

SOIL SURVEY OF STEWART COUNTY, GEORGIA.

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DESCRIPTION OF THE AREA.

Stewart County, Ga., is situated in the southwestern part of the State, on the Alabama line. It lies approximately between $31^{\circ} 55'$ and $32^{\circ} 15'$ north latitude and $84^{\circ} 40'$ and $85^{\circ} 5'$ west longitude. The county is bounded on the north by Chattahoochee and Marion Counties, on the east by Webster County, and on the south by Randolph and Quitman Counties. The Chattahoochee River forms the western boundary, separating Stewart County from Alabama. Roughly, the county is rectangular in shape. It has an area of 467 square miles, or 298,880 acres.

Stewart County lies in the physiographic province known as the Coastal Plain. The line separating this province from the Piedmont Plateau crosses the State of Georgia approximately 20 miles north of the northern county line.

There is a wide variation in the surface configuration of the county. In general, the surface ranges from smooth or gently undulating to rough and broken. The more nearly level part of the county is the upland plain, which is not yet badly dissected by erosion. This smooth country forms a belt, in which the elevations are among the highest in the Coastal Plain Region of Georgia. Lumpkin is 650 feet above sea level, Richland 600 feet, Brooklyn 691 feet, and Renfroes approximately 600 feet. The upland plain is mainly in the eastern part of the county, extending northward in a narrow strip, in some places less than one-half mile wide, to Renfroes on the northern county line. It extends westward to a point approximately 2 miles west of Providence School, being interrupted here and there by stream courses. This westward development reaches but a short distance north of Lumpkin and north of the Lumpkin-Florence road.

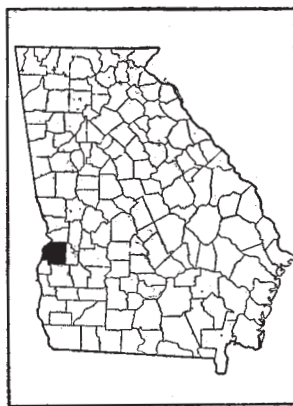


FIG. 14.—Sketch map showing location of the Stewart County area, Georgia.

In the southern part of the county the upland plain occupies the divides between Pataula and Hodchodkee Creeks, and its extreme western boundary is located approximately at Adams Store in the southwestern part of the county.

A lower belt of broken country has been formed by the originally smooth upland being dissected by stream erosion. This belt is characterized by deep gullies, steep hills, and ridges with undulating crests. Some of the deeper gullies, locally called "caves," vary in width from a few feet to one-fourth mile, and in depth from 50 feet to 100 feet or more. (See Pl. II.) Their sides are precipitous or perpendicular. The roughest topography in this belt is south of Providence Church, where the surface is very broken, being probably the roughest section in the southern part of the State. In this section there is scarcely an area of land suitable for agriculture the size of an ordinary garden. Steep ridges rise to an elevation of 200 feet or more above the deeper stream bottoms. The country is so rough and broken as to lead some of the inhabitants of the county erroneously to believe that the hills are a southern extension of the Appalachian Mountains.

Below this belt of rough country there is a lower-lying belt, which has a less broken topography, but is locally spoken of as hilly land. It comprises large areas of gently sloping land and smooth inter-stream areas. The greater part of the arable land occurring in these belts of rough country occurs north of the Hannahatchee Creek, in the vicinity of Louvale, and extending northward to the county line.

Another topographic division comprises the terraces along the Chattahoochee River. This division extends as a practically continuous belt from the northern to the southern boundary line of the county. Its greatest width is approximately $5\frac{1}{2}$ miles, the average width being about 2 miles. This belt includes a series of level to very gently undulating old river terraces. It constitutes one of the richest agricultural sections of the county.

The numerous streams, which form a very intricate drainage system, constitute a striking topographic feature of the county. Each system, no matter how small, has cut deep ravines, some of which are over a hundred feet deep. The greater part of Stewart County is within the drainage basin of the Chattahoochee River. The Seaboard Air Line Railway from Renfroes to Zion Church, and the Georgia, Florida & Alabama Railway in the extreme southeastern corner of the county, approximately mark the dividing line between the section drained by the Chattahoochee River on the west and that drained by the Flint River on the east.

Of the streams flowing into the Chattahoochee River, the Hannahatchee is the most important. This stream with its numerous tributaries, the largest of which is Colochee Creek, drains more than a third of the county. Hichitee Creek drains the northwestern corner

of the county, and the Talipahoga, Notchefaloctee, and Ichabuckler Creeks the southwestern section. Hodchodkee and Pataula Creeks, with their tributaries, drain practically all of the central and southeastern sections of the county. The drainage waters of the Flint River Basin are carried to that stream by Big Slaughter and Little Slaughter Creeks.

