ILLUSTRATIONS.

FIGURE.

MAP.

SOIL SURVEY OF TUSCALOOSA COUNTY, ALABAMA.

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DESCRIPTION OF THE AREA.

Tuscaloosa County is situated in the west-central part of the State of Alabama, in the second tier of counties from the Mississippi line. In shape the area approaches the proportions of a rectangle with a very irregular outline along its eastern border. It is bounded on the north by Fayette and Walker Counties; on the east by Jefferson and Bibb Counties; on the south by Hale and Greene Counties, and on the west by Greene and Pickens Counties. The present survey includes the entire county, comprising an area of 1,355 square miles, or 867,200 acres.

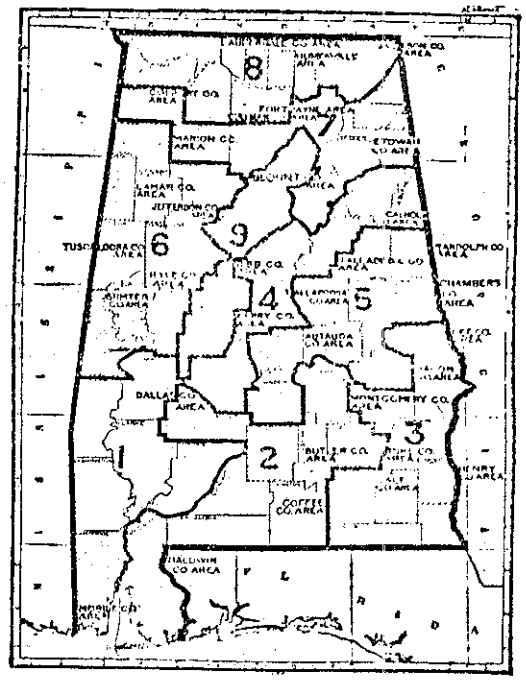

FIG. 1.—Sketch map showing the areas surveyed in Alabama.

The topographic features of the county are largely those of an elevated and rolling plain, rather deeply dissected by a thorough system of drainage lines cut to depths varying from fifty to several hundred feet below the crests of the highest hills and ridges. So thorough has been this erosion that the topography varies from very hilly and broken to gently rolling, with the rolling type prevailing over the larger part of the county. Roughly, three-fourths of the county lies in the Coastal Plain, the northeastern one-fourth being within the Appalachian province. As a rule, over the Coastal Plain region,

the hills and ridges are well rounded and the valley walls not so steep as in the Appalachian region. Very little of the former is topographically unfitted for cultivation. The Black Warrior River and its principal tributaries in the northeastern portion of the county—a region of Paleozoic shales and sandstones—have cut their channels to depths of several hundred feet, and the country contiguous to these drainage lines is rough and broken to mountainous. The valley walls are often almost precipitous and made exceedingly rough by bowlders and outcropping rocks. The watersheds and table-lands in this region represent the only areas of moderate surface relief and the only extensive areas suited to cultivation. As the Black Warrior River flows out of the Appalachian into the Coastal Plain its valley widens, and a number of comparatively level terraces are developed. These terraces border the river throughout the southern part of the county and constitute the only areas having a level to undulating surface relief. Similar terraces of less extent exist along the Sipsey River in the western part of the county.

The principal drainage line of the county is the Black Warrior River, whose basin embraces all of the county, except the western tier of townships, which are drained by the Sipsey River. These two main drainage lines, with their comprehensive system of large and small tributaries, afford excellent drainage facilities for all sections of the county.

A few pioneer settlers from Kentucky, Tennessee, and the Carolinas entered the area about 1815 and settled near the Black Warrior River. The Federal Government shortly afterwards instituted the sale of lands at cheap rates and on easy terms and the influx of homeseekers was augmented. These early settlers were largely of Scotch-Irish extraction, with a sprinkling of English, coming from Virginia, the Carolinas, Tennessee, Kentucky, Georgia, and the earlier settled districts in northern Alabama along the Tennessee River. Many were people of wealth and obtained large holdings of fertile lands, forming a community of large plantations. Settlement was, therefore, scattering until this condition was broken up by the Civil War. The productive valley lands were the first to be taken up, but the demand of a steadily increasing population eventually brought about the development of the sandy uplands. At present the county is quite generally settled, more densely in the region of easily tilled soils comprised in the Coastal Plain section and surrounding the towns. The Coal Measures, in the northeastern part of the area, have generally such a broken topography that settlement is scattering except in the less hilly section adjoining the rolling Coastal Plain region. The northeastern quarter constitutes the mineral district, where agricultural possibilities are reduced to a minimum. The

river bottoms and favorable upland soils near the city of Tuscaloosa and other smaller railroad points are most thickly settled and mo highly developed agriculturally.

No section of the area is as yet fully settled, only the more desirable areas being utilized. Systems of soil management do not generally include methods for upbuilding the soil and increasing acreage returns. Less than half of the acreage is under cultivation and less than one-fifth of it improved. The county could easily support many times it present population without taxing the soil resources to their utmost. Settlement is still progressing gradually, homeseekers coming from the more thickly settled districts of the United States.

The conveniences of rural telephones, rural mail delivery routes and improved roadways are making the rural districts more attractive, and the idle lands will eventually be utilized in a broadly diversified agriculture.

The mining of coal and iron in the eastern part of the county is rapidly being developed. Brookwood, Burchfield, Kellerman, Yolande, Abernant, and Goethite are the sites of important mines employing several thousand men and boys. Very little agriculture obtains in the section.

According to the census, the population of the county in 1900 was 36,147, and in 1910, 47,559. Tuscaloosa, the county seat, situated on a beautiful elevated plain on the Black Warrior River, near the center of the county, is a thriving city of 8,407 inhabitants, and the only town of any special importance in the area. It is the chief distributing point for a large section of country and the site of a number of industrial enterprises. By reason of its water communication with the coast, the city is favorably situated for handling the output of coal and iron of the surrounding mines.

Three systems of railroads traverse the eastern and southern portions of the county—the Alabama Great Southern, from Chattanooga to New Orleans; the Mobile & Ohio, from Artesia to Montgomery and the Louisville & Nashville, from Blocton to Birmingham. A branch line of the Mobile & Ohio, known as the Warrior branch extends from Tuscaloosa to Kellerman. The Birmingham & Gul Railway operates a local passenger and freight service under a street railway franchise from the city, with an extension to Holt. T Tuscaloosa Mineral Railroad, from Tuscaloosa to Brookwood, i under construction to connect with the Louisville & Nashville Railroad at the latter point. Holman, Elrod, and Buhl in the west, and Fanelle, Duncanville, Hagler, and Pearson, in the southeast, are the principal stations on the Mobile & Ohio Railroad, and Hull, Phifer, and Crabtree, in the south, and Cottondale, Coaling, and Vance, in

the east, on the Alabama Great Southern. The numerous mining towns in the east are connected by various branches of the Louisville & Nashville Railroad. Ralph, Jena, Fosters, and Romulus, in the southwest; New Lexington and Sterling, in the northwest; and Wiley and Windham Springs, in the north-central part of the county, are towns of local importance, the latter place being a health resort by reason of its mineral springs.

With the exception of a portion of the Mobile & Ohio Railroad that runs from Tuscaloosa west, there are no railroads west of the Black Warrior River, an area comprising almost two-thirds of the county. The lack of these has retarded the progress of the remote sections, though these are not entirely undeveloped, as some of the best farms are found at a distance from the railroads. The northwestern part of the area is very generally settled and prosperous.

The public roads of the county are largely unimproved. Some of the highways leading from Tuscaloosa have been straightened, graded, and reconstructed of sand and gravel, and are fairly well kept. The question of improving the road system will be an important factor in the development of the agricultural resources of the county. There is abundant material within the area which can be cheaply used for the improvement of the highways.

The drinking water of the county is obtained from surface and artesian wells, the latter ranging from 500 to 2,000 feet in depth. The valley lands of the Black Warrior River have numerous flowing wells, furnishing a bountiful supply of water for the lighter soils of the bottom lands, which might be utilized for irrigating truck or other special crops.

While the larger part of the county is distinctly an agricultural district, there are many other natural resources that contribute to its material welfare. Valuable forests exist, and many sawmills are in operation. A variety of clays afford material for the manufacture of bricks, earthenware, and tiles.

The school system of the county is reasonably extensive and efficient, and the rural schoolhouses are comfortable and substantial. The State University, a coeducational institution, is located at Tuscaloosa. Churches of the various denominations are found throughout the county.

CLIMATE.

The climate of the county is equable and temperate throughout the year. The winters are short and mild, with little snow or ice, and the summers, although long, are seldom oppressively hot. Moderate variations in temperature during the winter season are frequent and, on account of the humidity, are often keenly felt. Severely cold

spells are rare and usually of short duration. December, January, and February, the coldest months in the year, show a mean temperature of 45° F., with extremes during the season varying from 83° to —7° F. Zero weather is exceedingly rare. The summer months of June, July, and August have an average temperature of 80°, with extremes reaching 100° to 106° for a few days at a time.

There are slight variations in climatic conditions over the county, due to differences in elevation. The northern part of the county and the Appalachian region have elevations about 500 feet higher than the southern half, and the mean temperatures are slightly lower.

The climate of the county is favorable to a diversified system of agriculture. In addition to staple crops, many special crops, such as fruits, melons, medium early and medium late truck crops, can be readily matured through a growing season extending over 8 months. Tillage can be carried on during the entire year, with the exception of short periods during midwinter. The short, mild winters allow horses, mules, cattle, sheep, goats, and hogs to range about 10 months, and with the ready growth of native grasses stock raising and dairying are highly favored industries.

The annual precipitation is about 52 inches, favorably distributed throughout the year, the heaviest rainfall occurring during the winter and spring months. Late spring rains may delay the planting of cotton and corn, particularly over the bottom lands along the Black Warrior River. In exceptional cases cultivation of the young crops may be delayed, causing much extra labor and loss. Short periods of drought may occur from time to time during the growing season, sometimes with injury to the crops, mainly due to poor preparation of the land and inadequate methods of cultivation rather than to lack of sufficient soil moisture. Any system looking to the conservation of soil moisture would do much to lessen injury to crops from these short summer droughts.

The table following, compiled from the records of the Weather Bureau at Tuscaloosa, shows the normal monthly, seasonal, and annual temperature and precipitation.

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

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	46	75	9	4.8	1.1	4.0	0.2
January	44	78	11	5.6	4.1	3.6	T.
February	46	83	−7	4.8	4.1	5.6	1.0
Winter	45			15.2	9.3	13.2	1.2
March	56	88	17	6.0	5.2	6.1	.0
April	64	94	30	5.0	4.7	15.7	.0
May	73	100	40	3.2	3.5	1.4	.0
Spring	64			14.2	13.4	23.2	.0
June	79	103	48	4.8	7.0	13.5	.0
July	82	106	59	4.8	4.0	5.2	.0
August	80	105	59	3.5	1.2	.8	.0
Summer	80			13.1	12.2	19.5	.0
September	75	101	40	2.2	.6	3.3	.0
October	63	92	30	1.8	1.7	5.4	.0
November	53	88	19	3.0	3.8	4.6	T.
Fall	64			7.0	5.1	13.3	T.
Year	63	106	−7	49.5	40.0	69.2	1.2

Average date of first killing frost in autumn, November 6; of last in spring, March 23. Date of earliest killing frost in autumn, October 21; of latest in spring, April 9.

The late spring frosts following a very warm season may damage fruit. Orchards located on the higher elevations often escape, and in selecting orchard sites this should be borne in mind.

From the foregoing table the average date of the first killing frost in fall is Novemer 6 and of the last in spring March 23. There is thus a period of 228 days during which even the tenderest crops may be safely grown without protection.

AGRICULTURE.

The agricultural history of the area dates from the advent of the white settlers, about 1815, when homesteads were taken up in the vicinity of the Black Warrior River, and a rather crude cultivation of food crops, such as corn, wheat, oats, fruits, and vegetables, was practiced over the more easily tilled soils. A few head of live stock were usually owned by the early farmers, and these were pastured on the open range the year round. A gradual immigration from the older and more thickly populated districts resulted in a sprinkling

of home-seeds over the county, and a little later the sale of lands at a low price and on easy terms by the United States Government further encouraged settlement. Large holdings were obtained by many families. On these plantations practically all the necessities and many of the comforts of life were produced. With little change plantation life continued until the Civil War. At present few of these large estates exist, the tendency being to farm smaller tracts along more intensive lines.

Cotton was the chief money crop of the early settlers, with corn, wheat, oats, rye, potatoes, fruits, vegetables, and grasses as supplementary crops, of which enough was produced to meet home requirements. For a number of years small quantities of tobacco were also grown, but never on a commercial scale.

The settlement on the site of the present city of Tuscaloosa early became a general distributing point for the crops grown and the supplies brought into the county. The present city was incorporated by the first State legislature in 1819 and laid out in 1821. The town rapidly became an important center and in 1827 was made the county seat. With direct water communication to the Gulf, it soon became a distributing point for western and central Alabama. Cotton and other home products were shipped to Mobile, where exchanges were effected and the return cargo brought by steamboat up the river. Wagon trains completed the transportation to and from inland points.

Marked improvement of agriculture and its dependent industries took place prior to the Civil War. Horsepower gins gave way to gins run by steam, flour and grist mills were built, and the community became increasingly prosperous. The destruction of valuable properties during the war resulted in general demoralization, and a low ebb of fortune followed until near the close of the last century, when conditions began to improve. The building of the Alabama Great Southern Railroad in 1878 is an important event in the history of the county. A ready means of transporting cotton to market and of importing supplies stimulated all lines of agriculture. Since that time no setbacks have been experienced and a rapid and steady improvement has taken place. The construction of the Mobile & Ohio Railroad in 1898 opened up valuable timber lands in the southern, eastern, and western parts of the county and caused a substantial increase in the area of lands farmed in the sections through which it passed. In general, present conditions are better than ever before.

The agriculture has not changed materially—the county has always been distinctly a cotton-growing section—but progress has been made in the matter of methods of growing the crops and in extension of the area farmed. The system of growing cotton to the practical exclusion of other crops has unquestionably retarded a fuller utilization of its natural resources. Cotton is used as a basis for renting land

and stands almost as a medium of exchange. No system of rotating crops has been largely practiced, though slight diversification is general, and little attention is given to the adaptation of soils to crops. The present type of farming consists of the production of cotton as the chief money crop and corn as the chief forage crop for stock. Hay, oats, rye, peas, beans, potatoes, peanuts, sugar cane, melons, cantaloupes, various truck crops, berries, fruits, etc., are grown only on a limited scale to meet in part the local demands.

Commercial fertilizers are used extensively throughout the county, acreage applications of 200 pounds at planting time for cotton and corn being the general practice. Some farmers use larger quantities and also top dressings of nitrate of soda just before the bolls or ears form. This practice is particularly beneficial to corn on the upland sandy soils. The heavier soils of the river bottoms, subject to yearly overflow, are particularly well adapted to growing corn, and on these no fertilizers are ever used. The deposition of a thin layer of alluvium from year to year seems to maintain such lands in a high state of productiveness. The producing capacity of the lighter sandy soils is soon impaired under the continual drain of the one-crop system, and the application of fertilizers is necessary. As these sandy soils are open and porous, permitting a ready movement of soil moisture and leaching, the available constituents of commercial fertilizers applied at planting time are rapidly depleted.

Present cultivation is practically identical with that of years ago, except that some of the more progressive farmers employ more efficient methods of soil management. Crops are generally planted and matured at a minimum of expense. Lands are allowed to stand idle and untouched from harvest time until the spring, when broadcast plowing 3 to 5 inches deep begins the preparation for the following crop. Later the land is bedded and allowed to stand until planting time, when the beds are lowered by a drag or a harrow and the crop planted on a nearly level surface. The system of level cultivation is very desirable, except in case of inadequately drained areas, where ridge culture is advisable. A plan followed over some sections of the county is to allow the cotton land to stand idle throughout the winter season and to prepare it in the spring by running a scooter plow down the old bed, thus forming new beds over the water furrows of the preceding year. At planting time, or when the land is bedded, commercial fertilizers are drilled in at the rate of about 200 pounds to the acre. More progressive methods are employed by the most successful farmers. These include deep plowing in the fall, winter-cover crops to prevent washing, crop rotation with green manuring crops, and frequent shallow cultivation during the summer months.

The light sandy soils of the uplands, as well as the sandy soils of the river terraces, are well adapted to diversified farming. They are,

however, rather quickly reduced in productiveness through injudicious methods of cropping and cultivation. They are easily handled, well drained, respond readily to fertilization, and are susceptible of permanent improvement.

One of the chief factors in retarding a more highly developed agriculture is the prevailing system of tenantry. The tenant has only a temporary interest in the soil he tills, and consequently endeavors to mature his crops at the least possible expense. Tillage is light and inadequate, and expenditures for fertilizers and improvements are reduced to a minimum. Cotton is the chief crop. Those farmers who operate their own lands are more careful in the matter of upbuilding the soil and usually secure better yields than the tenant. Land is rented either on a cash or share basis, the cash rent ranging from $2 to $6 per acre. The share rent is usually one-half the cotton and one-fourth the corn. The latter varies, however, and depends upon the outlay made by the landowner.

Less than one-half the acreage of the county is now under cultivation, and there is excellent opportunity for those desiring farm lands. The soils are so varied that they may be developed for the production of the staple crops of cotton and corn or of a number of special crops. Oats, rye, peas, beans, peanuts, sugar cane, sorghum cane, potatoes, grasses, many vegetables, berries, melons, cantaloupes, and fruits all do well on the several types. It is possible that alfalfa could be grown successfully on some of the soils, and tobacco, wheat, and the clovers may be included in the general farm products if desired. Dairying, stock raising,[1] and poultry keeping can be made profitable. In addition to the forest products, rougher sections of the county near the Black Warrior River and its tributaries in the Appalachian region may be used to graze sheep, goats, cattle, and hogs.

According to the census of 1910 there were 450,211 acres under cultivation in the county, of which 163,119 were improved. The value of land and improvements, farm buildings, implements, machinery, and live stock amounted to $7,659,502; the size of the farms is 95.5.[2] About half the farms are operated by the owners. The value of all farm property has more than doubled during the last decade.

