses cypress is found.

The crop yields are difficult to determine, but are low. Cotton probably averages one-fourth bale and corn 10 bushels per acre.

Very little can be done to improve this soil until it is drained and protection from overflow provided. Cowpeas, soy beans, lespedeza, and various grasses, including carpet grass, do well. The deficiency in humus can be remedied by turning under legumes.

This type responds readily to applications of lime and stable manure. Complete fertilizers, when applied, are beneficial, especially those high in phosphoric acid, but with an increase of humus the results would be more marked.

The type sells for $1 to $10 an acre, depending on the quality of standing timber and the location with regard to towns.

KALMIA FINE SANDY LOAM.

The soil of the Kalmia fine sandy loam consists of a grayish-brown fine sandy loam about 8 inches deep. The subsoil is a pale yellow fine sandy clay mottled with gray. In the better-drained situations the mottling is less conspicuous. The percentage of very fine sand and silt in the surface soil is high in places and the type sometimes approaches a silt loam in texture.

The drainage is for the most part not as good as on the closely associated Cahaba fine sandy loam. Some of the lower areas are occasionally overflowed, while a few more nearly level bodies are covered with standing water after heavy rains. The largest and most typical area of Kalmia fine sandy loam is located near the Cranford bridge on Noxubee River. Minor strips and patches are mapped along a number of other streams.

The type, like the Cahaba fine sandy loam, is developed on second terraces and high bottoms lying for the most part above normal overflow

The natural growth is pine, water oak, pin oak, and gum, with some hickory and a varied undergrowth. But little of the soil is under cultivation. The yields are largely dependent upon the season. When these are favorable corn does well, as do a number of grasses and forage plants. The type is badly in need of drainage. The

yield of crops and agricultural value of the land are difficult to obtain, but should compare favorably with those given for the Cahaba fine sandy loam.

SUMMARY.

Noxubee County lies in the northeastern part of Mississippi, bordering Alabama on the east. It comprises 692 square miles, or 442,880 acres. The county was first settled about 80 years ago, and some of the soils have been under cultivation since that time.

The northeastern third of the county includes a section of the black prairie belt. Much of the south and southwest sections is hilly, sandy country, which includes the "flat woods."

Some parts of the county, including the better types of soil or sections within easy hauling distance of a railroad, are comparatively thickly settled.

Macon, Brookville, and Shuqualak are the main towns.

Climatic conditions favor a widely diversified agriculture. Freezing weather occurs a few times each year and is of short duration. Rainfall is ample and normally well distributed.

Farm labor is drawn almost exclusively from the negro race and the supply is adequate. Labor-saving machinery is being adopted, especially in the alfalfa belt.

Cotton is the main money crop, but the acreage of corn, oats, peas, sorghum, wheat, sugar cane, peanuts, soy beans, alfalfa, melilotus, and vetch is increasing. Johnson grass and alfalfa are grown on a commercial scale.

Dairying, which flourished 40 years ago, has lately been revived and large herds of pure-bred stock are being raised by the more progressive farmers.

The success of one extensive planter on Houston soils near Ravine in raising pure-blood horses and other stock has shown that stock breeding can be profitably carried on.

Not enough fruit and vegetables are raised for home consumption, although soils, markets, and climate encourage this form of farming. Diversified farming is gaining in favor.

The use of fertilizers is on the increase and more attention is being given to the adaptation of soils to crops. The greatest needs of Noxubee County are drainage, deeper plowing, crop rotation, and production of live stock.

Twenty-three types of soil, representing 13 series, are found in the county.

The Houston clay is adapted to corn, cotton, Johnson grass, lespedeza, soy beans, alfalfa, and melilotus. The type is capable of being maintained in a high state of productiveness. The Houston chalk at present has a low agricultural value and is generally sold in connection with other more valuable soils.

The Oktibbeha series is well adapted to peanuts, lespedeza, bur clover, Johnson grass, and Bermuda grass. Wheat, oats, and corn do well. Under proper conditions alfalfa may be grown.

Most of the Pheba clay and silt loam are at present in forest. Under proper treatment the fine sandy loam gives very good results with cotton, corn, peanuts, oats, rye, cowpeas, soy beans, and sorghum.

The Lufkin soils need liming, organic matter, and drainage. The Lufkin fine sandy loam in particular with drainage would be the equal of the Norfolk fine sandy loam, whereas it is markedly inferior to that soil in its present condition.

The Norfolk fine sandy loam is a popular upland sandy type both for general and special types of farming. The silt loam is well adapted to cotton, corn, forage crops, and grasses.

The Orangeburg fine sandy loam is a good general-purpose soil, and, like the Norfolk soil, would probably produce a good grade of tobacco. It is naturally adapted to fruit, especially the Elberta peach.

The Guin stony sandy loam comprises a large percentage of non-agricultural land suited only to grazing. Excellent drainage, friability of subsoil, and elevation make the better areas adapted to fruit.

The Susquehanna clay is at present of low agricultural value. It can be made a good soil with proper methods of cultivation. The Susquehanna fine sandy loam is a trucking soil, producing good crops of Irish and sweet potatoes, as well as early vegetables for local markets.

Drainage is the most important factor in improving the fertile alluvial soils.

The Cahaba clay is a strong soil for cotton and corn. It produces good crops of carpet grass and lespedeza where the drainage is satisfactory. The fine sand could best be used in the production of peanuts and watermelons. The Cahaba sandy loam needs organic matter and lime. It is texturally a good soil for peanuts, potatoes, and melons.

The Trinity clay is the strongest bottom-land soil of the county. It is best adapted to corn, and produces good cotton where not too calcareous. Alfalfa does well on well-drained areas protected from overflow.

The Ocklocknee clay is also a fine bottom-land type of soil, and, like the Trinity clay, produces abundantly with little fertilization or rotation.

All the bottom-land types are capable of producing good crops, but the yields are more dependent on a favorable season than upon the inherent productiveness of the soils.

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