All the streams of the county have strips of bottom or alluvial land along their courses, which vary from a few rods to one-half mile in width. These strips are widest at the upper portions of the drainage systems, narrowing considerably as the river terrace belt of country is approached. Where these streams flow through the river terraces their channels are deep and wide, and the usual first bottoms are wanting.

The present area of Stewart County was originally a part of Lee County. Later it was included with Randolph County. Stewart County was established in 1830. Parts of this county as originally established, however, were subsequently included with Quitman and Webster Counties.

In the early part of the nineteenth century southwestern Georgia was opened for settlement through various treaties with the Creek Indians. The settlement of the area within the present Stewart County took place immediately. The early settlers were from northern and central Georgia. The first settlements were made in the vicinity of Lumpkin and along the Chattahoochee River. The majority of the settlers occupied the clay hills, the level section of the county being avoided until a later day because of a belief that the land was of poor quality. Subsequently the hill country became so badly gullied by erosion that this region was almost entirely abandoned. Many substantial buildings in the vicinity of Louvale, Union, and Providence, abandoned many years ago, remain as an evidence of the early settlements.

About one-half mile west of Thompson Store, on the Chattahoochee River, the ruins of Roanoke are found. This was one of the earliest towns in the county, being a trading point of importance about 1830. It was burned in 1836, the population scattering to other parts of the county. Roanoke was succeeded by the town of Florence as an important cotton market and shipping point for all parts of the county. Florence at that time was a thriving town of over a thousand inhabitants.

Lumpkin, the county seat, has a population of 1,140. Richland, with a population of 1,250, is an important business and railroad center. This town has good public utilities, three banks, a cotton and oil mill, cotton compress, and a fertilizer plant. Omaha is an important trading town for the western part of the county. It has a population of only about 200. The Omaha mills, known throughout

southwestern Georgia, are located here. The town also has a brick plant which supplies the greater part of the surrounding country. Other towns and shipping points of local importance are Louvale, Union, Brooklyn, and Renfroes.

According to the United States census, the population of the county in 1910 was 13,437, showing a decrease of over 2,000 since 1900. During the past 20 years there has been a gradual emigration from the county, largely to other localities in southwestern Georgia.

The principal market of the early settlers was Apalachicola, Fla., which was reached from Florence by river transportation. Savannah was also one of the early markets, the settlers hauling their goods to and from this point in wagons. At a later date Columbus and Americus, Ga., became important markets.

The county was without railroad transportation until 1886, when a narrow-gauge road was built from Americus to Lumpkin. This road was subsequently extended to Louvale and later it became the Savannah & Montgomery branch of the Seaboard Air Line Railway. The Columbus & Albany branch of this system intersects this road at Richland. The Georgia, Florida & Alabama Railway has a terminus at Richland. It affords transportation for the southeastern part of the county.

The public roads of the county follow the main ridges and divides to all the important centers. A small percentage of the roads are in a fair condition, while the greater part are poorly built and maintained. Some of the roads during certain seasons are almost impassable, and in some parts of the county they are unfit for travel throughout the greater part of the year.

CLIMATE.

The climate of Stewart County corresponds with that of lower Texas, Louisiana, Mississippi, and upper Florida. The county has an average annual temperature of 66° F. The winters are mild, with occasional short periods of cold weather, followed by warm periods. Freezing temperatures are of frequent occurrence during the winter months, but a temperature as low as 0° F. is reached only occasionally. The lowest temperature recorded at the Weather Bureau station at Lumpkin is -5° F. Although snowfalls of any depth are uncommon, slight flurries generally occur during the winter. The mean temperature of the winter months is 49° F., but the relatively high humidity makes the cold more penetrating than in regions of drier atmosphere. The mean temperature for the spring months is 66° F., and for the summer months, 81° F. The temperature seldom rises to over 100° in the summer. For the fall months an average temperature of 67° F. is reported.

The mean precipitation for the year is 50.5 inches. The rainfall is well distributed throughout the growing season. The mean precipitation for the fall is lower than for any other season, which is favorable for the harvesting of various crops. Crops sometimes suffer from drought during the summer, especially on the lighter textured soils.

The average date of the last killing frost in the spring is March 11, and that of the first in the fall, November 11. The latest date of killing frost recorded is March 31, and the earliest, October 25. Hardy vegetables can be grown during the winter with but little protection. Strawberries ripen early in April and dewberries, the middle of April. Deciduous trees are in foliage during the latter part of March. The narcissus and lily of the valley bloom during the latter part of January.