Farm labor is largely colored and, though generally unskilled, is efficient under adequate supervision. Employment is by contract for the year or by the month at an average wage of $10 to $20 with board. Day labor is generally employed during the rush seasons of chopping and picking cotton, when the wage ranges from 75 cents

[illegible] No. 150, Raising Beef Cattle in Alabama; 154, Corn, Soy-Bean Pasture [illegible] Meal for Fattening Hogs; and 154, (1) Wintering Steers in [illegible] Cattle in Alabama, published by the Alabama Agricultural Experiment [illegible] also Farmers' Bulletin No. 411, U. S. Dept. of [illegible]

[illegible] was counted a farm

to $1.50, according to the supply and demand. By reason of nearby industrial enterprises, where laborers receive a higher wage, labor in the rural districts is not at all times available, though the shortage has not become acute.

The soils of the rolling upland Coastal Plain country, which are very sandy, as well as the rolling and more silty soils of the Appalachian region, are inclined to wash badly. Such areas rapidly deteriorate in productiveness. It is essential, therefore, to prevent washing on all areas of accentuated slope. This can be accomplished by deeper plowing and substituting for the continuous cultivation of clean-cultivated crops rotations including winter cover crops. On the steepest areas permanent pastures should be established. The summer crops should be varied from year to year and include frequently green manuring crops, preferably cowpeas, to be plowed under. This will add organic matter to the soil and tend to increase its moisture-holding capacity, thus reducing the run-off during heavy rains. The organic matter also tends to hold the soil together, while in the case of run-down fields it will greatly improve the yields. Barnyard manure is also a valuable aid in building up washed areas. Where the slope is too steep for such treament to be effective, terracing may be resorted to.

The more level soils occupying the terraces along the Black Warrior and Sipsey Rivers, while in need of deep plowing and the addition of organic matter, are less well drained than the rolling upland types and often require artificial drainage. The terrace soils appear to be naturally much more productive than the rolling upland soils and with drainage well established usually give good yields of the staple crops.

The diversification of crops to meet more nearly the local demand is one of the ways open to increase the net income of Tuscaloosa County farms. The use of suitable soils for peanuts,[1] sweet potatoes,[2] Irish potatoes,[3] melons, cantaloupes, garden truck, sugar cane, berries, fruits, clovers, etc., is necessary. In some sections where the soils are particularly well adapted to the growing of forage crops, more live stock should be raised. To this end cowpeas,[4] soy beans,[5] velvet beans,[6] Bermuda grass,[7] bur clover, vetch, lespedeza,[8] peanuts,

[1] See Farmers' Bulletin No. 356, Peanuts, U. S. Dept. of Agriculture.
[2] See Farmers' Bulletin No. 324, Sweet Potatoes, U. S. Dept. of Agriculture.
[3] See Farmers' Bulletin No. 407, The Potato as a Truck Crop, U. S. Dept. of Agriculture.
[4] See Farmers' Bulletin No. 318, Cowpeas, U. S Dept. of Agriculture.
[5] See Farmers' Bulletin No. 372, Soy Beans, U. S. Dept. of Agriculture.
[6] See Circular No. 14, Div. of Agrostology, Bureau of Plant Industry, U. S. Dept. of Agriculture.
[7] See Circular No. 31, Div. of Agrostology, Bureau of Plant Industry, U. S. Dept. of Agriculture.
[8] See Farmers' Bulletin No. 441, U. S. Dept. of Agriculture, Lespedeza or Japan Clover.

winter oats,[1] rye, and alfalfa,[2] in addition to the general farm crops, cotton and corn, should be given important places in the agriculture of Tuscaloosa County.

Neither the climate nor the elevation of the area renders it especially suited to the growing of apples. Some sections produce fair fruit, but only for home use. Peaches seem to do much better and are grown in small quantities by almost every farmer. Little care is given the trees. Pears do not thrive on account of the blight. It is probable that with modern methods of culture peaches could be profitably grown on a commercial scale. Late spring frosts and freezes following a warm, early spring offer the chief difficulty to peach growing, as otherwise they do well, but this condition must be met in other regions as well.

SOILS.

The northeastern fourth of the county is underlaid by consolidated rocks, the rest is formed of unconsolidated deposits, mainly of sand and clay.

The consolidated rocks, except a very small area in the extreme eastern part of the county, consist of sandstones and shales, the sandstones usually massive and the shales varying from sandy to argillaceous. These beds constitute the extreme southern end of the Allegheny Plateau.

The small area in the extreme eastern part of the county just referred to is underlain by a series of limestones occupying a belt of gently rolling country, the southern end of one of the limestone valleys of the Appalachian belt. The greater part of this belt, however, is covered by a thin deposit of unconsolidated material, so that the limestones take part, to a limited extent only, in the formation of the soils of the region.

Southwestward from the area underlain by these consolidated beds, the rest of the country is underlain by a series of unconsolidated beds of sands, clays, and gravels. The consolidated beds dip beneath the unconsolidated beds, so that the latter thin to a featheredge northeastward, finally occurring as small isolated patches of sand and gravel only on the flat tops of the plateau ridges where erosion has been unable to reach them.

The unconsolidated beds consist, according to the State geologist of Alabama,[3] of three groups. The lowest group is made up of alternating beds of sand and clay. It underlies by far the greater part of the county. It has been thoroughly cut to pieces by erosion

[1] See Farmers' Bulletin No. 474, U. S. Dept. of Agriculture, Winter Oats for the South.
[2] See Farmers' Bulletin No. 339, U. S. Dept. of Agriculture, Alfalfa.
[3] See E. A. Smith, "The Geology of the Coastal Plain of Alabama," 1894.

so that the individual beds are repeatedly exposed in the hollows. In the "Geology of Alabama" this series of beds is known as the Tuscaloosa formation.

Overlying these beds occurs a thick bed of sands, but only a very small area of it extends into the county at the southwestern corner. It is so thoroughly eroded even where it does occur that it is found only in small areas no more important from the soil-forming point of view than many exposures of the sands of the lower series. It is known as the Eutaw sands formation.

Before the last layer of material was deposited in Tuscaloosa County all the previously formed ones were subjected to a long period of erosion. The hard-rock region was cut into valleys, but the unconsolidated material of the Tuscaloosa and Eutaw suffered most. The region underlain by these formations was eroded to an uneven surface, and on this latter was deposited as a mantle spreading over both the Tuscaloosa and Eutaw material and even extending up over a considerable belt of the consolidated rock area a layer of sands, loamy sands, sandy gravels, and gravel beds, constituting the last of the three groups of unconsolidated rocks of the county. At one time this material seems to have covered practically the whole county, except, possibly, parts of the region of consolidated rocks. This deposit is known in the geology of the Southern States as the Lafayette formation.

Since its deposition apparently continuous erosion has been in progress in the region. The mantle of Lafayette sands and gravels has not only been cut by valleys, but it has been entirely removed from a large part of the county. It occurs more abundantly on the watersheds, though it may occur anywhere. Owing, however, to the fact that the sand beds of the Tuscaloosa and Eutaw seem to weather in the same way and to produce the same kind of soils as those of the Lafayette, it is not only impracticable but unimportant from the soil point of view to separate the sandy members of the three formations. The age of the deposits, where they are all of essentially the same physical character, is unimportant. The stage reached in the weathering or oxidation of the material is of more importance. This is usually, in this region, a function of the permeability of the material. From this point of view there are two main groups of material in the uplands in the region of unconsolidated rocks. These are the sand and gravel beds on the one hand and the clay beds on the other. The sands in any particular locality may belong to any one of the three formations named above. The clay beds, however, are always regarded as members of the Tuscaloosa formation.

In addition to these deposits there are beds of recent alluvium along all the streams and terraces of old alluvium along the larger

streams, mainly, however, along the Black Warrior River from Tuscaloosa southward.

The soil areas of the county correspond very closely to the rock areas. In the sandstone and shale area of the northeastern part of the county, two series of soils occur, the differentiation into series being based on the color of the soil and subsoil. These colors do not seem to correspond in any intimate way to the colors of the rocks from which they were derived, but seem to express differences produced by the soil-forming processes. They are, therefore, soil characteristics rather than geological characteristics. The soil has usually a pale yellow to reddish-yellow surface appearance and is underlain by either a yellow or a reddish silty clay subsoil. The soils with yellow subsoils belong in the Dekalb series, while those with a red subsoil belong in the Hanceville series. The two series are very closely allied.

Of the Dekalb series four types were established—the stony loam, usually found on the steeper slopes and distinctive because of the accumulation of rock fragments and frequent rock outcrops; the fine sandy loam, derived more generally from sandstone; the silt loam, derived from the finely textured shales and some sandstone, and the shale loam, distinctive because of the high percentage of thin, shaly fragments in both the soil and subsoil. Of the Hanceville series, two types were established—the fine sandy loam, derived largely from sandstone, and the silt loam, a very extensive development derived from shales and some sandstone. At times it was impossible to follow out these lines of separation in detail and small areas of the types of either series may be included in the types of the other.

The limestones of the extreme eastern part of the county are exposed to soil-forming agencies in only a very few places where they have furnished material for the formation of the Clarksville soils.

The upland soils of the region of unconsolidated soil-making material consist mainly of the soils of the Orangeburg group, the Susquehanna soils, and the Norfolk soils. The Orangeburg group includes the Greenville, Orangeburg, Ruston, and Guin soils. They are all derived from the sandy beds of the soil-forming material and have all reached a rather advanced stage in weathering; they are all rather well oxidized soils. The Susquehanna soils are derived from the clay beds, while the Norfolk soils are derived, like the Orangeburg, mainly from the more sandy layers of the material. Their distinguishing characteristic, however, is one of color.

The Orangeburg, the Ruston, the Norfolk, and the Greenville are [illegible] and the identification of each is based on its [illegible]

the best understood, and a full discussion of it will be given in connection with the terrace soils of the larger streams.

The Orangeburg series of soils is characterized by a gray sandy surface soil underlain by friable red sandy clays. Four types were established—the gravelly sandy loam, composed largely of an admixture of gravel and sands, 12 to 36 inches in depth, the sandy loam, fine sandy loam, and sand. The sandy loam types are classified according to the predominating texture of the sand grains and the depth of light sandy surface material. The sandy type is designed to include areas where the sandy surface material exceeds a depth of 15 to 18 inches, this depth of light soil being sufficient to have a marked influence on the agricultural value of the land.

The Ruston series of soils is derived, in part at least, from both the Lafayette and the Tuscaloosa formations. It embraces the types having grayish surface soils underlain by brownish-yellow to yellowish-red or dull-red sandy clay subsoils. Often the subsoil is quite heavy, though more generally moderately to decidedly friable. The series is closely related to the Orangeburg, representing a less advanced stage of weathering and oxidation. As this process continues, the soils will more closely approach Orangeburg characteristics.

The Susquehanna soils, characterized by sticky, plastic, heavy, red and mottled clay subsoils, are developed extensively over the southern half of the county, particularly in the southeast and the southwest. The series includes two distinct types—the gravelly sandy loam and the fine sandy loam. These type classifications are based on the nature and character of the surface covering over the clayey subsoils of Tuscaloosa origin. It is not improbable that in some instances the superficial material represents an admixture of Tuscaloosa and Lafayette sands. The weathered horizons of the two formations possess such similar characteristics that it is often difficult to differentiate the two.

The Guin sandy loam, the only type of this series established in the county, is made to include a rather broad range of soil material, differentiation not having been made, owing to the mixed condition of the soils and the rough topography. The type is characterized by very rough topographic features and varying percentages of iron-crust fragments. It is practically unfitted for any extensive utilization, and is valued only for the scant pasturage it affords and as timberland. It is a mixture of Tuscaloosa and Lafayette materials and is of heterogeous character.

The Norfolk soils are gray to very pale yellowish in the upper part or in the soil layer and yellow to grayish yellow in the lower or subsoil layer. The latter consists of sandy clay to silty clay. The Norfolk types usually occur at rather low levels and over areas

[illegible] surface. They are distinctly upland soils. A relatively [illegible] area in the north-central part of the county appears to be derived from material closely associated with the Lafayette formation, if not from that formation itself, while a second area in the eastern part of the county, near Vance, occupying a flat depression, appears to develop at the base of the Tuscaloosa formation and just above the older limestone rocks. In the vicinity of this body of soil and slightly higher, outcrops of limestone material appear, though not sufficiently numerous to justify a separation to cover the complication.

The recent deposits include all the types of soil established along the stream courses that have been formed or materially influenced by water action since the recession of the ancient sea. They comprise a vast acreage of first-bottom and terrace soils along the Black Warrior and Sipsey Rivers and their principal tributaries.

The first bottoms include material that is strictly alluvial in origin, consisting of sands, silt, and clays washed from the higher elevation of the drainage basin, transported by stream action, and deposited as reworked material during seasons of overflow. These areas form the present flood plains of the streams and are subject to frequent inundation. A number of series were established to include this broad class of soils, according to the character of the original material and to local soil-modifying agencies.

Along the Black Warrior River and such of its tributaries as carry wash material from the disintegrated shales and sandstones or limestone of the Appalachian region, as well as along the other small streams of the area carrying material of similar character, the Huntington series prevails. Two types were established—the fine sandy loam and the silt loam. The fine sandy loam type includes the coarser alluvial material, which usually appears near the stream channel, where it is deposited as soon as the current is checked by overflow. The silt loam represents deposits from moderately still waters and is the predominating type of the series. Along the smaller streams a part of the material of both types has been washed from the adjacent slopes.

Deposits along the streams whose basins are entirely confined to the Coastal Plains territory give rise to the Ocklocknee series, of which only one type was mapped—the fine sandy loam. Many of the smaller streams of this class will show marginal strips of reworked material so thoroughly undifferentiated and mixed up that a textural classification was impossible. Such areas were mapped as Meadow. Drainage conditions over these low-lying areas is a vital factor as affecting local modifications and determining agricultural utilization; consequently many of the lower areas, including old river sloughs, where water stands for long seasons of the year, were included as

Swamp. Agriculture is impracticable on such areas under present conditions, and artificial drainage is in many cases out of the question.

There are also flat or slightly depressed areas where drainage is utterly inadequate, but which stand above the swamp level. Such areas are usually very wet for long seasons and have been so affected by excess moisture conditions as to give a very whitish appearance to both the soil and the subsoil. This soil condition was included in the Bibb series under two types—the fine sandy loam and silt loam. Drainage is practicable in many cases.

The second bottoms along the principal streams of the county include a number of terraces comprising a vast acreage of valuable farming lands. The soil represents reworked material sufficiently elevated at the present time to preclude total overflow. Exceptionally high water, however, will inundate large areas of the lower terraces. The soil profile is rather uniform, showing a yellowish-gray to brownish surface material and a yellowish to reddish-brown and sometimes nearly red subsoil. These features characterize the Cahaba series, four types being established in this area—the sandy loam, fine sandy loam, silt loam, and loam. The series includes valuable and productive farm lands.

Conditions of poor drainage over the second bottoms or terraces have modified the character of many flat or depressed areas by imparting a pale-yellowish color to the soil and a pale-yellowish to mottled gray and yellow color to the subsoil. This condition gives rise to the Kalmia series, comprising two types—the fine sandy loam and the silt loam.

The oldest terrace of the county is found along the Black Warrior River at an elevation of 50 to 75 feet above the mean level of the second bottoms and probably 100 to 150 feet above the lowest first bottoms. This terrace is composed largely of a deep red loam, underlain by beds of gravel and sand, very irregularly stratified, cross-bedding or false bedding being conspicuous in cuts and gullies. The city of Tuscaloosa is situated on this high and plainlike terrace. The character of the material constituting this terrace is essentially different in every respect from the lower terraces. It partakes in almost every detail of the identity of the Lafayette, except that it is found in the river valley. This same terrace is present at intervals along the streams of the Coastal Plain from the fall line to the Gulf, always retaining its individuality and affording sites for many of the river towns. The soil material gives rise to the Greenville series, three types being established—the loam, fine sandy loam, and sandy loam. It is not at all improbable that the Lafayette[1] has contributed some

[1] Report of the Geology of the Coastal Plain of Alabama, p. 70.

material. There is some question as to whether this series should be grouped with the upland soils or the terrace soils. This is, however, of little importance from an agricultural standpoint.

Tuscaloosa County shows a soil variety that is exceptional, clearly indicating favorable conditions for developing a highly diversified system of agriculture. A large percentage of the soils can also be made highly productive and a system of intensive farming is likewise easily possible.

The following table gives the name and the actual and relative extent of each type mapped:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Orangeburg fine sandy loam	210,688	24.3	Susquehanna gravelly sandy loam	11,648	1.
Hanceville silt loam	95,168	11.0	Norfolk fine sandy loam	11,072	1.
Ruston fine sandy loam	93,952	10.9	Cahaba fine sandy loam	8,384	1.
Dekalb stony loam	67,392	7.8	Ruston sandy loam	6,784	.
Susquehanna fine sandy loam	61,952	7.1	Kalmia silt loam	6,656	.
Meadow	36,096	4.2	Dekalb silt loam	6,592	.
Orangeburg gravelly sandy loam	34,880	4.0	Dekalb shale loam	5,568	.
Ocklocknee fine sandy loam	26,112	3.0	Greenville fine sandy loam	4,416	.
Hanceville fine sandy loam	25,984	3.0	Dekalb fine sandy loam	3,840	.
Orangeburg sandy loam	20,672	2.4	Bibb fine sandy loam	1,984	.
Kalmia fine sandy loam	19,520	2.2	Norfolk loam	1,728	.
Huntington silt loam	18,496	2.1	Huntington fine sandy loam	1,024	.
Cahaba silt loam	18,176	2.1	Clarksville gravelly loam	960	.
Bibb silt loam	16,640	1.9	Cahaba sandy loam	576	.
Cahaba loam	11,072	1.5	Swamp	384	.
Red phase	2,112		Greenville sandy loam	384	.
Greenville loam	12,480	1.4			
Quin sandy loam	12,096	1.4	Total	867,200	
Orangeburg sand	11,712	1.3			

SUSQUEHANNA FINE SANDY LOAM.

The Susquehanna fine sandy loam consists of a gray to light-brown fine sandy loam, 6 to 15 inches deep, underlain by a heavy, plastic, and tenacious red clay, mottled with gray and yellow at lower depths. When wet the subsoil is exceedingly sticky and plastic and when dry very stiff, baking and cracking into small angular lumps.

The reddish-brown color is generally most pronounced in the shallower phases of the type, which occur over the upper slopes, where much of the sandy material has been washed to lower elevations. The fine sand and varying quantities of silt found in the soil impart a loamy, friable structure, particularly when well stocked with decaying vegetable matter, as is generally the case over virgin areas. Concretions and fragments of iron crust are usually in evidence over the higher hills and ridges.

As developed in the southwestern portion of the area, the type shows a texture slightly lighter than the average, with increased depth of surface material and a percentage of medium sand sufficiently high in places to make it approach a heavy sandy loam. This slight difference in agricultural value, however, was not recognized as of enough importance to warrant the separation of this soil as a distinct phase of the type. Under the customary methods of cropping and tillage the humus content is soon lowered and the soil shows a loose, open structure and a light coloring, particularly in the deeper phases. Some of the shallower areas are almost a loam in texture.

Variations in the character of the subsoil material are common. A very distinct phase is found at intervals over the type, particularly in the southeastern and southwestern parts of the county. The contact of subsoil with the soil is quite sharply marked. The former consists of a rather sticky, plastic, heavy red clay, gradually passing into a more friable sandy clay, somewhat like Orangeburg material. The heavy upper subsoil is clearly defined in cuts and washes by a characteristic cracking into small, angular lumps, and a gradual transition into the friable material at lower depths. The subsoil material is stratified, beds, bands, or lenses of whitish clayey material being embedded in the matrix of red clay. Minute mica flakes are usually disseminated throughout the soil and subsoil.

The underlying clays of this type are very impervious, particularly where of light color. This is shown by the presence of seepage waters on many of the lower slopes, which are often in a saturated condition. Cultivation of these areas is difficult and crop returns are uncertain, because of the droughty nature of the areas during the dry seasons.

The Susquehanna fine sandy loam is found mainly in the southern part of the county, where its topography is generally rolling. Natural surface drainage is good, but as already indicated the character of the clays composing the subsoil is not conducive to efficient underdrainage. Notwithstanding this the type is inclined to be droughty during dry spells. Cultivation can be carried on without difficulty when the soil carries a favorable moisture content.

The type is derived from the Tuscaloosa formation of Cretaceous time, which formation underlies the more recent Lafayette, but which now appears at the surface in much of that part of the county covered by sedimentary deposits. So similar in appearance are some of the materials of the two formations and so intimate their relation that it is impossible to distinguish between them, and the type unquestionably includes some material from each. The distinguishing characteristic of this type and of the entire series is the stiff, heavy red clay subsoil, which is without doubt of Cretaceous origin.

[illegible] the Orangeburg soils, the Susquehanna fine sandy loam [illegible] for general farming by reason of its unfavorable subsoil conditions, yet the type is distinctly not a useless soil. Yields range from fair to good, especially on new land, and under systems of soil treatment looking to a permanent improvement the productivity of the type could be greatly increased. Shallow plowing, clean culture and the lack of crop rotation have often caused failures, and a number of farms on the type have been abandoned. This soil is inclined to erode badly, and where uniform shallow plowing has been practiced and a compact subsurface or plow-sole established disastrous washing may result from a single heavy rainfall.

The most permanently productive phase is that having the more friable subsoil, resembling the Orangeburg subsoil. The impervious clays here appear to lie at some depth, and conditions of drainage are better. This phase is more easily improved and is a good soil for general farming.

As a whole the type needs methods of tillage that will improve the physical condition, increase the loaminess of the soil, and give it greater power to hold moisture. Deeper plowing, preferably in the fall, winter cover crops, leguminous crops to be plowed under, and systematic crop rotation are badly needed. Where necessary terracing should be employed to prevent washing. Cotton, corn, oats, rye, peas, beans, peanuts, potatoes, melons, vegetables, some fruits, and berries do well. The type is largely adapted to the general system of farming outlined under the Orangeburg fine sandy loam, and the suggestions for upbuilding the soil given in the description of that type apply equally to this one.

The native timber growth consists chiefly of pine, with oak, hickory, maple, gum, and poplar plentiful in different localities. Most of the abandoned farms have grown up in "old-field" or loblolly pine, with a scattering of hardwoods.

Lands of the Susquehanna fine sandy loam type of soil range in value from $5 to $20 an acre.

SUSQUEHANNA GRAVELLY SANDY LOAM.

The Susquehanna gravelly sandy loam consists of a grayish to reddish-brown fine sandy loam, from 5 to 15 inches in depth, usually underlain by a heavy red clay, mottled with gray and yellow in the lower portions and carrying a fair proportion of small mica flakes.

Small ferruginous sandstone or clay-stone fragments and quartz pebbles are found in the surface material, which differs little from that of the fine sandy loam, both types showing a fairly high percentage of the finer grades of sand and an appreciable content of silt. The structure is usually quite open and loamy. The depth of the surface soil is variable, conforming largely to topographic lines

the shallower phases appearing over the crests and ridges and the deeper phases on the lower slopes, where an accumulation of 15 to 24 inches of soil is not uncommon. The presence of humus in virgin soils imparts a dark-gray color.

The distinctive characteristics of this type include a hilly to broken topography and varying percentages of gravel and small ferruginous fragments in the soil. The higher hills and ridges invariably show the highest percentage of consolidated material, which may be often sufficient over small areas seriously to hinder cultivation. On the other hand, occasional instances occur where the rock content is very low, and the areas would unquestionably conform to the fine sandy loam in general characteristics.

The subsoil material and underlying beds of whitish sands and clays show a very irregular stratification. Beds, lenses, and thin bands of whitish clay may be found embedded in the sands at almost any depth. Frequently a profile of 50 to 100 feet along a roadway ascending a high hill or ridge will reveal a number of beds of sand and clay, alternating in position and usually separated from one another by thin sheets of iron crust. The subsoil proper, like the surface material, shows a number of variations. Along the lower slopes underlying the deeper phase of soil both the color and the structure are modified. This phase probably admits of a broader agricultural usage than any other and includes most of the cultivated areas of the type.

The Susquehanna gravelly sandy loam is largely a product of the Tuscaloosa formation, with a probable admixture of some Lafayette material in the surface. It has a low agricultural value. Scant pasturage for sheep, goats, hogs, and cattle is afforded by a scattered growth of native grasses. The forests of pine and of blackjack oak seem to prevent much undergrowth.

The value of the type is largely determined by the quality and the character of the timber growth and the location with respect to transportation facilities. Cut-over lands command but a few dollars an acre, while the good timbered areas may sell for $10 to $30 an acre.

NORFOLK FINE SANDY LOAM.

The Norfolk fine sandy loam consists of a light-gray to pale yellowish-gray fine sandy loam, 6 to 10 inches deep, underlain by a yellow fine sandy clay loam, grading into a yellow fine sandy clay at 18 to 20 inches. The subsoil, while somewhat friable, is considerably more plastic than that of the Orangeburg fine sandy loam. Occasionally the color may vary to some shade of brown, especially over the higher elevations, while a slight mottling of gray may be seen in the lower depths in flat and less adequately drained areas.

The surface appearance of the virgin areas is decidedly darker than the cultivated portions, by reason of a larger humus content, which, however, is soon exhausted in the process of cultivation. The soil is of a light, friable nature and is easily handled. Plowing can be done under a rather wide range of moisture conditions, and little difficulty is experienced in securing a good, mellow tilth during all stages of cultivation.

The topography of the type is gently rolling, with occasional level areas. Drainage is usually well established. In addition to favorable surface relief, the sandy texture induces a ready percolation of soil moisture. The character of the subsoil renders it retentive of moisture and under a system of cultivation looking to the conservation of soil moisture crops should be easily protected during normal periods of drought.

Areas of this type are found in the eastern part of the county between Coaling and Vance and in the northern section some miles southeast of Windham Springs. It is also developed at irregular intervals in connection with the other upland soils of the Coastal Plain country. Many areas too small to indicate on the map were found in all sections of the county, more particularly in connection with the Ruston soils.

The type is of sedimentary origin and is apparently a product of the Lafayette formation in one instance and of the Tuscaloosa in another. Unquestionably both of these deposits have contributed to the formation of this soil. In some instances it appears to be derived from a stratum of Lafayette sands immediately beneath the superficial red loam, while in others it seems to be very closely allied to the Ruston soils and in close proximity to distinct Tuscaloosa material. In either case it is essentially the same.

The Norfolk fine sandy loam is devoted largely to cotton, yields ranging from one-fourth to one-half bale per acre. Corn gives only fair crops, producing from 10 to 25 bushels per acre. Oats, cowpeas, vetch, rye, sweet potatoes, peanuts, beans, sugar cane, etc., do well. The quality and color of sirup from cane grown on this soil are better than in case of the product of the more productive types, such as the Orangeburg fine sandy loam, although the yield is lower. The culture of tobacco may be expected to meet with a fair degree of success. The soil is a medium to late truck soil, and profitable returns can be secured from these crops if properly handled.

Injudicious methods of cropping soon reduce the productiveness of this soil, and it is now giving yields far below its natural capacity. Improved methods of treatment meet with a ready response. A system of crop rotation including winter cover crops and leguminous crops to be plowed under, with the use of commercial fertilizers would greatly increase its productiveness. Peanuts do well

villo series. A poor condition of drainage which prevents free aeration and effective oxidation may be the cause of this characteristic color along the lower slopes. So complicated were these narrow strips and so unimportant from an agricultural standpoint that a separation of them was not attempted.

Where the Lafayette and upper Tuscaloosa deposits thin down to a mere veneer over the Tuscaloosa clays, from which the Susquehanna soils develop, the coherency of the subsoil of the type is considerably more pronounced than is usual. This is probably the result of admixture of more or less of the plastic, sticky Tuscaloosa clays. This peculiarity appears at lower depths and does not warrant a different classification. In the transition zone between the Orangeburg and the Susquehanna soils the soil boundaries are often more or less arbitrary. The type was held, however, rather closely to definite characteristics.

A few inches of the soil is largely a light fine sandy loam having little coherency. In some cases, particularly in the more level areas and upper slopes, the sand content is rather low, and the soil in such cases is more mellow. The color is usually some shade of brown. The virgin areas of this type possess a larger content of organic matter than the cultivated fields and are therefore darker colored and slightly more loamy. The subsoil of the type as a whole has a granular, porous structure, making it a ready absorber and retainer of moisture. To this property is due a large measure of the agricultural value of the type. This quality is not so pronounced in the deeper, lighter phases, where droughts are more liable to affect growing crops.

The Orangeburg fine sandy loam being a light soil is easily handled under a wide range of moisture conditions. It responds readily to fertilizer treatment and is a very desirable soil for all classes of farming carried on in the area. The type has a wide distribution over the entire Coastal Plain section, as the map will show.

The surface features of the type range from hilly to gently rolling, with the rolling topography predominating. Drainage conditions are universally well established. In addition to the natural surface relief, the open structure of the soil material permits a ready movement of ground water; in fact, percolation may be so rapid over some of the lighter phases occupying the higher hills and ridges as to cause droughtiness during the dry seasons of summer. The more level areas, found usually on the crests of the watersheds or lower slopes of the uplands as they give way to the river terraces, show a slightly heavier structure and a finer texture than is typical, and a tendency toward the red color of the Greenville soils.

The Orangeburg fine sandy loam is unquestionably derived from both the Lafayette and the Tuscaloosa formations. A differentiation between these formations is exceedingly difficult at times, but the soil is essentially the same in either case. Over much of the type it contains a noticeable quantity of gravel, the content being greater on the slopes of stream valleys. In road cuts or washes seams of gravel may occasionally be noticed many feet below the surface. Where the soil is derived from the Lafayette formation the gravel is largely of quartz and the soil is more uniformly a bright brick-red color. The material of the Tuscaloosa formation giving rise to this type appears to consist of brown and yellow sands that have undergone sufficient oxidation to give them a red color. Beds of these sands are plainly seen in washes and road cuts, where the red coloring extends to a depth of 2 or 3 feet, gradually passing below that depth into a yellowish material of the same texture. The quantity of gravel in such areas is usually small, and often there is none. In several instances seams of subangular pebbles were seen embedded in the lower yellow to brownish material. Areas that are distinctly derived from the Lafayette have a gray surface resting upon the red deposit, and those from the Tuscaloosa a red color from the surface to a depth of 2 or 3 feet.

The type is well adapted to all the farm crops grown in the area. A large percentage of it is uncultivated and supports a forest growth consisting chiefly of pine. Cotton is the principal crop, with yields ranging from one-fourth to one-half bale to the acre. Better fields where a liberal use of commercial fertilizers is made and good methods of tillage followed often give yields as high as 1 bale to the acre. The type is not considered a good corn soil, though the recent practice of supplying nitrate of soda to the growing crop just prior to the fruiting season is demonstrating the feasibility of making good yields of corn on these light upland soils. Under this treatment 50 to 60 bushels have been secured, although the average yield varies from 15 to 20 bushels. Oats, cowpeas, beans, melons, cantaloupes, sugar cane, peanuts, rye, medium late truck, and small fruits do well. Peaches seem to do especially well on the higher portions of the type. The growing of tobacco could no doubt be made profitable, care being exercised in selecting a loose, open surface soil, underlain by a friable red sandy clay. The phase showing the sticky subsoil approaching the Susquehanna type should be avoided.

The Orangeburg fine sandy loam can be brought to a high state of productiveness. The addition of organic matter to the soil is essential. In a light, porous soil such as this an abundance of vegetable matter tends to increase its capacity for moisture. Stable manure is the best form in which to supply this constituent, and in the absence of manure green manuring crops are available. Winter cover crops of rye, oats, or vetch should be seeded as a protection against washing and as a source of organic matter. Cowpeas plowed under are

especially beneficial, adding nitrogen as well as humus-forming material. Peanuts are also valuable for soil improvement.

Commercial fertilizers are used on this soil, usually at the rate of about 200 pounds to the acre. In some cases heavier applications and better grades are used profitably, particularly for cotton, corn, and oats. Mixtures of cottonseed meal, kainit, and acid phosphate and of cottonseed meal and acid phosphate (generally in the proportion of 2 to 1) are being used on this land in many parts of the South. Acreage applications of 500 to 1,000 pounds of such mixtures for cotton, 400 to about 600 pounds for corn, and about 300 pounds for oats very frequently have given yields of 1 to 1½ bales of cotton, 50 to 100 bushels of corn, and 60 to 70 bushels of oats per acre.

In connection with fertilization definite crop rotations, including cover crops and the catch crops for green manuring, should be planned. The cover crops are needed to prevent washing, which is doing much damage to the fields of this soil.

The type varies in value with the location and agricultural use. The more broken and hilly areas command a low price, as they represent areas mainly suitable solely for forestry. Arable areas conveniently located to towns or shipping points are valued at $20 to $50 an acre. Lands within a few miles of Tuscaloosa are held as high as $100 an acre. The virgin timber growth is largely longleaf pine, but much of it has been cut and superseded by a growth of old-field and loblolly pine, with a sprinkling of hardwood.

ORANGEBURG SANDY LOAM.

The Orangeburg sandy loam consists of a gray to slightly brownish gray loamy sand to sandy loam, 6 to 15 inches deep, underlain by a red, friable sandy clay, somewhat sticky in places. The sand content varies from medium to fine, with the fine grades predominating. The deeper phases of the soil, arbitrarily separated from the sand type, will show a gray surface 4 to 6 inches deep, underlain by a yellowish to brownish-yellow sandy loam to loamy sand resting on the red subsoil proper. The shallower phases have a reddish-brown color, owing to a slight admixture of the subsoil material, or to a less degree of leaching. The uncultivated or forested areas contain an appreciable quantity of organic matter and consequently have a slightly darker surface color. After a few years' cultivation this humus content is depleted and the soil assumes a characteristic shade of gray.

The red color of the subsoil sometimes extends to a depth of 6 to 10 feet, as seen in road cuts, and at other times is less than 3 feet deep, where there occurs a brown to yellowish-red material having the same texture and structure as the overlying stratum. Difference in origin is probably the cause of this variation in the subsoil material. A small percentage of well-rounded quartz gravel and subangular chert pebbles is scattered through the soil and subsoil. Very thin seams of gravel and occasional pebbles often appear embedded in the lower subsoil.

The type is a very light, open soil and is easily cultivated under a wide range of moisture conditions. By reason of its structure and texture it is leachy, although it responds readily to fertilizer treatment.

The Orangeburg sandy loam occurs in irregular areas throughout the southern and southwestern parts of the county. The topographic features range from gently rolling to hilly, and drainage is at all times well established. In addition to the favorable surface relief the open, granular structure of the subsoil permits a free movement of excess ground water. The slopes wash readily and gully, on account of the loose, incoherent character of the sandy material, and many instances were encountered where the red subsoil was exposed. The higher hills and ridges, usually showing the deeper phases of the type, are excessively drained and are consequently inclined to be droughty.

The Orangeburg sandy loam is derived from sedimentary material in part of the Lafayette and in part of the Tuscaloosa formation. The presence of subangular chert pebbles and the shallow red subsoil grading without any abrupt stage into a reddish-yellow material, are taken to indicate an origin from the yellowish and brownish sands of the Tuscaloosa. Many areas are distinctly derived from the Lafayette, which originally mantled the Tuscaloosa and which is still present over the crests of many of the hills and ridges of the Coastal Plain region. In either case the character of the soil material is essentially the same.

A large proportion of the type remains in forest, consisting of pine with a scattering of oak, hickory, and dogwood. A fair growth of native grasses affords some pasturage. The cultivated areas are devoted chiefly to cotton and corn. Cotton produces from one-fourth to one-half bale and corn from 10 to 25 bushels to the acre. Oats, rye, cowpeas, melons, peanuts, potatoes, cabbage, onions, sugar cane, peaches, grapes, and berries apparently do well. Probably a filler type of tobacco could be grown. The type is well adapted to the production of a very desirable quality of cane sirup, cantaloupes, medium late truck, sweet potatoes, and fruits. About 200 pounds of commercial fertilizers are used per acre for cotton and corn. The yield of these staple crops may be materially increased by the use of nitrate of soda as a top dressing just prior to the fruiting of the plant, corn being more generally treated than cotton. The better farmers are supplying nitrates in this way and find the practice profitable.