The following table gives the normal monthly, seasonal, and annual temperature and precipitation as recorded at the Weather Bureau station at Lumpkin, Stewart County:

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

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.	Inch.
December.....	49	74	10	4.2	3.7	3.2	0.1
January.....	48	75	15	3.5	6.2	3.3	0.2
February.....	49	80	-5	7.4	6.1	9.5	0.7
Winter.....	49	.....	.....	15.1	16.0	16.0	1.0
March.....	59	87	21	6.3	3.8	5.7	T.
April.....	64	93	34	3.6	2.5	2.8	0.0
May.....	75	99	42	3.2	2.5	11.7	0.0
Spring.....	66	.....	.....	13.1	8.8	20.2	T.
June.....	80	101	49	3.4	1.4	3.9	0.0
July.....	82	106	62	4.9	5.5	3.9	0.0
August.....	81	103	62	5.5	5.0	2.2	0.0
Summer.....	81	.....	.....	13.8	11.9	10.0	0.0
September.....	77	102	46	3.1	0.8	4.0	0.0
October.....	67	94	32	3.3	4.8	1.8	0.0
November.....	58	84	20	2.1	1.1	4.0	T.
Fall.....	67	.....	.....	8.5	6.7	9.8	T.
Year.....	66	106	-5	50.5	43.4	56.0	1.0

AGRICULTURE.

The early settlers of the territory now included in Stewart County depended largely on stock raising. They brought with them large numbers of cattle and sheep, which were allowed to graze on the open range throughout the year with little shelter or care. They were at first more or less nomadic in their mode of life, but later permanent homes were established and other lines of agriculture taken up. The type early developed was self-sustaining, and it continued on that basis until about 1865. The sheep afforded sufficient wool for clothing, and wheat, oats, rye, corn, and barley were grown for home use. Cotton, cattle, hides, and tallow were the first articles of commerce shipped from the county.

In order to use the land for agriculture, the original heavy growth of hickory, various species of oak, and shortleaf pine was deadened and later removed. This growth was found mainly on the red clay lands of the county. Since the abandonment of this section a second growth of shortleaf pine has developed. The gray sandy lands supported a growth of longleaf pine. This timber was removed with the settlement of this section, and to-day only a very small percentage of the arable land of the county is forested.

The production of cotton became of first importance upon the demand for a money crop immediately after the Civil War. This change in the system of agriculture was accompanied by the introduction of fertilizers.

The soils and climatic conditions of Stewart County are favorable to the production of a wide variety of crops. At present, however, the principal crops are cotton, corn, oats, cowpeas, forage crops, and sweet potatoes.

Although the agriculture practiced in Stewart County can not be classed as a one-crop system, cotton not only occupies the first place among the crops grown, but overshadows all other crops by the demands it makes on the attention and effort of the planters. Corn is second in importance to cotton, and these crops occupy a far greater acreage than all of the other crops combined. The acreage devoted to cotton has remained about the same for the last 30 or 40 years, averaging between 44,000 and 44,500 acres. The largest acreage reported was in 1889, when, according to the 1890 census, 53,426 acres were devoted to cotton. About 35 per cent of the improved farm land of the county is utilized for this crop. The yield for the past 40 years has ranged from 12,653 bales of 500 pounds each in 1879 to 19,351 bales in 1889. In 1869, 13,643 bales were produced, while in 1899 the yield was 16,702 bales. A production in 1909 of 15,540 bales from 43,762 acres is reported in the 1910 census. The average yield in 1879 was 0.28 bale per acre, and in 1909, 0.35 bale, showing an

apparent small increase. This may represent the effects of seasonal differences rather than an improvement in methods.

All of the arable types of soil found in the county are used for the production of cotton. Owing to the varying methods of farming practiced it is difficult to determine which soil gives the greatest yield per acre. The fertile terrace soils of the Chattahoochee River produce a large percentage of the cotton, at a low average yield per acre, the result of the tenant system of farming. One of the most productive soils for this crop is the Hannahatchee sandy loam, which often yields a bale per acre without the use of fertilizer.

The general method of preparing the land for cotton consists of bedding the field in rows varying from 3 to 5 feet apart. The distance between the rows depends upon the fertilization given and the natural productiveness of the soil. They are placed farthest apart where the land is most productive or where the largest quantities of fertilizer are applied.

The fertilizer is usually distributed beneath the furrow thrown up to form the beds. The land is generally rebudded over the old "middle" and the cotton is planted on this bed. This method of preparing the soil is gradually giving way to a better system, which is now used on some of the farms. This better method consists of breaking the land "broadcast" or "flat" with a two-horse turning or disk plow during the fall or early winter months, and in the spring "laying off" the rows by making furrows, in which the fertilizer is distributed. Beds are then made over these furrows, on which the cotton is planted.

The cotton is usually planted between April 10 and May 1, the date depending upon the season and the condition of the soils. The crop is planted earlier on the uplands than on the bottom-land soils, as the bottom lands remain unfit for cultivation for a longer time on account of poorer drainage. The first cultivation of the crop consists of "barring off" or plowing close to the young plants and throwing the soil to the middle of the rows. This operation leaves the young cotton on narrow ridges, which vary from about 8 to 10 inches in width, thus facilitating the chopping out or thinning of the plants by the use of hand hoes. The distance between the plants averages about 12 to 18 inches, but varies from about 8 to 36 inches, depending upon the productiveness of the soil and the amount of fertilizer applied. The general tendency is to crowd too many plants in the row. The next operation in cultivating the cotton consists of "siding" or "running around." This operation consists of turning the soil back toward the plants by the use of a "sweep" or "scrape." Under favorable weather conditions, when the growth of grass between the rows is rank or thick, the ordinary "twin plow" is generally used to cover this growth. Subsequent

cultivations consist of "siding" the cotton with "sweeps" or "scrapes" until the crop is "laid by," usually between July 15 and July 30. The crop receives an average of about four cultivations, although the best farmers cultivate as many as six, and sometimes eight, times. As a rule the crop is "laid by" too early in the season, for it has been demonstrated that late cultivations result in more profitable yields.

No definite system of fertilization is practiced by the farmers of the county. The mixtures most commonly used carry from 8 to 10 per cent phosphoric acid, from 2 to 4 per cent nitrogen, and from 2 to 4 per cent potash. The highest grade fertilizer used consists of a 10-4-4 mixture. Generally an 8-2-2 or a 9-3-3 brand is used. An average of 250 to 300 pounds per acre is applied. The best farmers use from 300 to 600 pounds, and in some cases as much as 1,000 pounds to the acre. Higher grades and larger quantities are being used each year. The common practice is to apply the fertilizer at the time of bedding, although it is a common practice to make two applications, and many farmers make three or four applications during the growing season. Nitrate of soda is used as a side dressing in some cases, in quantities varying from 50 to 150 pounds per acre.

Of the varieties of cotton grown, the Toole is the most popular for all types of soil. The Pulnott and Russell are also commonly grown. Other varieties used are the Truitt, Cleveland Big Boll, Schley, Excelsior, Mortgage Lifter, and Christopher. Some varieties are subject to anthracnose and to wilt. Considerable difficulty is encountered by the farmers owing to the wilt disease, or root rot. On lands so affected the Dixie and Toole varieties are said to do best.

About 25 per cent of the improved farm land of Stewart County is devoted to corn. The largest acreage is reported in the 1900 census, which gives a total of 37,810 acres in corn in 1899. During the last 20 years the average annual yield has been about 300,000 to 340,000 bushels, the average yield per acre ranging from 8 to 10 bushels. The 1910 census reports a production of 300,917 bushels from 31,456 acres in 1909. The low average yield may be attributed to the lack of attention paid the crop. Generally the poorest land of each farm is selected for this crop, and little attention is given to its cultivation and fertilization, the object being to produce sufficient corn for home use only, and in many cases the tenants fail to produce even this amount. Not since 1860 has the county produced sufficient corn for its own use. With the prevailing high prices for corn, the better farmers are paying more attention to this crop, with the result that yields of from 40 to 60 bushels per acre are not uncommon.

The general method of handling this crop consists of bedding the rows from 5 to 7 feet apart and planting the seed by hand on these

beds. Under the better methods practiced by some farmers, the land is plowed or broken flat with a two-horse plow during the fall or winter. In the spring the rows are laid off at the desired distance by running a furrow, in which the fertilizer is placed and the seed planted. The distance between the rows varies from $4\frac{1}{2}$ to 6 feet, depending upon the productiveness of the land and the quantity of fertilizer used. The stalks stand from 12 to 36 inches apart in the drill. The growing of a somewhat greater number of stalks to the acre, with increased fertilization and cultivation, materially increases the yield per acre.

The cultivation of this crop is begun as soon as the plants are from 3 to 6 inches high by running a furrow between the rows with a shovel plow and then listing with twin plows toward this furrow. The corn is then "barred off" by two additional furrows, leaving the plants on a narrow ridge. Another method consists of running close around the rows with a "scooter" plow. The middles are then plowed out with a shovel plow, subsequent cultivations being made with a sweep or scrape.