Like all sandy soils with a rolling topography under continual cultivation in cotton or corn, the productiveness of this type soon deteriorates. The chief cause of this is the depletion of organic matter. Stable manure is the ideal means of supplying this constituent, but the supply is entirely inadequate and the planters must resort to the plowing under of green crops, preferably legumes, such as cowpeas, vetch, soy beans, velvet beans, or clovers. The soil responds readily to better methods of management, which should include, besides green manuring, systematic crop rotations, tillage to control moisture conditions, prevention of washing, and the judicious use of commercial fertilizers. Moderate to heavy applications of mixtures of cottonseed meal and acid phosphate or cottonseed meal, kainit, and acid phosphate will profitably increase the yields of cotton, corn, and oats. Protection during the winter season by some cover crop, such as rye, oats, or vetches, will materially diminish losses from erosion. The type is inherently a very desirable soil for diversified farming and may be kept in a reasonably high state of productiveness. It is worth from $10 to $35 an acre.

ORANGEBURG SAND.

The Orangeburg sand consists of a grayish to reddish-brown sand to loamy sand, ranging in depth from 15 to 36 inches and carrying usually a small percentage of well-rounded and subangular pebbles. The shallower phase is underlain by a reddish-brown to yellowish-red sandy clay subsoil and is in many cases essentially like the sandy loam type. The deeper phase often consists of 36 inches of a grayish to yellowish brown loamy sand. Such areas are found frequently on the lower slopes, where the depth of sandy material appears to be due in part, at least, to wash from higher elevations. Areas of this character are numerous over many hills, ridges, and valleys. The deeper phases of the type when occuring in extensive and uniform bodies usually show a slightly sticky reddish to yellowish-red material below 15 to 18 inches. The sand content varies from medium to fine, with the finer textures predominating. Some areas were encountered where the proportion of the fine sand was large enough to give a typical fine sand texture, but the difference between the two types scarcely warranted any separation.

The type occurs most extensively on the watershed between the Black Warrior and the Sipsey Rivers, in the southwestern part of the county, and to a less extent in connection with the sandy loam types. Surface features vary from hilly to rolling and surface drainage is well established, and this with its very open and loose structure giving free internal movement of moisture causes much of the type to be droughty, though less so than would naturally be expected, as the loose surface soil is a very efficient mulch. Erosion has resulted in many local variations in the depth of surface material, but the areas included in the type are distinctly light and sandy and so recognized by the farmers. In some places erosion has been severe enough to expose the subsoil.

In the extreme southwestern part of the county the mantle of Lafayette sands seems to disappear and the type is derived from the Tuscaloosa formation. Here there is little doubt that areas of Susquehanna sand and Ruston sand could have been established. Very slight agricultural differences could possibly exist, but all the sand areas were mapped with the Orangeburg series. The red to brownish sandy clay subsoil of the region does not at all times possess the typical friability of the Orangeburg soils, and there is even less of the plastic, impervious, mottled clays of the Susquehanna series. The material is quite sticky and slighty heavy in the upper section of the subsoil, but becomes more friable with depth until it finally assumes the characteristic structure of the series in which it is included. The establishment of a number of sandy types would have involved an unnecessary amount of detailed inspection.

The origin of the type is in part from the Lafayette and in part from the Tuscaloosa formation. Both of these deposits include beds of sands and sandy clays, which on being exposed at the surface develop Orangeburg characteristics. The deeper phase of grayish sands represents the most advanced stage of weathering and bleaching. A fair proportion of the type is under cultivation, being utilized chiefly in the production of cotton and corn. The shallower phases give yields similar to those secured on the deeper phases of the Orangeburg sandy loam, and the recommendations given in the description of the latter type apply in handling the former. Yields are generally fair over the entire type. When first put under cultivation the yields of cotton and corn are exceptionally good, but the growing of clean-culture crops without rotation soon causes a decline in productiveness. The crops of the second year after clearing are invariably the largest. Cotton averages about one-third bale, and corn from 15 to 20 bushels to the acre. These yields are markedly increased by a top dressing of nitrate of soda just prior to laying by the crop.

About 200 pounds of commercial fertilizer are usually drilled in at planting time. Heavier applications are needed for maximum crops, and it is likely that small applications at intervals during the growth of the plants will give better results and be less likely to cause "firing," especially where the organic matter content is low, than where a heavy application is made at planting time. Cottonseed meal and kainit mixtures, with some acid phosphate, have proved satisfactory on this soil.

This type of soil is very open and leachy and the more soluble fertilizer salts are quickly removed by the soil waters. The original content of organic matter is soon exhausted under the present methods of tillage and cropping and the addition of stable manures or the plowing under of green manuring crops is absolutely essential to the maintenance of the yields. Systematic crop rotation should also be practiced as a means of soil improvement.

The Orangeburg sand is not a good general farming soil. It is more distinctly suited to the production of early to medium early truck, including potatoes, and to peanuts, melons, cantaloupes, and small fruits. In growing these special crops greater expenditures can be afforded for fertilizers and improvements. At present, owing to the distance from railroad facilities, such crops can not be grown generally. For this reason the type does not command prices corresponding with its intrinsic agricultural value. It is the earliest truck soil of the county.

ORANGEBURG GRAVELLY SANDY LOAM.

The soil of the Orangeburg gravelly sandy loam, to a depth of 6 to 15 inches, consists of a gray to brownish fine sandy loam, carrying a rather high percentage of rounded quartz and chert gravel. This is underlain by a red sandy clay having a friable, granular structure closely resembling that of the fine sandy loam type. The sand content varies from medium to fine, with the fine grades predominating. In addition to the white and rose-colored quartz and quartzite pebbles, it is not uncommon to find varying quantities of ironstone fragments and some iron concretions.

The depth of surface material is quite variable, with extremes ranging from 2 to 36 inches over very small areas. The shallower phases occur on the crests and upper slopes of the hills and ridges very much in the same manner as the shallow phases of the other types of the series, while the deeper phases appear on the lower slopes, as if caused by the accumulation of material washed from higher positions. Such phases usually show a depth of 2 to 3 feet and are underlain by a yellowish-red to brownish-yellow subsoil.

The gravel found in this type is usually disseminated throughout the surface soil, and except in a few cases where gravel beds outcrop, the subsoil is largely free from stony material. Thin seams of gravel are occasionally seen in road cuts and erosions.

The Orangeburg gravelly sandy loam has a rolling to hilly topography and drainage is well established. While many crests of hills and ridges are covered by this type, it is more largely confined to the gradually sloping and well-dissected valley walls. The most extensive areas are found along the outer edges of the Black Warrior River valley. The upper slopes of many of the hills and ridges that

flank the stream as it emerges from the Appalachian region covered by remnants of Lafayette and Tuscaloosa formations. the vicinity of Holt the gravel content is particularly high.

The soil is easily cultivated under a wide range of moisture co ditions. The heavier phases are quite similar in agricultural va to the fine sandy loam and should be handled in the same manı The gravel content is not in every respect disadvantageous, as it not sufficient to offer serious difficulty to cultivation and is of so benefit in aiding the conservation of moisture. The broken to hil topography constitutes the chief hindrance to the use of this soil f farming.

The type owes its origin largely to Lafayette material, the wate worn pebbles in the surface material coming from pockets and be that have been broken down by weathering. Unquestionably t Tuscaloosa formation has also contributed in part to this type. Su angular chert gravel is typical of that formation and such fra ments are found in some areas of this soil. The type is a rather ligh warm soil and where the surface conditions are favorable would gi good results under a system of cropping and treatment such as ou lined for the Orangeburg fine sandy loam. The steeper slopes shou be seeded to Bermuda grass and used as pasture. The timber grow consists largely of pine, with a sprinkling of hardwood. Land this type of soil may be purchased for $5 to $25 an acre.

GUIN SANDY LOAM.

The soil material of the Guin sandy loam is usually a gray to ligh brown loamy sand to light sandy loam, with an average depth of inches, carrying more or less iron crust, iron concretions, and rounde quartz and chert gravel. The sand content varies from medium fine, with the fine grades predominating, and the soil under norm conditions is loose and incoherent. The depth of soil is exceeding variable, ranging from 6 to 20 inches. The surface material deeper areas is a very light gray. In the areas in the western pa of the county the sand is somewhat coarser. In the shallow phas enough fine material is present to cause the material to cohe when wet, though in all instances the soil is exceedingly friable.

There is a definite line of demarcation between the soil and su soil. The latter has a dull-red, reddish-brown, or yellowish-brow color and a structure decidedly heavier than that of the soil, rangin from a sandy loam to a sandy clay. Variation both in color a texture are frequent. The rapid change and wide variation in ma terial, in addition to a very hilly surface configuration, largely deter mine the classification of this type. It represents more accurately a soil condition than it does a classification of soil material and in

cludes a rather broad transition zone between the Orangeburg and the Susquehanna soils. In some instances the material of this type is very distinctly of Lafayette origin, and such areas have the physical characteristics of the Orangeburg fine sandy loam, but a broken surface practically precludes any extensive cultivation, and this fact is sufficient basis for excluding the portion of the type from the Orangeburg. In like manner some areas included might have been placed under the Susquehanna series, they being more largely from Tuscaloosa material and appreciably sticky in the subsoil. In fact, the type can be said to cover a number of soils, as sandy loams, fine sandy loams, gravelly sandy loams, sands, stony loams, and the like, mainly of the Orangeburg and Ruston series, in areas too small to map on the scale used in the survey. The descriptions given above are intended to cover the dominant material classified and described as a definite type at the beginning of this chapter.

Being a soil of light texture and structure and having a very broken surface, the Guin sandy loam is inclined to wash and gully. Leaching is rapid, and the content of organic matter is usually low. The abundance of ferruginous masses is often sufficient in local spots on the high hills and ridges to warrant a classification as a stony loam, but these areas were too small to show on the map.

Very little of the Guin sandy loam is under cultivation, and little of it can be farmed with profit. Small areas could be used for medium early truck crops, peanuts, fruits, and vegetables with fair to good results. The soil is exceedingly loose and friable and needs the addition of organic matter. The best use for the larger proportion of the type is forestry. Where cultivation is at all practicable the crops and management should be the same as for the Orangeburg fine sandy loam.

The Guin sandy loam ranges in value from $5 to $20 an acre, according to the character of the timber growth, which consists of pine and scrub oak. Many areas in the western part of the county in the vicinity of Hurricane Creek support heavy forests of longleaf pine.

RUSTON FINE SANDY LOAM.

The Ruston fine sandy loam consists of a gray to grayish-brown loamy fine sand to light fine sandy loam, 6 to 15 inches deep, underlain to 36 inches by a yellowish-brown, reddish-yellow, or dull-red fine sandy clay. The lower part of the subsoil shows considerable gray mottling.

This is extensively developed over the upland Coastal Plain country, and many local conditions give rise to variations in the character of both the soil and the subsoil. In the more rolling areas, where conditions favoring weathering obtain, a lighter phase is developed and the subsoil is redder; while in the more level areas, generally

occurring over the lower slopes of the stream valleys, more silt is present and a heavier phase, with a subsoil of a yellowish color occurs. Where drainage and aeration are inadequate the subsoil is inclined to be mottled. In local spots on the steeper slopes, where erosion has been active, the subsoil is exposed. Subangular chert pebbles are often encountered in the rolling areas of the type. This coarser material is a constituent of the Tucaloosa formation, from which the type is derived. The quantity is never great enough to warrant mapping as a gravelly type. The uncultivated areas, by reason of a larger quantity of vegetable matter, are slightly darker in the surface than cultivated areas. With a few years' cultivation, however, the material bleaches into a characteristic light-gray color, much of the organic matter disappearing.

The subsoil of this type is slightly more plastic than that of the Orangeburg fine sandy loam and more nearly like the subsoil of the Norfolk fine sandy loam, or sometimes, in the lower subsoil, resembles the lighter subsoil of the Susquehanna fine sandy loam. It is, however, a friable material, and readily absorbs and retains moisture. In color the subsoil is intermediate between the Orangeburg fine sandy loam and the Norfolk fine sandy loam subsoils, while in structure it is more nearly intermediate between the material underlying the Orangeburg fine sandy loam and that found beneath the Susquehanna fine sandy loam. The type is found in close relation to types of these series and unquestionably includes small areas of the fine sandy loam of both. The question of differentiation was at times very difficult and the boundary lines are in many instances arbitrarily placed, particularly as regards the Orangeburg fine sandy loam. The soil is comparatively easy to till and capable of improvement. Methods of treatment and tillage suitable for the Orangeburg fine sandy loam may be used for the Ruston.

The topography of the type ranges from rolling to nearly level. Surface drainage is generally well established. In some comparatively level and rather low-lying areas drainage is inadequate, and artificial means have to be employed to fit the land for farming. Open ditches usually suffice to remedy this condition.

The Ruston fine sandy loam is a sedimentary soil, apparently derived largely from the Tuscaloosa formation of Cretaceous time. The character of the material is similar to that from which a portion, at least, of the Orangeburg fine sandy loam is derived. Very probably the material is the same, and the characteristic coloring of this type merely represents a stage of weathering less advanced than that of the Orangeburg type.

The type is fairly productive, and much of it is under cultivation. Cotton, corn, oats, and vegetables are the chief crops, and yields are generally high. Under the ordinary methods of culture cotton pro-

duces from one-third to one-half bale and corn from 30 to 40 bushels to the acre. Oats are grown in a very limited way and are usually fed to the stock in the sheaf. Rye, cowpeas, beans, sugar cane, berries, peanuts, and small fruits do well. It is probable that cigar-filler tobacco could be grown successfully. The type over a portion of its occurrences appears to be about as valuable as the Orangeburg fine sandy loam for farming purposes. It responds readily to good treatment, and with proper management much of it may be brought to and maintained in a reasonably high state of productiveness. Deep fall plowing, crop rotation, the addition of organic matter, frequent shallow tillage during the summer months, and the judicious use of commercial fertilizers are recommended for increasing the producing capacity of this type. In crops to be grown and methods of improvement the Ruston fine sandy loam is quite similar to the Orangeburg fine sandy loam.

Applications of commercial fertilizer are believed to be more necessary for this type than for the Orangeburg fine sandy loam, although the same kinds of mixtures are suited to both soils. In other sections mixtures of cottonseed meal and acid phosphate, in the ratio of 2 to 1, applied to fall-plowed land in quantities varying from 500 to 700 pounds per acre have given yields of 75 bushels or more of corn per acre. Kainit would improve the mixture. For cotton, oats, and peanuts the same mixture seems to do well, though different applications are necessary, say 600 to 1,200 pounds per acre for cotton, 400 pounds for oats, and 400 to 500 pounds for peanuts.

Land of this type has a value ranging from $8 to $35 an acre.

RUSTON SANDY LOAM.

The Ruston sandy loam is a gray to brownish loamy sand to light sandy loam, 8 to 12 inches deep, underlain by a reddish-yellow, reddish-brown, or yellowish-red sandy clay. The sand grades range from medium to fine, with the fine predominating. The surface soil may carry a small percentage of waterworn chert and quartz pebbles. More silt, in addition to a greater humus content, renders the soil more nearly a loam in the lower-lying and level areas than is the case generally, the material usually being loose and open.

The type is not developed extensively in Tuscaloosa County. It is very similar to the Ruston fine sandy loam. Local variations occur in both soil and subsoil. The sandy surface soil is variable both as to depth and color. The deeper phases found more on the lower slopes usually have a neutral gray color, while the shallower phases are of a brownish color and occupy the upper slopes. A slightly greater content of organic matter in either case imparts a darker tint to the soil.

The color of the subsoil is apparently governed by topographic [illegible] the more rolling areas, where conditions favor weathering and oxidation of the iron constituents, having a redder color, and the level areas usually some shade of yellow. Where drainage is inadequate the subsoil is inclined to mottle in the lower portion. On some of the upper slopes spots appear where erosion has exposed the subsoil material. The structure of the subsoil is usually more plastic than that of the Orangeburg sandy loam, though it is distinctly friable and easily retains soil moisture.

Like the fine sandy loam type the subsoil has a characteristic color intermediate between the colors of the Orangeburg and the Norfolk subsoils and a friability between the Orangeburg and the Susquehanna subsoils. Where it occurs in close relation to other types of these series, without any clearly defined differences, the boundary lines were arbitrarily drawn. The type is easily handled, and under normal conditions works up into a good tilth. It is susceptible of a high degree of improvement and responds readily to fertilizers.

Areas of this type vary from rolling to very gently rolling, and surface drainage is naturally good. A few areas of small extent may demand ditching to improve drainage, this method being usually sufficient to put the land in good condition for crops.

The Ruston sandy loam is of sedimentary origin, representing a development from the Tuscaloosa formation of Cretaceous time. The material giving rise to this soil appears to be very similar to that from which a portion of the Orangeburg sandy loam is derived. There is slight difference between these two types other than the color of the subsoil and a slightly more plastic subsoil structure. It is not unlikely that the two soils in such cases are derived from similar material, the Ruston classification merely representing areas that have undergone a less thorough process of weathering, including oxidation.

The type is fairly productive, the yields of cotton, corn, oats, and vegetables being about the average for the county. Cotton produces from one-third to one-half bale and corn from 15 to 35 bushels to the acre. Oats are not extensively grown, though they do very well. Cowpeas, rye, beans, sugar cane, peanuts, melons, potatoes, berries, small fruits, and vegetables give good results. Cuban filler tobacco could be grown.

The proper use of this soil corresponds to that of the Orangeburg sandy loam and the methods of improvement are the same. Deep plowing, the addition of organic matter, crop rotation, and the judicious use of fertilizers constitute broadly the steps necessary for increasing the crop yields. About the same fertilizer treatment as suggested for the Ruston fine sandy loam is applicable on this type; that is, moderate to heavy applications of mixtures of cottonseed meal and kainit, with some acid phosphate or mixtures of cottonseed meal and kainit. The Ruston sandy loam has about the same agri-

cultural value as the fine sandy loam and commands the same price per acre. It is probably somewhat less retentive of moisture, on account of its coarser texture and more open structure, but this difference can be modified through liberal incorporation of vegetable matter either by aplying barnyard manure or by plowing under green crops of cowpeas, velvet beans, soy beans, winter vetch, lespedeza, bur clover, oats, and rye. In its natural condition the type supports a growth of pine and hardwood, with a fair to good growth of native grasses, which afford fair pasturage.

DEKALB STONY LOAM.

The Dekalb stony loam, although including considerable areas so stony or steep as to preclude agricultural utilization, embraces a fairly large total of land available for the production of crops. The type is developed in the Appalachian region of Paleozoic shales and sandstones, and is confined to the steep and broken areas along the stream courses. The Black Warrior River and its numerous tributaries have deeply dissected the region, cutting their channels to depths varying from 50 to several hundred feet below the crests of the higher hills and ridges, and presenting valley walls that are often precipitous and usually rough with bowlders and rock outcrops. Along North River and Hurricane Creek the same condition exists—the valley slope bordering the stream channels is often steep. So rough and broken are these areas that cultivation is largely impossible, and they have been included with this type. Fragments of sandstone and shale are present very frequently in quantities sufficient to interfere seriously with cultivation, even were the topography favorable to tillage. In many cases, however, the type represents merely very rough and broken areas, without any appreciable quantity of rock fragments.

The fine earth ranges from a fine sandy loam to a heavy silt loam of a grayish to brownish color. Erosion is severe and the loose surface material is often very shallow, except upon lower slopes, where it accumulates as a colluvial deposit. The chief value of these areas is for their timber and mineral rights, the timber value being low because of the inaccessibility of the country and the generally scrubby character of the growth. Some of the less severely rolling portions include small areas of soil material similar in character and crop utilization to the Dekalb silt loam and the Dekalb fine sandy loam types.

DEKALB SILT LOAM.

The soil of the Dekalb silt loam, to a depth of 6 to 12 inches, consists of a gray to yellowish-gray loam to silt loam, sometimes assuming a brownish tinge. Beneath this material is found a compact

though friable yellowish silty clay loam. Small fragments of the parent rock are disseminated throughout the soil profile. There is sufficient sand in the soil to produce usually a rather friable structure and to make cultivation easy. When dry the surface soil has a loose, floury feel. The line of demarcation between the soil and the subsoil is seldom sharp. Small fragments of shaly sandstone and fine-grained shale are numerous throughout the soil profile, and the partially disintegrated shale is encountered occasionally at a depth of 30 to 36 inches. On small knolls and slopes the soil often contains enough shale fragments at times to justify its classification as a shale loam, but these areas are too small to be shown on the map of the scale used in this survey. Local spots of fine sandy loam are also included.

The Dekalb silt loam occurs in close relation to the Hanceville silt loam, which is the predominating type of the Appalachian region of Tuscaloosa County, and undoubtedly includes small areas of this latter type. Boundary lines between the two are often hard to locate, because of the complicated occurrence of the areas, and classification was necessarily based on the predominating characteristics of the areas in question. The only differences between the two types are the color of the subsoil and the slightly greater agricultural value of the Hanceville type.

The topography of the Dekalb silt loam is hilly to broken, the more broken areas lying near the streams. Drainage is well established. The type is a residual soil derived through weathering from the disintegration of interbedded shales and sandstones of Carboniferous age. The type is not extensively developed, although the numerous small areas in the aggregate amount to a large acreage. The forested areas support a timber growth of oak, gum, chestnut, and hickory, and afford fair pasturage. The steeper slopes, over which cultivation is largely impracticable, are best suited to forestry.

Part of the type is under cultivation, cotton and corn being the chief crops. Yields are fairly good, where a liberal use of commercial fertilizers is made and humus-supplying crops, such as cowpeas and vetch, are grown. Sorghum, oats, cowpeas, peanuts, Irish potatoes, rye, grasses, and many vegetables do well. The soil is not very retentive of moisture and is inclined to wash and gully. The system of management suggested in the description of the Hanceville silt loam applies equally well to this soil, since it differs slightly from that type.

Land of this type of soil has a value ranging from $5 to $25 an acre.

DEKALB FINE SANDY LOAM.

The Dekalb fine sandy loam consists of a yellowish-gray fine sandy loam, with an average depth of 8 inches, underlain by a compact

yellow to brownish-yellow silty clay loam to silty clay, usually becoming heavier with depth. Occasional areas show a decidedly brownish tinge in the surface soil. Small fragments of sandstone and shale are generally present on the surface, especially on slopes occupied by the deeper phases of the type. The percentage of sand appears to vary to some extent with the character of the parent rock and with difference in topographic position, the steeper slopes having the lighter texture. Organic matter imparts a slightly darker color to the surface few inches, making it loamy and giving a good, mellow tilth. Continual cropping tends to bleach the soil to a light-gray color, the color corresponding to the degree of depletion of organic matter. Small sandstone and shale fragments in varying stages of disintegration are usually found in the subsoil. While the percentage of silt is high, the material is rather friable.

The Dekalb fine sandy loam is easy to cultivate and can be handled under a wide range of moisture conditions with an assurance of a good tilth.

The surface features of the type range from gently rolling to hilly, and the drainage is generally well established. Small areas may require artificial drainage, such as can be readily accomplished by means of open ditches. A few small areas of the Dekalb fine sandy loam are found in the northern and western parts of the county in the Appalachian region. The type has here little agricultural value. It is a residual soil derived from the weathering of sandy shales and sandstones of Carboniferous age.

A small proportion of the type is under cultivation. Cotton yields from one-fourth to one-half bale and corn from 10 to 25 bushels to the acre. The yields are dependent upon seasonal conditions and the quantity of fertilizers used. Sweet and Irish potatoes, peanuts, cowpeas, oats, rye, small fruits, and many vegetables do well.

To increase the productiveness of this soil deep plowing and the addition of organic matter are essentials; the addition of organic matter to increase the loaminess of the soil and improve the moisture condition. In the absence of barnyard manures, green crops, such as oats, rye, cowpeas, and vetch, plowed under offer the best means for supplying this constituent. The recommendations made for the Hanceville fine sandy loam apply to this type, the two differing but slightly in character and agricultural value.

DEKALB SHALE LOAM.

The fine earth material of the Dekalb shale loam does not differ essentially from that of the silt loam type, being a gray to brownish silt loam, underlain by a yellow or reddish-yellow heavy silt loam to silty clay loam that becomes slightly heavier with depth and finally passes into a silty clay. Areas having a red subsoil and really constituting the Hanceville shale loam occur, but no attempt was made to separate them. The entire area of shale loam material is small and of uniform agricultural value. The percentage of shale fragments in the subsoil as in the soil is high, and apparently increases with depth, until the partially disintegrated bedrock is encountered. In many instances it was impossible to bore deeper than 24 inches, and the parent rock is sometimes encountered within the 3-foot section.

Variation in the texture of the soil may occur as the result of differences in the parent rock, and occasional areas more sandy than the typical soil are found. The high percentage of shale chips seems to give to the soil a rather loose and open structure, in spite of the fine texture of the soil mass.

The type does not absorb the rainfall as rapidly as the sandy types, and it is inclined to wash badly. It also becomes droughty during the latter part of summer. There is but little organic matter present, even in the surface material, and this limits the retention of soil moisture.

The Dekalb shale loam forms a continuous area along the northeastern edge of the county, with small isolated areas in different parts of the country underlain by the Coal Measures. It occurs generally on the slopes or as knolls or ridges where erosion has been very active and much of the fine earth is removed about as rapidly as it is formed. Areas of the type, too small to map, are included in the areas of silt loam and fine sandy loam of both the Dekalb and the Hanceville series.

The Dekalb shale loam is a residual soil derived from fine-grained sandstones and shales of Carboniferous age. The presence of a large quantity of thin shale fragments is the basis of its differentiation from the Dekalb silt loam.

Very little of this type is under cultivation, the forested areas supporting a timber growth consisting chiefly of pine and oak, the latter predominating in cut-over areas. Most of this soil is held by corporations owning mineral rights and has but little agricultural value. With the liberal incorporation of vegetable matter and fertilization, fair yields of Irish potatoes, corn, oats, and rye may be secured.

HANCEVILLE SILT LOAM.

The soil of the Hanceville silt loam is a pale yellowish to reddish-brown silt loam, 5 to 9 inches deep, carrying sandstone and shale fragments. When dry it has a floury feel and works up into a loose, open seed bed. The subsoil is a yellowish-red to red silty clay loam, gradually passing into a silty clay at lower depths. It is friable to

becomes rather sticky when wet. In uncultivated areas both the soil and the subsoil are quite compact. Small fragments of a fine-grained sandstone and chips of shale are common in the subsoil and occasionally the partially disintegrated shale rock is encountered within 3 feet of the surface.

The depth of surface material varies with the steepness of slope and the consequent degree of washing. The deeper phases, which are largely of a pale-yellow to grayish color, occupy the more level areas, while the shallower phases in which the soil is brownish to reddish brown occupy slopes. Many gently rolling areas under cultivation, however, show a decidedly brownish tinge.

The type occurs extensively over the broad stretch of rolling to hilly country of the coal measures and necessarily includes numerous minor variations. The soil usually is, as described, a silt loam, though there are variations toward either a fine sandy loam or a silty clay loam, and frequent occurrences of typical loam. The agricultural value of all these phases is essentially the same. The type is so closely allied to the Dekalb soils and develops so irregularly in almost any position that small bodies of the Dekalb soils are included. In fact, no separation was attempted over large sections of the hilly to rolling country, the predominating character of the soil being used to decide what type should be shown on the map.

The Hanceville silt loam includes many small areas of a very shaly material which usually occur as small knolls or slopes where erosion has removed a large part of the fine earth and where disintegration has proceeded sufficiently to break down the shale formation into small, thin fragments. As a rule, however, the type does not contain an appreciable quantity of rock material, except on the slopes of the valley walls, where outcrops and bowlders may occur.

A hilly to rolling topography gives the type good surface drainage. The steeper areas are subject to severe erosion and care must be exercised in cultivating such areas. The type may be cultivated without any special difficulty and can be plowed under a wide range in moisture content. The soil works into mellow tilth, and has little tendency to clod or pack.

Like the other soils of the county, the type is deficient in organic matter. After a few years' cultivation the original content of humus is exhausted and little attention is given to the matter of replenishing it.

The Hanceville silt loam is a residual soil of the Appalachian province. It develops over the hilly section of the county where the country rocks belong to the Carboniferous and is derived from shales and sandstones. Shales give rise to the larger part of the type. They vary in color from gray and olive to brown and red, but in any case weather into a reddish material. The sandstone that contributes

to this type appears to break down completely on weathering. The type is identical in origin and position with the Dekalb silt loam, the distinguishing characteristics being the red-colored subsoil. So far as could be seen, there is no difference in the character of the parent rocks.

A considerable area of the Hanceville silt loam is under cultivation, and fair to good yields are obtained. The forested areas support a growth of oak, pine, gum, beech, chestnut, hickory, and smaller underbrush, and much of it is utilized as pasturage for sheep, goats, and cattle. The more broken to hilly areas should be permanently utilized as pasturage in connection with a system of forestry. Cotton and corn are the chief crops, cotton averaging from one-third to one-half bale and corn from 15 to 25 bushels to the acre. Oats, sorghum, rye, cowpeas, soy beans, Irish potatoes, vegetables, berries, and fruits do well, but are grown only in small quantities for home consumption. Clovers and grasses should give good returns.

The Hanceville silt loam, with a rolling topography, is a very desirable soil for general farming purposes. It is slightly more productive than the Dekalb silt loam. Permanent improvement is easily accomplished, but careless methods of cropping and tillage have reduced many cultivated areas to a low state of productiveness. The soil is generally in a poor physical condition, owing to shallow plowing, lack of organic matter, and to washing and leaching during the winter season when the fields are usually without protection. Deep plowing in the fall, gradually increasing the depth until a mellow seed bed 10 to 12 inches is secured, would improve this type. This alone will largely control moisture conditions and prevent washing, though some of the steeper slopes may need terracing. The soil should be seeded to some winter cover crop, such as oats, rye, or vetch, with an application of a few hundred pounds of commercial fertilizers per acre, following the crop with cowpeas, cutting the vines as a forage crop after harvesting the seed. The stubble should be plowed under deeply in the fall and the land again seeded to some winter crop, following with either cotton or corn the next spring and applying a liberal dressing of stable manure. Continuous practice of a system of crop rotation that will include the legumes, an occasional crop to be plowed under, will result in increased yields for all crops grown. Commercial fertilizers should be used judiciously in acreage applications of about 500 to 800 pounds for cotton, 400 to 500 pounds for corn, and the same for oats. Mixtures of cottonseed meal, kainit, and acid phosphate give good results.

Much of this type is held by large corporations as mineral lands and is not usually for sale. Prices range from $5 to $25 an acre, [illegible] the mineral right reserved.

HANCEVILLE FINE SANDY LOAM.

The Hanceville fine sandy loam consists of a pale yellowish to light-gray, fairly heavy fine sandy loam, 4 to 10 inches deep, underlain to a depth of 12 to 15 inches by a yellowish-red silty clay loam that gradually passes into a friable red fine sandy clay, extending to a depth of 36 inches or more. Disintegrated sandstone is frequently encountered at lower depths, where it has weathered into a compact sandy mass. In cuts and washes the various stages of weathering are clearly seen, showing a gradual transition from the consolidated rock at lower depths to the surface covering of soil.

The surface soil, to a depth of a few inches, has usually a slightly darker color than the underlying material, on account of the presence of organic matter, this being particularly true of the uncultivated areas. Small subangular fragments of sandstone and shale appear on the surface and in the soil mass, and in some instances, where erosion has been more active over the steeper slopes of the hills and ridges, larger fragments may be encountered.

The type occurs in rather extensive areas in the northeastern part of the county, where the topography is very hilly and broken and many minor variations in the character of the materials are found. This section of the county is marked by numerous high and narrow ridges, separated by deep and narrow valleys, and the detail soil variations could have been shown only by a tracing of this intricate surface configuration. Cultivation is impossible over large bodies, on account of the very broken surface. The crests of these ridges often show a very thin mantle of sedimentary material and an occasional sprinkling of rounded gravel and ferruginous particles, the remnants of such deposits. The more level areas occupying the interstream plateaus are usually narrow, but afford some areas of tillable land.

The shallower phases of the type generally show the brighter red coloring as well as the heavier structure. The rolling areas include spots where much of the surface soil has been washed off, bringing the subsoil close to the surface. Such areas are distinct, but were too small to map separately. Low-lying, narrow, troughlike depressions are usually quite silty, but these were also too small to separate. Thus the soil, as mapped, includes many small areas of silt loam, shale loam, and other types of the Hanceville series, and probably small areas of the Dekalb fine sandy loam.

The Hanceville silt loam is a residual product formed through the disintegration of red and gray sandstone and some siliceous shales of Carboniferous age. The material from shale gives the silty character to the soil, the rock being of fine texture.

A comparatively small proportion of the type is under cultivation, the larger part retaining its original timber growth of pine, poplar, oak, gum, beech, hickory, and smaller underbrush.

An open, friable structure makes the type one easily cultivated. The drainage is generally excellent. Cotton and corn form the leading products, of which moderate yields are secured. Oats, rye, Irish potatoes, sweet potatoes, peanuts, cowpeas, sorghum, truck, berries, and fruits do well, but are grown only in small quantities to meet in part the local demands.

Crop rotations are not generally practiced and little attention is given to improving cultural methods. Commercial fertilizers are used in the production of cotton, applications of about 200 pounds per acre being made. From one-fourth to one-half bale to the acre is about the range of cotton yields. Heavier fertilization and incorporation of large quantities of manures will increase these yields. Cottonseed meal, kainit, and acid phosphate mixtures are substances suited to the crops and soil conditions. Corn yields from 12 to 30 bushels. This crop is grown largely on the lower-lying areas.

Under favorable topographic conditions the Hanceville fine sandy loam is a good soil for general farming purposes and is capable of being built up to a state of reasonably high productiveness. Clean cultivated crops should not be grown continuously. Deep plowing in the fall, followed by a winter cover crop to prevent washing, frequent shallow cultivation of the growing crop to control moisture conditions, and rotation of crops are recommended. Cowpeas, soy beans, peanuts, clovers, oats, rye, and vetch should be included in the rotation, as the soil needs the organic matter that will be added by such crops. Barnyard manure should be saved and applied to the fields wherever practicable, as nothing will give better results than this.

Land of this type of soil ranges in price from $5 to $20 an acre.

CLARKSVILLE GRAVELLY LOAM.

The Clarksville gravelly loam to a depth of 8 to 12 inches is a light-gray loam to silt loam, carrying an appreciable quantity of cherty material, underlain by pale yellow to yellowish-red or reddish-yellow silty clay loam or clay loam, with a noticeable content of cherty material. In fact, the content of rock fragments may be so high that a boring below 1 or 2 feet is impossible. The cherty fragments vary in size from small angular gravel to large cobbles. The underlying bedrock lies at considerable depth, the soil profile to a depth of several feet, as seen in road cuts, always showing practically the same admixture of fine earth and rock fragments.

This type is not extensively developed in the area, being found only in a few areas that mark the most southern occurrence of the

valley limestone. The parent rock probably belongs to the Trenton group. The type occurs on the slopes of some of the hills and ridges in the eastern part of the county near Tannehill. Very little of it is under cultivation on account of its unfavorable topography. Where the rock content is not too high the soil is inherently very desirable for cotton, corn, small grain, Irish potatoes, and vegetables. Fruit would do well on the ridges or situations having good air drainage. Strawberries and cantaloupes are grown with marked success on this soil as developed in other sections, particularly in Tennessee.

The productiveness of the Clarksville gravelly loam would be greatly increased by the addition of organic matter, which would tend to increase its water-holding capacity and otherwise improve its physical condition. Some commercial fertilizer will be needed. Mixtures of cottonseed meal, kainit, and phosphoric acid are suitable for most crops adapted to this type.

Land of this type of soil commands a very low price, which in addition to its small area makes it of very little importance in this area.

HUNTINGTON FINE SANDY LOAM.

The Huntington fine sandy loam consists of a very light-brown to grayish-brown fine sandy loam, underlain at an average depth of 10 inches by a light-brown loam grading rapidly into a darker brown loam to silty clay loam which extends to a depth of 36 inches or more. In slight depressions and along contacts with the silt-loam type the proportion of silt in this type increases. The subsoil in these cases is quite silty and has a slightly reddish cast. As is the case with most alluvial soils, the type is subject to minor variations. In general the texture may range from a mellow fine sandy loam to a loamy sand. Areas occur where the light loamy sand had a depth of 12 to 18 inches and rested upon a material identical with that forming the silt loam of the series. These probably represent the deposition of sandy material by some recent overflow. These several variations are of uncertain duration, as any succeeding overflow may remove the loose sandy material to other positions, a condition appreciated by farmers.