The crop is generally planted between March 10 and April 1, depending upon the season and the condition of the soil. Planting is later on the bottom-land soils than on the uplands. The usual custom is to pull the fodder, which is done about August 1. This consists of pulling the upper leaves from the stalk, tying them in bundles, and allowing them to cure for forage. This practice is becoming less common, as the farmers are using more hay. Some corn shredders are operated in the county, but their use is not common.

The use of fertilizers for corn is becoming more general. About the same brands are used as for cotton. Applications range from 200 to 600 pounds per acre, the average on the best farms being about 400 pounds per acre. A mixture of cotton seed and phosphoric acid and cotton seed alone are also commonly used on corn land. The time of application varies considerably. Two applications are generally made, while three applications are not uncommon. Where the fertilizer is applied in two parts, one-half is distributed in the furrows and the remainder added at the second or third cultivation. In other cases one-third of the fertilizer is applied at the time of planting, and the remaining two-thirds at the second or third cultivation. Some farmers do not use any fertilizer until the crop is well up. The use of a top dressing of sodium nitrate, at the rate of 50 to 150 pounds per acre about the time of the last cultivation, is common.

Hastings Prolific is the most popular variety of corn. The Marlboro and Mitchel Prolific are also extensively grown. The Knighton, a local variety, is quite popular. The improved varieties are used where the field is carefully prepared and the crop properly fertilized and cultivated. Under other conditions the Knighton variety does

best. The landowners recognize this fact in furnishing seed to their tenants.

Although oats were grown by the earliest settlers, the crop did not occupy a prominent place in the agriculture of Stewart County until about 1870. The production increased from 4,760 bushels, reported in the 1870 census, to 61,370 bushels, reported in 1880. A production of 36,410 bushels from 3,753 acres is reported in 1900, and in 1909 a total of 72,600 bushels were produced from 3,689 acres. In the last-named year the yield averaged 19.7 bushels per acre.

Several methods are used in seeding this crop. Usually it is sown broadcast and plowed under with a small turning plow, which leaves the land rough and in poor condition as a seed bed. Another method consists of plowing the land, sowing the seed on the rough surface, and then harrowing it in. A third and better method consists of plowing the land, preparing a good seed bed by subsequent harrowing, and then either sowing the oats broadcast or planting with a grain drill. The acreage planted in this way is increasing from year to year.

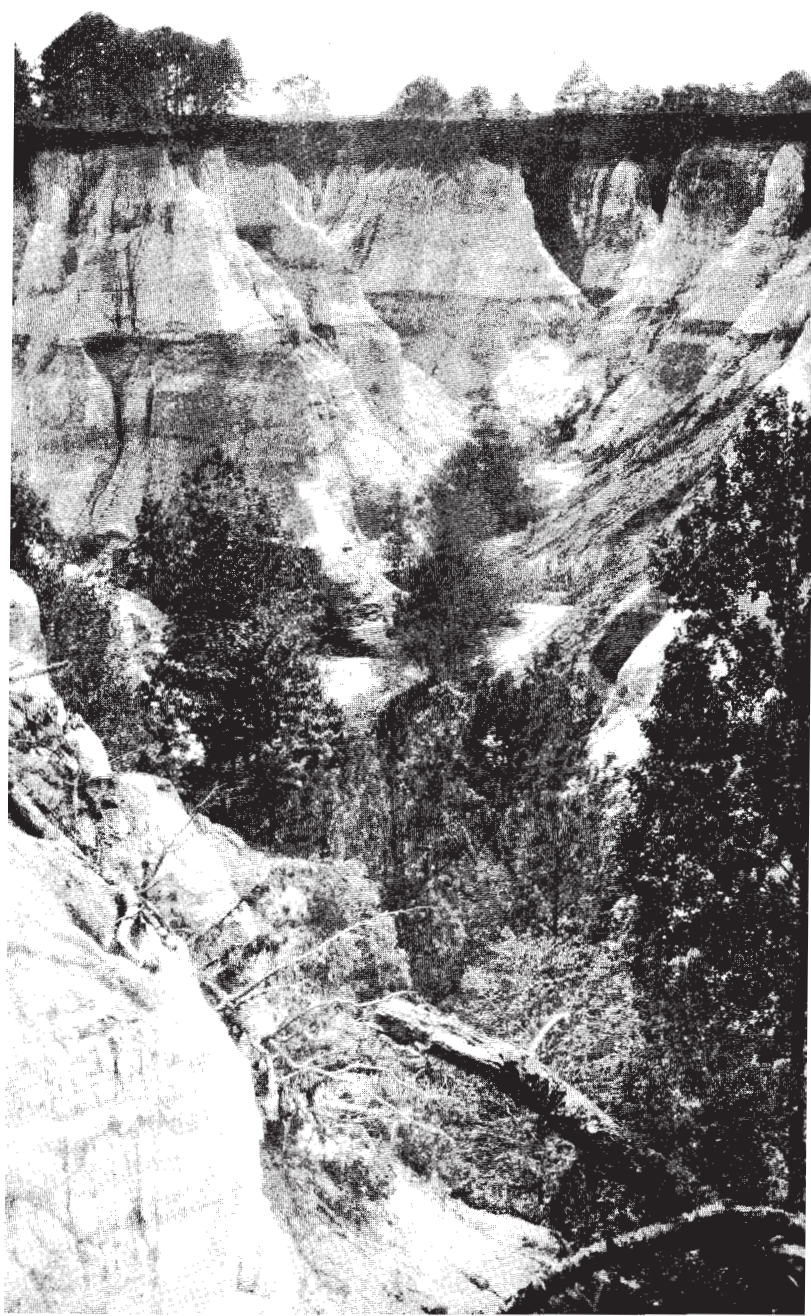
Although the best time of the year to sow oats to obtain a certain crop is in October, in many cases the crop is not sowed until late in winter or early in spring. Early fall planting is desirable in order to obtain a good stand, so that the crop can resist the freezes of the winter. The best yields are obtained from the early seeding. Frequently late-sown oats suffer on account of dry weather in early spring, and in some cases the crop is entirely lost. Early planting is also desirable on account of the relatively low average precipitation during April, May, and June.