By reason of its light texture and open structure, the soil can be handled under a much wider range of moisture conditions than the silt loam type.

The Huntington fine sandy loam is found in limited areas along the Black Warrior River, usually near the stream channel, where it represents the heavier particles washed from the upper valley basin, transported by the river, and deposited as soon as the river channel is overflowed and the velocity of current is checked. The type has

not been developed over much of the bottoms, being confined to a few small areas at intervals along the stream. The larger proportion of material transported by the stream consists of silt and clay. The type is also found along the edges of some of the crescent-shaped lakes situated near the present stream channel, its origin and manner of formation being unquestionably similar to that described above. The lakes represent cut-off sections of an older river channel. In this latter position the type takes on some of the characteristics of the Cahaba series. The process of oxidation during the long time since the areas have been subjected to inundation has resulted in giving the soil a slightly reddish coloring, although it quite distinctly belongs to the Huntington series.

The topographic features of the Huntington fine sandy loam vary from level to undulating or slightly ridgy, and as the areas lie near the stream channels drainage conditions are usually well established. The soil is a very desirable bottom-land type. Little difficulty is experienced in handling it, and it responds readily to fertilization.

The type is largely devoted to cotton, which gives satisfactory yields, averaging about one-half bale to the acre. Corn yields from 20 to 40 bushels per acre. Fertilizers are seldom applied. The light character of the material makes it a suitable soil for growing watermelons, cantaloupes, peanuts, sweet corn, sugar cane, and vegetables. A superior quality of sirup is produced from the cane grown on this soil. The organic matter content appears to be low and fertility should be maintained by applications of stable manure or plowing under green cover crops. The more easily overflowed areas usually receive a dressing of alluvium that tends to maintain their productiveness.

The type is of little importance in the agriculture of the county by reason of its small extent.

HUNTINGTON SILT LOAM.

The Huntington silt loam to a depth of about 12 inches consists of dark-brown to light chocolate-brown silt loam, gradually passing into a slightly lighter brown, heavy silt loam that extends to a depth of many feet. This soil is a first-bottom soil. It does not include, however, all of the overflow land, for the high-water marks of the river show an inundation of vast acreage over several higher and distinct terraces.

In some instances no distinct terrace line is present and the line of separation between this type and the Cahaba soils is necessarily more or less arbitrary. For this reason the character of the [illegible] is not uniform, sufficient latitude for [illegible]

of the type have a slightly lighter colored surface material with a depth of 8 to 12 inches, which is underlain by a distinctly lighter colored subsoil than is typical, often resembling that of phases of the Cahaba silt loam. Likewise there is usually a variation in the type in the lowest depressions, or slough bottoms, and other areas subject to more frequent and lengthy overflows. This phase presents a soil material of a darker color and slightly heavier than is typical, possibly approaching a silty clay loam, and in many instances showing little, if any, difference to a depth of many feet. Again, where water stands for long periods on account of slow drainage, the subsoil below 6 to 12 inches may be mottled with gray and brown or yellow and brown colors. Such areas, however, are very limited in extent, being found along the boundary between the type and soils of the Bibb series or the Swamp. After flooding the heavier phases of the type on drying crack to a depth of 1 or 2 inches. The more frequent the overflow the darker the color of the soil and the more uniform the soil and subsoil.

Along the smaller streams of the shale-sandstone region in the northeastern part of the area usually appear narrow marginal strips of reworked material belonging to this type. The surface soil is a brown to yellowish-brown silt loam to a depth of about 6 inches, often containing a small percentage of shale fragments. The subsoil is a yellowish to reddish-brown silty clay loam to silty clay. Here the type results from the admixture of colluvial and alluvial material. The area of this phase mapped is not extensive. Many of the small streams have narrow bottoms composed of this soil that could not be shown on the map without exaggeration.

Cultivation of the Huntington silt loam is sometimes difficult. Late spring rains and overflows may delay the preparation of the land or the planting of cotton and corn until late, or the planting may be done in due season and cultivation impeded, with much damage to the young plants. Occasionally crops are destroyed by overflows. When in favorable condition the soil can readily be put in good tilth. When plowed too wet the land is inclined to bake and when plowed too dry it breaks into clods, which are afterwards a source of annoyance in cultivation, though they can be more or less easily broken down by harrowing.

The Huntington silt loam is found mainly in the first bottoms or overflow land of the Black Warrior River. There is little or no overflow land along this river in the Appalachian region of the county. At Holt the stream enters the rolling country of the Coastal Plain and the valley widens. Below Tuscaloosa there are numerous terraces varying from 4 to 7 miles in width and reaching a maximum at Saunders Ferry. The course of the river through this

broad valley is marked by frequent ox-bow bends and many old sloughs and narrow, crescent-shaped lakes, the latter sections of abandoned channels. The most extensive and uniform developments of the Huntington silt loam are included in the river bends and as marginal strips in the lower lying areas next to the stream.

The topography varies from flat or undulating to hummocky, and drainage under normal conditions is good. An adequate slope either to the river channel direct or to the narrow depressions and old sloughs afford satisfactory drainage without ditching or tiling. Some of the lower depressions would be helped by artificial drainage.

The soil is entirely alluvial and represents a fine-textured material washed from the slopes along the river basin and deposited from slowly moving to still waters during seasons of overflow. The material is largely from Paleozoic shales and sandstones, with some from crystalline limestone. There is, of course, a small quantity of Coastal Plain material included.

The Huntington silt loam is considered the strongest of the alluvial soils, being especially productive in growing corn, cotton, sugar cane, and grasses. Corn is the principal crop, and under favorable conditions yields from 30 to 75 bushels, with maximum yields of more than 90 bushels per acre. Probably 40 to 50 bushels is a fair average. No fertilizers are used. Cotton yields from one-half to three-fourths bale to the acre. The plant is inclined to run to stalk and a late crop often fails to mature the top bolls. It may prove profitable to top the crop on these strong soils and to give more room between the rows and the plants in the row. Confining the crop to the better drained areas will also insure better results. Applications of acid phosphate will hasten maturity. Sugar cane thrives on this moist soil, from 350 to 400 gallons of sirup being ordinarily secured per acre. Oats do well, though very few farmers grow that crop, preferring to seed it on the uplands, the late spring season making this crop uncertain. The nature and character of the soil would indicate the possibility of growing alfalfa on areas adequately drained and above damaging overflow. The crop will not survive any excessive flooding.

In the preparation of this soil for planting it is the general custom to run a scooter plow 4 to 5 inches deep, bedding the ground without previous plowing. Better results will follow if the fields be broken broadcast 10 inches deep in the early spring, just as soon as the moisture condition will permit, and then bedded for cotton or corn later. Most of the type in the lower areas demands ridge culture to improve the drainage.

Yearly additions of alluvium tend to maintain the [illegible] of this soil. No fertilizers are used and [illegible]

attempted. On account of the danger from overflow it is unwise to seed this type during other than the summer season, except over the less frequently flooded areas.

The native timber growth consists of cypress, gum, poplar, maple, and beech, with a scattering of swamp pine. A large proportion of the type is under cultivation. Along the edges of the river channel and old sloughs the wild cane grows profusely.

The type is valued at $40 to $75 an acre and usually commands a yearly rental of $7 an acre.

OCKLOCKNEE FINE SANDY LOAM.

The Ocklocknee fine sandy loam embraces a broad textural classification of bottom-land material along the smaller streams of the Coastal Plain section of the county. By reason of its position and origin many modifying influences occur, and the type shows many variations. A characteristic phase, however, consists of a grayish fine sandy loam 6 to 10 inches deep, grading into a darker gray or light-brown loam to heavy fine sandy loam 15 to 20 inches in depth. Beneath this occurs a yellowish to slightly brownish loam, which quickly passes into a rather plastic fine sandy clay of the same color, slightly mottled at lower depths. Mottling is most pronounced in the subsoil of low-lying areas and depressions. In a few instances only do any two soil profiles show the same characteristics, though the sand content is largely of the finer grades at all times. Areas carrying appreciable quantities of medium and coarse material lies near the stream channels, where they represent the first deposit from overflow waters, or along the outer margins of the stream valleys, where colluvial wash from adjacent sandy uplands has accumulated. The color of the surface material is likewise variable, being determined in a great measure by the character of the original material. It is as a rule of a grayish hue, though a large percentage of wash from the red Greenville or Orangeburg soil will give a red tinge to the alluvial type. The color of the subsoil is largely determined by conditions of drainage. Decayed vegetable matter is also a factor influencing color, and as a rule the frequently overflowed areas have a darker gray or brown appearance than those flooded at rarer intervals.

This type is an alluvial soil, derived from Coastal Plain materials. Most of this has been reworked by the streams and deposited in their flood plains, but a part, particularly along the outer edges of the areas, is a direct wash from the adjacent slopes. The soil usually forms narrow strips along the smaller stream channels of the Coastal Plain country, seldom exceeding one-fourth mile in width. Most of its area is subject to overflow. The bottom lands along Big Sandy,

South Sandy, and Bear Creeks were mapped as of this type, although there were many notable variations such as outlined above.

The Ocklocknee fine sandy loam has a fairly high agricultural value, especially where adequately drained. It is moderately productive, easy to cultivate, and responds readily to good cultural methods. Extremes, either of rainfall or drought, do not materially damage the crops.

Cotton and corn are the principal crops grown, with small patches of sugar cane, oats, grass, and melons. The type is more generally adapted to corn than to cotton, though both crops are planted. With small applications of commercial fertilizers corn yields from 15 to 35 bushels and cotton from one-third to one-half bale to the acre. The native grasses give substantial hay crops and excellent pasturage.

Little attention is given to improving this soil. Yearly deposits of alluvial material tend to maintain its productiveness, and but for these the type would soon become of low value with prevailing cultural methods. Rotations including leguminous crops to be plowed under and a thorough system of drainage would wonderfully improve the land for the production of the staple crops. Sugar cane thrives and the yield of sirup is high and of good quality. The type intrinsically is a very desirable soil for general farming. It now commands prices ranging from about $20 to $25 an acre.

BIBB SILT LOAM.

The Bibb silt loam consists of 6 to 10 inches of a very light gray to whitish silt loam, loose and floury when dry and slightly plastic and coherent when moist, underlain by a light-gray silty clay loam, slightly mottled with yellow and brown in the lower depths. The surface inch or two of the uncultivated areas has a very dark color, due to included vegetable matter. When wet the soil is inclined to run together and has the consistency of paint. The subsoil shows slight variations in structure, with occasional evidences of iron stains and black iron concretions. It is very plastic when wet, the stickiness varying with the clay content, and bakes hard when dry.

By reason of diverse local conditions of drainage, many variations appear in both the soil and subsoil. The slightly elevated areas usually have a larger content of fine and very fine sand and the subsoil more mottling of yellow and brown. Flanking the stream channels, where drainage may be better established, the content of sand is also slightly higher. In these areas the color is more pronounced and the soil more friable. In zones of transition to other types variations that approach the characteristics of the respective types

of water through the soil, cultivation is difficult. When plowed very dry the soil either breaks into clods or falls into a pulverulent dust, and when plowed very wet it is inclined to run together and bake, forming a continuous surface crust. In addition to the necessity of ditching to lower the water table, plowing must be done in a way to facilitate the removal of surface water. The system of breaking in narrow lands with deep water furrows is advisable.

Artificial drainage is essential for this type, but is hardly practicable in case of the more extensive areas where it represents a later stage of Swamp. The most extensive developments of the type are found along the Sipsey River and its tributaries, where it is locally called Swamp. Smaller areas are also found along the minor tributaries of the Black Warrior River and in poorly drained depressions in the first and second bottoms. It develops wherever any silty alluvial material having very poor drainage is found.

The type is derived from alluvial material subjected to long periods of saturation. The soil particles seem to possess a peculiar arrangement opposed to flocculation or granulation, and the type on the whole is a rather undesirable soil for farming.

Under present conditions the chief value of the Bibb silt loam lies in its forests, consisting mainly of oak, swamp pine, beech, poplar, birch, and cypress. A scant undergrowth affords poor pasturage. Some of the more accessible areas have been drained by open ditches and cultivated with poor to fair results. The addition of organic matter improves the structure of this soil and tends to increase its productiveness. The small grains and grasses are the crops most likely to succeed.

The successful handling of this soil will require thorough drainage. The water table should be kept at a depth of several feet, so that aeration of both soil and subsoil may take place. In view of the abundance of more available idle lands, however, and the cost of reclaiming this type of soil, not much of it will be brought into cultivation for some time. To reduce the valley lands along the Sipsey River to a condition of cultivation it will be necessary to straighten and deepen the river channel and to cut canals through the Swamp. The stream follows a meandering course and has a very shallow channel, and a few feet rise in the water level is sufficient to flood large areas.

The Bibb silt loam, even with good drainage, has not proved very productive for cultivated crops. It could be utilized more advantageously in the production of hay and pasturage. Carpet grass (*Paspalum compressum*), water grass (*Paspalum dilatatum*), and lespedeza are adapted to this soil and should be utilized much more extensively for grazing than they are at present. Lespedeza may be

cut for hay, and water grass, also, if cut before the tall, woody stem is too old.

The Bibb silt loam, because of its poorly drained condition and low agricultural value, may be purchased for a nominal price, except where valuable timber trees are found.

BIBB FINE SANDY LOAM.

The Bibb fine sandy loam consists of 6 to 9 inches of light-gray fine sandy loam, underlain by a whitish clay loam to clay, mottled with yellow and brown in the lower portions. A few small areas approach a loam in texture. The surface of the uncultivated areas is occasionally very dark, owing to a covering of organic matter, but there is little or no organic material in the underlying soil. There is considerable silt in the soil and in small depressions the content of this grade is invariably high. Such areas are too small to indicate on the map and for this reason were not mapped as a separate type.

The type is more easily tilled than the silt loam member of the series. Like the silt loam type, the question of drainage is of paramount importance, and the reclamation of the areas at this time is of doubtful economy.

The soil material is of alluvial origin, the type being found over the poorly drained areas along the smaller streams. It is confined to a few small areas, and its effect on the agricultural conditions of the county is negligible. It is well adapted to the production of lespedeza, carpet grass, and water grass.

KALMIA FINE SANDY LOAM.

The soil of the Kalmia fine sandy loam has a depth of 5 to 8 inches and consists of a pale yellow to light-gray fine sandy loam. The subsoil to a depth of 24 inches is a pale yellow fine sandy clay, where a mottle gray and yellow material is encountered. This extends to a depth of 36 inches or more, the mottling becoming more pronounced at lower depths. The subsoil is plastic and sticky when wet, though it is quite friable under normal conditions. The sand content varies in quantity sufficiently to give a light fine sandy loam in some areas and a heavy fine sandy loam in others. The silt content is appreciable in both soil and subsoil and is greater in the lower lying areas than elsewhere. The timbered sections usually support a rather profuse growth of underbrush, the surface few inches being darker colored by reason of an abundance of decayed organic matter.

This soil occupies a position between the light-colored Bibb soils and the brown Cahaba soils and grades slowly into these, making the placing of boundaries more or less arbitrary. Some of the flat and poorly drained areas have a very light surface appearance and a

pronounced gray mottling in the subsoil, varied by a yellowish tinge or a yellowish mottling. The better drained areas usually have a gray surface soil, underlain by a plastic yellow subsoil. The mottled subsoil is, however, predominant.

The soil is somewhat compact, but under favorable conditions is tilled and put in good, mellow tilth. The surface is flat to slightly undulating, and drainage is usually inadequate, particularly in the flat areas. The pale yellow and mottled appearance of both the soil and subsoil is indicative of a sluggish drainage, and the agricultural value of the land is generally low because of this fact. A fair to good growth of native grasses is found, and the type is largely utilized for pasture. Before the type can be used generally for farming it will be necessary to lower the water table by means of ditching. The soil permits a fairly free movement of soil water, and the system of ditches will not need to be extensive.

The Kalmia fine sandy loam is found over the terraces of the Black Warrior River, its origin being similar to the other terrace soils. It is not so poorly drained as the Bibb soils nor so well drained as the soil of the Cahaba series. It is confined largely to the second bottoms and higher terraces.

The larger proportion of the type is not under cultivation and supports a forest growth consisting chiefly of water oak, elm, sycamore, gum, birch, dogwood, and pine. With good drainage conditions corn, oats, sugar cane, cotton, and forage crops do well. Commercial fertilizers in moderate applications are necessary for good yields.

KALMIA SILT LOAM.

The Kalmia silt loam consists of 6 inches of light-gray to dark-gray silty loam, underlain by yellow, mottled brown, or gray and yellow silty clay. There is usually more fine sand in the areas occupying the higher and better drained positions than in the typical soil.

The type has a number of distinct phases. The surface being generally low and flat, drainage is largely deficient, and varying conditions have caused marked differences in the color of the soil and subsoil. Areas that are very wet for a large part of the year are lighter colored and the subsoil is more mottled with gray and pale yellow. Where moisture conditions have been better and weathering more effective a yellow color may prevail to 30 inches, though seldom exceeding that depth. A rather high humus content in the first few inches of soil in a large portion of the type gives a dark-gray to brownish surface and a slightly brownish subsoil. On the higher crests this brownish tinge is more pronounced, and the color approaches that of the Cahaba silt loam. At the other extreme are the poorly drained areas that possess characteristics approaching the Bibb silt loam.

The forest on this type consists chiefly of water oak, gum, birch, beech, pine, and cypress. The areas along the Sipsey River and some of those in the Black Warrior Valley are so situated that the question of drainage presents many difficulties. The Sipsey River is a sluggish stream meandering through a flat valley within a narrow channel but a few feet below the land level, and the draining of the contiguous areas by ordinary means is impracticable. The river channel will have to be straightened to accelerate the flow and to provide an outlet for the drainage waters from canals and ditches.

The Kalmia silt loam is of alluvial origin and represents terrace deposits of silts, sands, and clays modified by poor conditions of poor drainage. Owing to the difficulty of drainage very little of the type is under cultivation, and owing to its small area it is of little importance. A good growth of grasses affords some pasturage. With thorough drainage oats, corn, and forage crops would give good results.

CAHABA FINE SANDY LOAM. Cs

The Cahaba fine sandy loam varies from a light to a heavy gray to brownish fine sandy loam, 6 to 10 inches deep, underlain by 2 feet or more of reddish-yellow to yellowish-red or dull-red silty loam to silty clay loam of friable structure. The line of demarcation between soil and subsoil is fairly well defined. There appears to be very little clay in the surface material, the finer particles being largely fine sand and silt.

A number of phases occur. The lower lying areas, as well as those of a rather level topography, usually have a surface material lighter colored than the typical soil, 6 to 8 inches deep, underlain by a yellowish silty loam to silty clay loam to a depth of 12 to 15 inches, when the material passes into a rather plastic fine sandy clay of a decidedly yellowish color. Below 30 inches the subsoil may become lighter in texture and have a yellow color, mottled with brown and gray. This phase is very closely allied to the Kalmia fine sandy loam, representing the extreme variation in that direction. On the higher elevations of the better drained terraces the color of the surface soil is more pronounced. Areas on the older and higher terraces where better conditions of drainage exist have more red and brown coloring in the subsoil. As a rule the lighter textures are found on the higher slopes of the very gentle swells. The color of the surface soil here varies from a pale-yellow to reddish-brown, and the subsoil from a decided yellowish-red to reddish-brown. The more intense coloring indicates more complete oxidation.

The type as a rule is very friable, rarely becomes compact, is easily tilled, and may be put in good tilth under a rather wide range of moisture conditions. It is a very desirable bottom-land type.

The Cahaba fine sandy loam is found over the older terraces of the Black Warrior and Sipsey Rivers, where it occurs as irregularly shaped areas of varying size. The surface ranges from level to undulating, and drainage is usually well established. In addition to good surface drainage the structure of the material, allowing ready internal movement of soil moisture, aids materially in securing the proper moisture conditions. A few low-lying areas are deficient in natural drainage, but these may be improved by means of open ditches.

The type is of alluvial origin and represents material deposited by rivers when they flowed at higher levels. The areas immediately bordering the upland escarpment unquestionably include some material washed from the surrounding slopes.

Most of this type is under cultivation, almost exclusively in the production of cotton and corn. As in all light, sandy soils, the yields depend in a great measure upon maintaining an adequate supply of vegetable matter in the soil, and the custom of growing clean-culture crops year after year has caused a deterioration of the fields. Organic matter is essential, and in the absence of sufficient quantities of barnyard manure the plowing under of green cover crops, preferably cowpeas, bur clover, or vetch, is recommended. Commercial fertilizers are used with fair to good results. The application is usually light, about 200 pounds to the acre. Heavier applications of better grades would likely prove profitable. Cotton yields an average of one-half bale and corn from 15 to 40 bushels to the acre. These yields should easily be doubled. In addition to cotton and corn, hay, oats, cowpeas, rye, sugar cane, peanuts, sweet and Irish potatoes, cabbage, onions, melons, cantaloupes, and certain fruits may be grown.

Systematic crop rotation, with frequent crops of the legumes to be plowed under, the judicious use of commercial fertilizers, and adequate cultivation would bring this soil to a high state of productiveness.

The timber growth over the type, which has been largely removed, is chiefly shortleaf pine, oak, hickory, and elm.

CAHABA SANDY LOAM.

The Cahaba sandy loam consists of a grayish to slightly reddish brown light sandy loam 8 to 12 inches deep, underlain by a reddish-brown heavy sandy loam, becoming lighter in color and heavier in texture with depth and grading in the lower part into sandy clay in the lower portions. The sand content ranges from coarse to fine, with the medium grade predominating. A small percentage of minute mica flakes is characteristic of the type.

This soil is very easily handled under a rather wide range of moisture conditions by reason of its loose, open structure and a well-established natural drainage. It has a good friable tilth and may be quickly built up. Its area is very small, and its importance in the agriculture of the county is slight.

The Cahaba sandy loam is found only upon the gentle swells or ridges of the higher terraces along the Black Warrior River. A gentle surface relief, aided by an open structure, provides good drainage and renders the soil warm.

The Cahaba sandy loam is of ancient alluvial origin. It is the lightest of the terrace soils. It is subject to overflow only in time of abnormally high water. It is probably the oldest of the Black Warrior River deposits.

This soil is entirely under cultivation and gives fair to good yields of cotton. No doubt it was among the first of the bottom-land soils to be cleared for tillage by the early settlers. It is easily handled and appears to be inherently productive in its virgin state. Under the present system of growing cotton year after year without any regard to improvement the yields have declined to an average of one-fourth to one-half bale to the acre. Corn does fairly well, the crop being better adapted to the heavier bottom-land types. Cowpeas, medium early truck, peanuts, sugar cane, berries, and small fruits do well.

The Cahaba sandy loam responds readily to fertilization and more attention to this matter would result in increased crop returns. A rotation, including leguminous crops to be plowed under, frequent shallow cultivation of the clean-culture crops during the summer months, and a dressing of nitrate of soda when the crop is laid by would prove markedly beneficial. The soil requires organic matter. Stable manure, if available, would unquestionably meet this need more fully than green-manuring crops, but in the absence of sufficient quantities of the former cowpeas or crops of this kind must be resorted to. Peanuts should be planted more extensively, both as a forage crop and as a means of upbuilding the soil. This crop is especially valuable as pasturage for hogs. Sugar cane does not produce as much sirup to the acre as on some of the heavier bottom soils, but the quality is superior. Melons and cantaloupes do well. While this sandy soil requires continual attention to maintain its productiveness, it is a very desirable type for a diversified system of general farming. Land values range from $15 to $30 an acre.

CAHABA SILT LOAM.

The Cahaba silt loam consists of a pale yellowish to slightly reddish-yellow silt loam to silty clay loam, gradually passing into a reddish-yellow or reddish-brown silty clay, extending to a depth of 3 feet or more. The surface material in the lighter phases of the

type may contain an appreciable quantity of the finer grades of sand, while the heavier phases carry enough clay to approximate a silty clay loam in texture. Except for this textural range the surface soil is generally uniform, but conditions of drainage vary so much in the wide distribution of the type as to produce pronounced differences in the material underlying the soil. The better drained areas invariably have a brown to reddish-brown color, the less adequately drained areas a yellowish color, and the poorly drained areas are conspicuously mottled with gray and are streaked with dark iron stains. The latter phase really represents a development of the Kalmia silt loam too small to map. The line of separation between the Cahaba and the Kalmia series of soils is nowhere very distinct, and as mapped either series is likely to include small areas of the other. Even where drainage is fairly well established brown iron stains are often present.

In uncultivated areas the soil is exceedingly compact, this condition being induced by a lack of vegetable matter and the fine texture of the material. The type is, however, rather friable and under favorable moisture conditions breaks into good tilth. When plowed under unfavorable moisture conditions clods are formed which are troublesome in later cultivation. The soil is a very desirable bottom-land type for general farming, very little of it being subject to overflow, while the surface allows the use of labor-saving machinery.

The Cahaba silt loam is found on the second and third terraces of the Black Warrior River. The system of terraces along the river is often 6 or 7 miles wide, and the type may occur in almost any position, though more extensively near the stream, where the deposits are comparatively recent. In many instances it is difficult to establish the boundaries between it and the Huntington silt loam.

The type owes its origin to early stream action. It has been formed of material deposited during seasons of extensive overflow, when the stream level was considerably higher than it is to-day. Some areas, however, contain a proportion of more recent deposits. The original character of the material is probably quite similar, in mineralogical composition at least, to that deposited by the streams to-day and classified as the Huntington silt loam. Only a part of the type is regularly subject to overflow, and the long period of time since its elevation, with better drainage conditions and a more thorough weathering, has resulted in the present conditions of color and structure.

Fairly adequate natural drainage is afforded by the elevation of the areas, although the surface is comparatively flat, ranging from level to slightly undulating. Some of the flatter or slightly depressed areas require open ditches to carry off excess moisture.

The native timber growth consists of water oak, white oak, ash, maple, swamp pine, beech, and hickory, though little of the original growth remains. Along the lower stream channels and old sloughs

there is usually a rather luxuriant growth of cane, which is utilized as pasturage during the late fall and winter months.

The larger proportion of the Cahaba silt loam is now under cultivation, much of it having been farmed for many years. The soil is naturally productive, as is shown where the cultivation of cotton has been continuous for a number of years with average high yields.

In late years the moderate use of commercial fertilizers and cottonseed meal has become quite general, and the average yields of cotton are, no doubt, maintained in a great measure in this way. A top dressing of nitrate of soda just prior to the fruiting of the plants has been found to increase the yields. The ordinary yield is from two-fifths to one-half bale to the acre. No attempt is made to rotate crops or to maintain the productiveness of the fields by green manuring. The incorporation of an abundance of vegetable matter, plowing it down well, would markedly improve the physical condition of the soil, and commercial fertilizers would then be much more effective. Corn gives fairly good yields, ranging from 20 to 40 bushels per acre, though the crop is more generally planted on the Huntington silt loam than upon this type. Oats do well, but are usually grown in very small patches and fed to stock in the sheaf. Sugar cane gives a high yield of sirup, though the quality is inferior to that made from cane grown on the lighter sandy soils. Grasses, small grain, berries, and potatoes, and other truck crops do well. Japan clover and a variety of native grasses and herbaceous plants usually spring up where areas of the type are thrown out of cultivation. These afford excellent pasturage. A number of pecan groves are located on this type of soil. While the trees seem to make a very hardy growth, so little attention is given them that the production of nuts does not reach any considerable proportions, and the nuts are of inferior quality.

The better-drained areas of the Cahaba silt loam may perhaps be used for growing alfalfa. Much care is necessary in preparing the seed bed and in freeing the land from weeds. The addition of 2,000 to 3,000 pounds of lime to the acre is advisable, as is also the inoculation of the soil either by applying soil from an old alfalfa field, by sowing seed treated with a culture solution, or by seeding the land to Melilotus prior to seeding to alfalfa. A dressing of well-rotted stable manure well worked in would tend to insure a catch. The surface drainage and underdrainage of land devoted to alfalfa should be thorough, and it should not be subject to inundation.[1]

The cultivation of this soil is attended with some difficulty on account of its close structure, but with care an excellent tilth may be secured. Deep plowing and the addition of organic matter tend to improve the physical condition and facilitate tillage. Frequent shallow cultivations are necessary to assist the growing crops to with-

[1] See Farmers' Bulletin No. 339, Alfalfa.

stand droughts. The type is a very valuable soil and highly productive under adequate management. There should be little trouble in doubling the present yields of cotton, corn, and oats, especially where cowpeas, velvet beans, bur clover, and vetch are grown in rotation with these crops.

CAHABA LOAM.

The Cahaba loam consists of 5 to 9 inches of a yellowish-gray to brownish-gray loam to silty loam, underlain by a reddish-yellow to yellowish-brown silty clay. The sand content is of the finer grades and the percentage of silt is at all times appreciable. In the slight depressions enough silt is present to give the soil the structure of a light silt loam. The higher swells are occupied by the more sandy phases of the type. There is always a gradual transition from one type of this series to another, and small areas have not been separated from surrounding areas of different texture. Areas are also mapped with the Kalmia soils.

The two series are closely related, being differentiated merely on a basis of difference in underdrainage and consequent subsoil weathering, or, in other words, the intensity of reddish color in the subsoil. There is no definite line of separation. The low-lying or flat areas of the Cahaba loam almost invariably show a gray mottling in the lower subsoil, which is a characteristic of the Kalmia series, although the coloring of the upper subsoil is more intense than in the Kalmia. The Cahaba loam is moderately friable and easily tilled. Under favorable moisture conditions it works into an excellent tilth. Clods may form if the land is plowed when too wet or too dry, but the clods are easily broken down in harrowing.

Areas of the Cahaba loam are found in the second bottoms of the Black Warrior River and in high first bottoms where no distinct terrace is present. The general topography is level to undulating and drainage conditions are usually good. Local areas exist in which water collects, but with few exceptions these can be drained by ditching. The character of the soil material is unfavorable to the internal movement of moisture.

The Cahaba loam is an alluvial soil, composed of deposits of sand, clay, and silt from the overflow waters of the Black Warrior River. The manner of formation is similar to that of the silt loam and fine sandy loam of the series. A small proportion of the type is still subject to overflow during exceptionally high water, which tends to maintain its productiveness.

The larger proportion of the type is under cultivation. The methods of cropping are similar to those stated in the discussion of other types of the series. The yields are very satisfactory, averaging one-half bale of cotton and from 25 to 45 bushels of corn to the acre. Commercial fertilizers are used in moderate quantities, being drilled in at planting time in the seed furrow. Some attention is given to growing oats and sugar cane. Both crops do well, the latter producing from 250 to 300 gallons of superior sirup to the acre. No effort is made to build up this soil, although it can readily be brought into a more productive condition. Most of the type lies above usual overflow, and should be one of the most desirable and productive of the bottom-land types. It is adapted to a wide range of crops. With good drainage, deep plowing, crop rotation, the addition of vegetable matter, and frequent shallow cultivation to assist in tiding the crops through periods of drought, this soil would become much more valuable than it is at present. It is capable of producing more than double the present yields.

Practically all the better-drained areas are under cultivation, the forested portions supporting a growth of pine, oak, hickory, and gum. The areas thrown out of cultivation for a few years support a good growth of native grasses and furnish excellent pasturage.

Cahaba loam, red phase.—The Cahaba loam, red phase, occurs chiefly west of Tuscaloosa. It is found in a few small areas in higher, better drained parts of the terraces lying below the level of the plain upon which the city is situated. A more pronounced reddish color of both soil and subsoil was the basis of differentiating the areas included under this head from the typical Cahaba loam. Undoubtedly the deeper red color is the result of the better drainage and consequent more complete oxidation of the iron constituents of the soil.

The red phase of the Cahaba loam consists of a reddish-brown to brownish-red loam 6 to 9 inches deep, grading into a brownish-red to red friable sandy clay to silty clay. In places the subsoil color changes to a yellowish brown or reddish yellow. The surface material occasionally varies to a heavy fine sandy loam, with the sand content largely of the finer grades, though usually containing an appreciable quantity of silt. Two small areas lying south of Tuscaloosa along the outer edge of the Black Warrior River terraces, that is, the terraces below the Tuscaloosa plain, have a grayish-brown to reddish-brown color of the surface soil and a dull reddish brown to brownish-yellow color of the subsoil.

This soil is nearly level to undulating, with very gentle slopes to the lower soils. No severe washing is likely owing to the gentle surface relief and the ready absorption of rainfall by the granular, friable soil and subsoil.

The type is well adapted to a wide range of crops. Cotton and corn are the principal crops. Sorghum, oats, cowpeas, melons, and vegetables are grown in limited quantities with good results.

Deep plowing, the addition of barnyard manure, and the plowing under of green manuring crops to increase the humus content, rotation of crops, and frequent shallow cultivation are recommended for improving the soil.

This phase is of rather small extent, but it is an excellent soil, responding to good treatment. It is worth from $50 to $75 an acre.

The following table gives the average results of mechanical analyses of samples of the soil and subsoil of the red phase of the Cahaba loam:

Mechanical analyses of Cahaba loam, red phase.

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.*
413455, 413457.....	Soil.....	0.0	2.5	5.9	18.5	12.1	46.0	14.6
413456, 413458.....	Subsoil.....	.0	1.6	4.1	13.3	10.2	43.5	27.1

GREENVILLE LOAM.

The Greenville loam consists of 4 to 9 inches of a dark-brown to reddish-brown loam, underlain by a dark-red, friable sandy clay, extending to a depth of 36 inches or more. The sand is usually of the medium and fine grades and the content is occasionally large enough to give a light character to the soil, particularly on the slightly elevated knolls and ridges. A part of the silt and clay originally present in the rolling areas has been washed to lower lying and more level areas, making them a silty phase of the type. The soil material of this phase has a more decided brownish color when dry and the subsoil normally has a more plastic nature and less brilliant coloring. The depth of surface material is variable. On the gentle slopes local spots of red clay loam may appear, apparently due to exposures of the red sandy clay subsoil by erosion and a slight mixing of the surface material therewith. The higher level areas are the more typical of the type, where the soil averages about 8 inches in depth and is underlain by a reddish-brown clay loam, gradually passing into a heavier and more plastic material until a rather heavy red sandy clay is encountered at lower depths. Iron concretions are often present in the soil, and occasionally a sprinkling of well-rounded quartz pebbles. When plowed under the proper moisture conditions, an excellent tilth results. The soil is inclined to stickiness when wet and should not be tilled at such times.

The largest development of the Greenville loam is in the vicinity of Tuscaloosa, where the surface features are those of a flat to undulating elevated plain, and in the vicinity of Goethite, in the extreme northeastern part of the county. Smaller areas occur in the more

level areas of the Lafayette formation. In every instance the topography is level to gently rolling, and though drainage is well established no serious erosion takes places. In addition to the gentle slope favoring the quiet run-off of surface water the type has a structure conducive to ready percolation of excess moisture. It is usually underlain at a depth varying from 4 to 15 feet by a gravel bed.

The origin of the Greenville loam is rather confused. Found largely in the Black Warrior River valley and often, as is the case at Tuscaloosa, lying immediately along the stream channel at an elevation of 100 to 150 feet above low water and at an appreciably lower level than the surrounding uplands, it has the appearance of an ancient river terrace. It is also found in a few small areas occupying the same position in respect to North River. The areas mapped in the northeastern high-rolling part of the county are quite distinctly of Lafayette origin. Beds or strata of brown, yellow, and gray sands and gravel from 2 to 8 feet thick underlie the surface mantle of red loam and red sandy clay, which is itself from 4 to 15 feet in thickness. Usually the gravel immediately underlies the surface stratum. The former on being exposed on the stream slopes gives an admixture of gravel with sand and clay and was classified as a gravelly loam type of the Orangeburg series. The material on the flatlands about Tuscaloosa is identical or essentially similar to that developed in the rolling country of the northeastern part of the county. The Lafayette formation, so clearly defined in cuts and washes, is underlain by the Tuscaloosa, consisting chiefly of sands and clays, and no doubt several of the strata of gray, yellow, and brown sands beneath the beds of gravel may belong to this latter formation. As a Lafayette deposit the material of the Greenville loam should represent the remains of a mantle originally laid down over an uneven country, much of which has been removed from the more rolling uplands. Possibly the clearly defined position of the main portion of the type occurring in the valley of the principal drainage line of the county places its time of deposition at the close of Lafayette time, when the inundation had receded to the broad depression.[1]

Remains of distinct Greenville material are found even over some of the higher hills of the upland country. The presence of gravel beds in place in sections of distinct uplands leads to the presumption that the Lafayette formation was extensive. Such instances are clearly seen in cuts along the Alabama Great Southern Railroad east of Cottondale and still farther east of Coaling. The origin of this soil is discussed at some length in the chapter on soils.