Until 8 or 10 years ago the only fertilizer used for oats consisted of cotton seed, which was sowed with the oats. This method is now used to a small extent. The use of complete fertilizers for oats is not very general, but many farmers apply from 75 to 100 pounds of nitrate of soda per acre as a top dressing in the spring. When fertilizers are used they are of about the same grade as those used for cotton. Applications range from 200 to 500 pounds per acre.

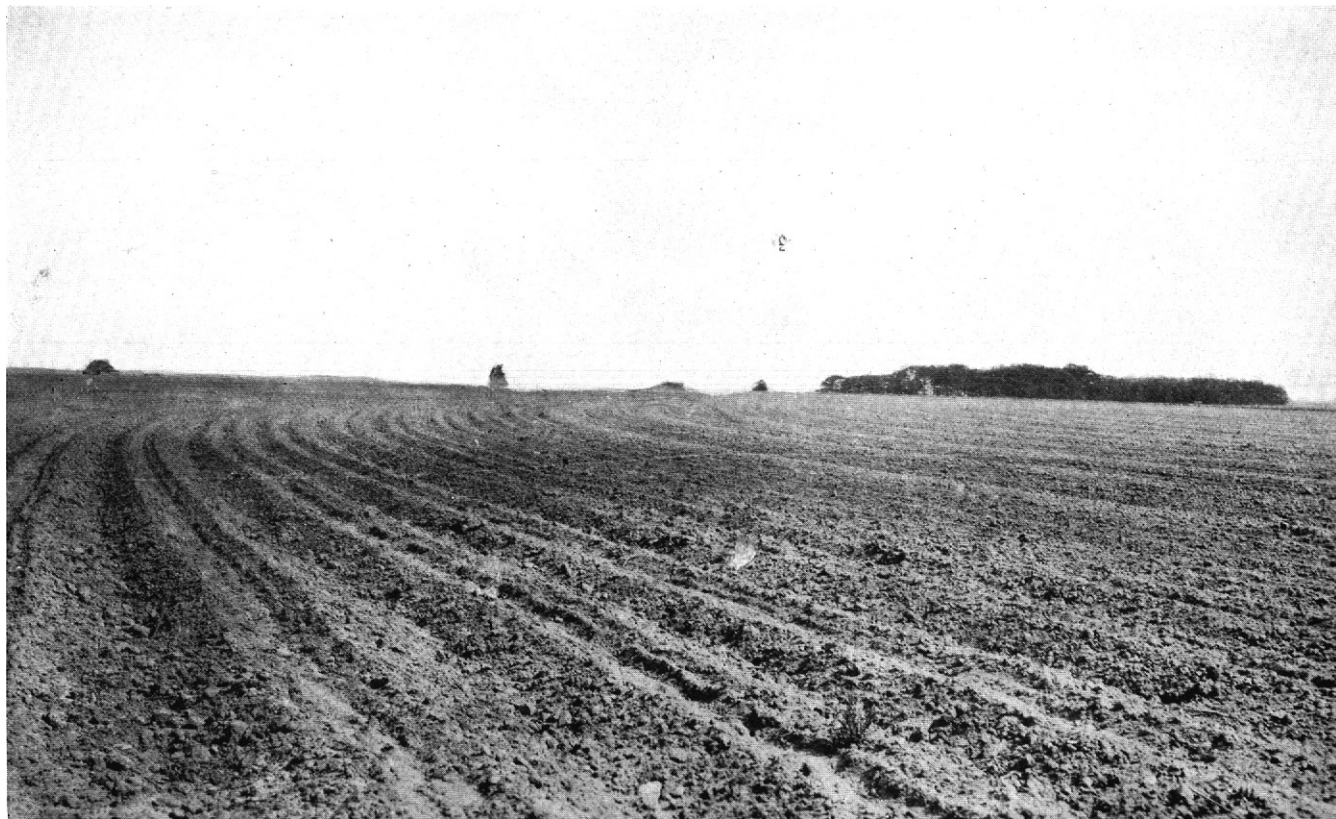
Bancroft is the favorite variety. Texas Rust Proof, Appler, and Red Rust Proof are also grown. Where it is impracticable to plant oats in the fall and spring planting must be done the Burt is the most satisfactory variety.