[1] See Geology of the Coastal Plain of Alabama, by Dr. Eugene A. Smith, pp. 70–71 and 80–81.

The Greenville loam is essentially an upland type, its weathering having proceeded to an advanced stage. The terracelike phase around Tuscaloosa was undoubtedly influenced by running water, although this is not a detail of great importance.

The Greenville loam is the strongest and most desirable of the upland soils of the county. It is an excellent soil for cotton and corn and is adapted to a wide range of crops. Cotton averages one-half bale to the acre without fertilizers and three-fourths bale with liberal applications and an adequate system of cultivation. Corn will yield from 75 to 100 bushels to the acre under similar treatment, while the average now is about 40 bushels. With careful seed selection and good management, including rotation of crops, applications of vegetable matter, deep plowing, and frequent shallow cultivation of the growing crop, and a top dressing of nitrate of soda when the crop is laid by, yields of both the staple crops could be easily doubled. Oats do well, but are grown in very small quantities and are usually fed in the straw. Oats, rye, vetches, and clovers constitute very desirable winter cover crops, and cowpeas an excellent summer catch crop. Potatoes, beans, vegetables, sugar cane, berries, etc., do well. The type should prove well adapted to the cigar-filler type of tobacco. Unquestionably a variety of clovers could be grown and probably alfalfa. Experiments with this crop are recommended. A thorough preparation of the seed bed, care being exercised to destroy all weeds and grasses, a liberal application of lime and well-rotted stable manures some months prior to seeding, and a thorough inoculation of the land should suffice to secure a stand. Inoculation could be effectively secured by a dressing of soil from an old alfalfa field. A good practice is to grow a leguminous crop, preferably melilotus before seeding to alfalfa, stubble being allowed to rot thoroughly and being well worked into the soil.

The Greenville loam is not as warm as the sandy types, and is consequently not so early, but is much more productive and much more easily maintained in a productive condition. It has an excellent capacity for retaining moisture and at the same time is well drained. Severe damage by erosion is not likely to occur. On account of level surface features, labor-saving machinery can be used to advantage.

The chief need of this soil is deep plowing and the addition of organic matter. More adequate tillage, plowing 10 inches deep, a rotation of crops, including frequent leguminous crops to be plowed under, and frequent shallow cultivation to prevent loss of soil moisture during droughts are recommended for building up this soil.

By reason of its productiveness and location, most of it lying near the city of Tuscaloosa, the Greenville loam commands a high price, ranging from $100 to $150 an acre.

GREENVILLE FINE SANDY LOAM.

The soil of the Greenville fine sandy loam consists of a brownish-red fine sandy loam, 6 to 8 inches deep. The subsoil is a red fine sandy clay loam gradually passing into a friable sandy clay at lower depths. The surface soil is usually quite friable, though there is a sufficient quantity of silt to give it some coherency below the first inch or two. Slight variation in the relative quantities of sand and silt exists in different areas, the more silty phases approaching the nature of the silt loam type. The content of organic matter is generally low, but there is enough in some areas to give a darker brownish color and to make the soil more loamy. The lighter phases of the type have a slightly grayish surface appearance.

The subsoil is quite uniform to a depth of several feet. It has a rather low content of sand of the medium to fine grades and occasionally some rounded quartz gravel and iron concretions. The material, while sticky when wet, is normally friable and possesses a structure very favorable to the retention of moisture. There are usually present at depths varying from 3 to 10 feet beds of rounded gravel that assist the underdrainage.

This soil is easily tilled and may be handled under a rather wide range of moisture conditions, though it is sticky when very wet. The customary practice of plowing to the same depth every year has resulted in the formation of a plow sole or "hardpan" layer, and where this condition is marked the land is more droughty. The layer can readily be broken up by deeper plowing or by subsoiling. Loosening the soil to a depth of 8 to 10 inches is usually all that is necessary. With a loamy seed bed of that depth and frequent shallow cultivation during the growing season, crops should never be injured during ordinary dry periods.

The Greenville fine sandy loam is closely associated with the loam member of the series and is developed most extensively in the vicinity of Tuscaloosa. The surface is undulating to very gently rolling and drainage is well established. There is little damage from erosion, as the open character of the soil permits the ready absorption of the rainfall and the excess surface water drains slowly away.

The origin of the type is similar, in part at least, to that of the loam member of the series. The type passes gradually into the upland types of the Orangeburg series and differs from the Orangeburg fine sandy loam chiefly in its uniform and reddish surface appearance. The two types are probably derived from the same original material, the Orangeburg fine sandy loam, with its more rolling topography and its gray surface representing a much more advanced condition of weathering, wherein the soil grains have become bleached of the iron oxide coloring.

The Greenville fine sandy loam is one of the most desirable soils of the county. It is adapted to many different crops and is capable of being made highly productive. Cotton, corn, potatoes, sugar cane, cabbage, beans, oats, rye, onions, medium late truck crops, berries, peanuts grasses, etc., may be grown successfully. Probably a good grade of filler tobacco could be produced. Cotton and corn, the chief crops, usually give satisfactory yields, cotton averaging about one-half bale and corn about 25 bushels to the acre. The liberal use of commercial fertilizers invariably increases the yields, particularly when the nitrogeneous ingredients are high. In addition to clovers, vetches, and cowpeas, it is quite probable that alfalfa may be grown on some areas of the type. This type has a small extent in Tuscaloosa County, only small, isolated areas of it being found.

To increase the yields on this soil, it should be plowed to a depth of 10 inches in the fall and seeded to some winter cover crops, liberal applications of stable manures should be made whenever possible, a crop rotation including leguminous crops to be plowed under every two or three years should be maintained, and commercial fertilizers should be used. All the crops respond readily to nitrogenous fertilizers. Top dressings of nitrate of soda during the growing season tend to increase the yields materially.

Practically all of this soil is under cultivation, and is held at prices ranging from $50 to $125 an acre.

GREENVILLE SANDY LOAM.

The Greenville sandy loam consists of about 10 inches of a medium-textured, reddish-brown sandy loam, underlain by a red, sticky sandy loam, which becomes heavier with depth and grades into a light sandy clay at about 24 inches. Both soil and subsoil contain an appreciable quantity of coarse sand. Lighter phases of the type are found on the gentle rises and heavier phases, with increased silt content in the lower-lying areas and slight depressions. The depth of the surface soil varies from 3 to 15 inches, the shallower soil occurring in the more sloping areas, where the sandy loam covering has been partly washed away, leaving the sandy clay near the surface. The soil here is somewhat more compact and the subsoil is considerably heavier and redder. Cultivation must take place when conditions of moisture are favorable.

The type usually occupies plainlike elevations with gently rolling topography. Drainage is generally adequate. The typical soil is open and porous, but capable of absorbing and retaining a relatively large quantity of moisture. At the same time the underdrainage is satisfactory. Tillage is easy and the fields may be readily improved by proper methods of management.

The Greenville sandy loam occurs in very limited areas associated with the Orangeburg sandy loam. The two types appear to be derived from the same geological formation, the Lafayette, the distinction between them being the reddish surface coloring of the Greenville type. The comparatively level areas usually show Greenville characteristics and the rolling areas those of the Orangeburg series. This difference may be due to more advanced weathering in the rolling areas than is possible in the level areas.

On account of desirable surface features and productiveness, the greater part of the type is under cultivation. It is used largely for cotton, with occasional areas given to corn and oats. Despite its long-continued use in the growing of cotton, fair to good yields, ranging from one-third to one-half bale to the acre, are obtained with moderate applications of fertilizers. Corn yields from 15 to 25 bushels per acre. Oats, rye, cowpeas, sugar cane, fruits, melons, cantaloupes, and other truck crops do well. Nitrogenous fertilizers give good increases in the yields.

This soil is adapted to a variety of crops. Deeper plowing, particularly over the heavier phases, the use of stable manures and other forms of organic matter, rotation of crops, and the judicious use of commercial fertilizers would bring this soil into a higher state of productiveness. Like all soils that are used continuously and exclusively for clean cultivated crops, such as cotton and corn, the humus content is low and the physical condition impaired. In the absence of stable manure green manuring crops should be turned under every year or two.

The larger proportion of the type is under cultivation and is a very desirable soil. It is held at $25 to $75 an acre.

SWAMP.

The Swamp includes the lowest depressions of the first or second bottoms, where water stands practically all the year. In their present condition such areas have no agricultural value. Generally this condition is confined to old sloughs or depressions along streams, where even a slight rise in the streams will result in complete flooding. Drainage is largely impracticable, owing to the very low position of the type. Canebrakes along the outer edges of the Swamp areas afford some pasturage, but they are valued chiefly for their growth of cypress. The soil consists principally of silt loam and silty clay loam and similar to the Bibb or Ocklocknee soils. Could drainage be effected Swamp would become a valuable corn soil.

MEADOW.

The Meadow consists of very poorly drained first bottoms occurring in comparatively narrow strips along many streams of the county. The soil ranges in texture from silt loam or silty clay loam to sandy

loam or even sand. Much of the area grouped under this name is covered with water-loving vegetation, and considerable quantities of the decaying remains of these plants have accumulated in the soil. In many places the soil has a brown to nearly black color, and the subsoil is more or less mottled with gray and yellow.

Much of this type could be used for farming by straightening and deepening the stream channels and running lateral ditches from the streams across the bottoms to the foot of adjacent slopes. In places considerable protection would be afforded by constructing ditches near the foot of the upland slopes to carry off rain water or seepage from the higher land.

When properly drained much of the Meadow could be profitably utilized for the production of corn, hay, oats, cane, cowpeas, millet, and forage. A number of wild grasses, especially lespedeza and water grasses, thrive on land of this kind, so that good yields of hay could be secured, provided the land had proper drainage and could be mowed.

SUMMARY.

Tuscaloosa County is situated in the west-central part of the State of Alabama, in the second tier of counties from the Mississippi border, and comprises an area of 867,200 acres, or 1,355 square miles. The surface features range from hilly and broken in the northeastern part to gently rolling over the upland Coastal Plain country. The river terraces are comparatively level. The two principal drainage lines are the Black Warrior River and the Sipsey River.

The settlement of the county is fairly general, being densest near the railroad towns and upon the more easily tilled and more productive soils. The mining district represents the most thinly populated section, as well as the least developed agriculturally.

Tuscaloosa, situated on the Black Warrior River, is the county seat and a flourishing town of 10,000 inhabitants. There are no other towns with over one or two hundred inhabitants, with the exception of a few mining centers in the eastern part of the area.

Three systems of railroads traverse the area—the Alabama Great Southern, the Mobile & Ohio, and the Louisville & Nashville—all operating in the eastern and southern parts of the area. The northern two-thirds of the county is without railroads.

Climatic conditions favor a highly diversified agriculture. The winters are short and mild and the summers long and moderately hot. The rainfall is well distributed throughout the year, the highest average precipitation occurring during the late winter months and the lowest during the fall months.

Less than half the area of the county is under cultivation. The present agriculture depends upon cotton as the chief money crop

and corn as the chief food crop for stock, with hay, oats, rye, peas, beans, peanuts, potatoes, sugar cane, sorghum, watermelons, cantaloupes, various truck crops, berries, fruits, etc., grown in small quantities to meet in part the home demands.

Commercial fertilizers are used extensively on the upland sandy soils. No crop rotation is general and little attention is given to maintenance of the productiveness of the soil.

The present system of tenancy is not conducive to improved methods of farming. Farm labor is largely colored and reasonably satisfactory with supervision. The average monthly wage is $15, with subsistence.

Thirty-four types of soil were established in the area. These are grouped in fourteen series and two miscellaneous types, Meadow and Swamp.

The Susquehanna fine sandy loam is not a very desirable soil for general farming purposes, owing to its very heavy and impervious clay subsoil. Fairly good yields of cotton and corn are obtained under the usual methods of cultivation.

The Susquehanna gravelly sandy loam has a rather hilly topography and is not well suited for farming. The timber growth of pine constitutes its chief value.

The Norfolk fine sandy loam is well adapted to the usual farm crops. It is also a good medium to late truck soil and has been found in other sections of the country to be well adapted to the culture of certain types of tobacco.

The Norfolk loam is not an extensive soil type, being found only over a section of the "flatwoods" country in the eastern part of the county, where it supports a forest growth chiefly of pine. It affords good pasturage.

The Orangeburg fine sandy loam is the predominating type of the upland Coastal Plain country and is adapted to a wide range of crops. It responds readily to methods of improvement and is a fairly productive type. The character of the subsoil favors the absorption and retaining of soil moisture and renders it easily susceptible to permanent improvement. The less rolling areas are greatly esteemed for agriculture.

The Orangeburg sandy loam is a lighter, warmer type than the fine sandy loam. It has also a rather wide range for crops, being especially favorable for the production of sugar cane, peanuts, cotton, fruits, melons, and medium late truck. It is capable of being made quite productive.

The Orangeburg sand, the lightest soil of the county, is better suited for the growing of peanuts, sugar cane, vegetables, fruits, potatoes, and melons than for general farming.

The Orangeburg gravelly sandy loam is quite similar to the fine sandy loam in agricultural value where the gravel content and the surface relief is not an obstacle to its use. A small proportion of this type is under cultivation.

The Guin sandy loam represents a soil condition existing over a severely rolling to broken territory. It consists of an admixture of Orangeburg and Susquehanna material. It has a low agricultural value. Forest products and grazing at present constitute the chief use of this type.

The Ruston fine sandy loam possesses characteristics intermediate between those of the Orangeburg fine sandy loam and the Norfolk fine sandy loam. Crop adaptation and methods for improvement are the same. The type is fairly productive.

The Ruston sandy loam is somewhat lighter in texture than the fine sandy loam. It has practically the same agricultural value.

The Dekalb stony loam occupies the broken and rocky areas along the stream slopes occupied by the Coal Measures. It has little or no agricultural value in Tuscaloosa County.

The Dekalb fine sandy loam is a rather compact soil derived from sandstone. It is not naturally productive, but appears to be fairly well adapted to potatoes, fruits, and various truck crops. Cotton and corn give fair returns. The type responds very readily to applications of fertilizers.

The Dekalb silt loam has a good, mellow tilth, but is inclined to be droughty. Corn, wheat, grasses, potatoes, fruits, and vegetables constitute the chief crops, with moderately high yields where liberal applications of fertilizers are used.

The Dekalb shale loam is unimportant in this area. The fine earth is quite similar to that of the silt loam type, its distinctive characteristic being the high percentage of thin shale chips found generally disseminated throughout the soil profile.

The Hanceville fine sandy loam does not differ essentially from the Dekalb fine sandy loam in agricultural value. The two types occur closely related. The former is considerably more extensive and is in many areas very desirable for general farming. Potatoes, peanuts, sorghum, fruits, berries, and vegetables do well.

The Hanceville silt loam is the predominating type of soil in the region of Carboniferous rocks. It is quite similar in texture and structure to the Dekalb silt loam, differing from that type in the red color of the subsoil. It is slightly more productive than the Dekalb type. Cotton, corn, oats, rye, cowpeas, potatoes, vegetables, berries, fruits, grasses, etc., seem to do well.

The Clarksville gravelly loam is of very limited occurrence and of low agricultural value, owing to its broken surface and chert content. It is derived from a very cherty limestone.

The Greenville loam is the most desirable and most permanently productive soil of upland characteristics. It is probably of ancient alluvial origin, but quite similar to the true upland types derived from the Lafayette formation. It has a comparatively level topography, a friable nature, excellent drainage, and a wide crop adaptation. It is a strong soil for the production of cotton and corn, as well as for the supplementary crops grown in the county. By reason of its productiveness and proximity to the city of Tuscaloosa, it is valued at $100 to $150 an acre.

The Greenville fine sandy loam also occupies a comparatively level to undulating topography and is essentially adapted to the same crops as the loam, although the yields are not generally as high. It is a lighter soil and demands a more constant attention to maintain its productivity. The surface soil has a reddish color, which distinguishes it from the Orangeburg fine sandy loam.

The Greenville sandy loam, the lightest soil of the series, is a very desirable type for the production of cotton, oats, peas, sugar cane, beans, garden truck, melons, berries, cantaloupes, and fruits.

The Cahaba fine sandy loam is the lighter soil of the better-drained areas in the second bottoms. It is a durable soil and well adapted to the culture of cotton, sugar cane, peanuts, melons, and medium late truck.

The Cahaba loam is likewise a second bottom type and productive of the general farming crops. Drainage conditions are usually well established. The soil is friable, easily tilled, and retentive of moisture.

The Cahaba silt loam, the heaviest member of the series, is particularly well suited for corn, grasses, and cotton. A part of the type is subject to occasional inundation by high water.

The Huntington fine sandy loam is of slight importance, owing to its small extent. It is an alluvial soil and well adapted to sugar cane and cotton.

The Huntington silt loam is the strongest of the bottom-land soils. It is of recent alluvial origin and regularly subject to overflow. It is the best corn soil of the county, yields often reaching 75 bushels to the acre without fertilizers.

The Kalmia fine sandy loam and Kalmia silt loam occur in the second bottoms in the lower-lying and flat areas, where conditions of drainage are inadequate. Little of these types is under cultivation, but they afford some pasturage.

The Ocklocknee fine sandy loam includes the sandy deposits along the smaller streams of the Coastal Plain region. The type represents very valuable soils for corn and sugar cane. The better-drained areas give good yields of cotton, cowpeas, beans, and other crops.

The Bibb silt loam and Bibb fine sandy loam types include the very poorly drained areas occupying the lower depressions of the