The oat crop is harvested during June, usually with a mower, few binders being used for this purpose. Oats are generally fed in the straw. Those grown for sale—and a small part of the crop is sold—are thrashed.

Cowpeas, both for seed and forage, are becoming a crop of considerable importance. Where grown for hay, the seed is generally sown broadcast on land from which oats have been harvested. The crop is sowed during late June or early July and harvested about



PROVIDENCE "CAVE," SHOWING CHARACTER OF ROUGH GULLIED LAND.



AREA OF ORANGEBURG SANDY LOAM, SHOWING LEVEL TOPOGRAPHY OF THE BETTER UPLAND SOILS.

the last of September or early in October. Yields of one-half to 1½ tons of hay per acre are obtained, the yield depending upon the natural productiveness of the land and the fertilization given to the preceding crop. Ordinarily fertilizer is not applied to land in this crop. Good yields of peavine hay are cut from the bottom lands, especially from the Hannahatchee sandy loam.

Where grown for seed or as a soil renovator, cowpeas are sowed in the corn, generally at the last, but preferably at the next to the last, cultivation, in order that they may receive at least one tillage. Where the corn rows are only a short distance apart the cowpeas are planted in the drill with the corn, while where the distance between the rows is greater the seed is planted in the center furrow. The peas are picked by hand during the month of October. In many cases the crop is left to be pastured by hogs.

The Unknown, Whippoorwill, and Iron varieties are most commonly used. It has been found through practice that cotton following cowpeas is more subject to root rot or wilt disease, and for this reason many farmers object to the use of cowpeas. This danger may be minimized by the use of the Iron cowpea and a resistant variety of cotton.

The production of wheat has decreased from about 13,000 bushels from 2,652 acres, reported in the 1880 census, to a virtual abandonment of the crop during the last few years. According to the census of 1910, only 171 bushels were produced in Stewart County in 1909, this being harvested from 21 acres. This decline is due largely to economic conditions. Where wheat is produced it is generally grown in small fields and the product is milled at home.

According to the census of 1910, no rye was produced in Stewart County during 1909. Formerly a small acreage was devoted to this crop each year. Rye is an excellent winter crop to prevent soil erosion and furnish grazing in winter and spring.

Although most of the soils of Stewart County are well adapted to trucking, very few garden vegetables are grown. The gardens of the individual farms are small, and in the aggregate not enough vegetables are produced to supply the local demand, large quantities being shipped into the county from other points in the State and from Florida. Scarcely any white or Irish potatoes are grown, and sweet potatoes are grown only to supply home needs, 211 acres being devoted to this crop in 1909, with a production of 16,118 bushels. Sweet potatoes are apparently grown on a smaller acreage each year.

Each farm has a small patch of sugar cane, from which sirup is manufactured at home. On most of the farms comprising red soils, the product has a dark color though good flavor. The cane grown on the gray sandy soils, however, produces a sirup of superior quality, having a lighter color and better flavor. The quantity of

sirup produced is not sufficient to supply local needs. The sugarcane patch is always selected with reference to favorable moisture conditions, being generally located in a small depression or along a drainage course.

The value of the live stock of the county steadily declined from \$651,516, reported in the 1860 census, until about 1880, when a value of \$240,986 was reported. Since that time it has increased, amounting to \$289,308 in 1900 and \$533,163 in 1910, an increase of \$243,855 during the last decade. The live stock products of the county are insufficient for local needs, and each year thousands of dollars are expended for meat and other animal products outside the county. According to the 1910 census the value of animals slaughtered on the farms in 1909 was \$49,113. On many of the farms no cows are kept. The value of all dairy products, excluding milk and cream used at home, as reported by the same authority, is \$25,341. About 300,000 gallons of milk are produced, of which less than 2,000 gallons are sold. Through years of neglect and inbreeding, the native cattle have deteriorated. At present, however, the raising of live stock is receiving somewhat greater attention, and there is a tendency to improve the grade of animals by importing purebred cattle. Hogs also are steadily being improved.

The county offers special opportunities for dairying and live-stock raising. There is a large total acreage of land which can not be utilized advantageously for general farming, but which may be used for pasturage. The fertile bottom lands, which generally occur within the large areas of untillable land, are capable of producing profitable yields of corn and hay, suitable for fattening the stock for market. In some areas absence of water during the entire year is a serious drawback, but this condition, as a rule, exists only in restricted areas. In general farming a part of the products which would otherwise be lost may be used by the live stock.

Crop rotation is practiced by the best farmers of the county so far as is practicable under the tenant system. The systematic rotation of crops, however, is not followed generally in the county. Many fields have been planted to corn or cotton successively for the last 30 to 50 years, commercial fertilizers being depended upon to maintain the yields. In many cases the fields are planted to one crop as long as possible and then rested by being allowed to lie idle for a time. As a rule the better method is to turn under a growing crop, such as rye or oats, rather than to allow the field to grow up in noxious weeds.

The rotation commonly practiced in the county consists of cotton the first year, corn with cowpeas planted between the rows the second year, and oats the third year, followed by cowpeas for hay. Some farmers do not follow the oats with cowpeas the third year, but use the land

for pasture after removing the oats. In other cases corn and cotton are alternated every few years. The most satisfactory crop rotations are those which include a legume, such as cowpeas, velvet beans, or vetch. Velvet beans, like cowpeas, are very beneficial to the soil. In several places in the county their effect has been manifested for several years after the crop was removed. The system of planting clean-cultivated crops has seriously depleted the organic-matter content of the soils. The use of legumes and fibrous root crops, such as the small grains, tends to replenish the supply of organic matter.

The systematic rotation of crops is beneficial because less dependence need be placed upon the success of one crop. The more prudent farmers are preparing to meet boll-weevil conditions by working out definite crop rotations suited to the needs of their particular farms and a changed plan of agriculture.

An expenditure of \$130,277 for fertilizers is reported in the 1910 census. This amount is almost three times that reported in 1900. Most of the fertilizer used is bought ready mixed. The home mixing of fertilizer is followed on a number of large plantations along the river and by a few farmers in other parts of the county.

Little attention is given seed selection. The farmers generally provide seed by holding a part of their crop for this purpose, regardless of the character, growth, or condition of the plants. Some obtain seed from a neighboring farm when a change of seed is desired, or from a seed firm. In ginning cotton the seed in many cases becomes badly mixed.

A few farmers have improved their crops by exercising care in the selection of seed. Local varieties of certain crops, such as Carter's Blue Ribbon corn and Rood's Improved Yellow Bancroft oats, are the result of such selection.

Since the soil types of the county are numerous, and since certain types are better adapted to certain varieties of a particular crop than to others, it is necessary for each farmer to select the seed of those plants best suited to his individual conditions. Best results are had where the seed are taken from vigorous plants free from disease. On lands affected by the cotton wilt or root rot an excellent opportunity is afforded to select seed from plants which offer the greatest resistance to such conditions.

The gradual improvement of agricultural methods in Stewart County is accompanied by an increase in the number of improved farm implements used. According to the census of 1910 the value of the farm implements and machinery is \$129,500, an increase of \$53,280 over that reported in 1900.

The land is plowed or broken by the use of two-horse turning or disk plows, instead of the small one-horse "dixie," which was formerly used. A few subsoil plows are used. Disk harrows are used

in preparing the seed bed after plowing. In some cases these are used instead of plows, but this practice is not encouraged by the best farmers. One-horse and two-horse riding and walking cultivators are displacing the 1-foot plowstocks which are common to the South. Mowers are in common use, while reapers and grain drills are becoming more popular each year. Hay presses and the heavier types of farm implements are also being introduced. The stalk cutter is in common use, and its utilization assists materially in conserving the organic matter in the soil by leaving the old stalks, which were formerly burned, to be plowed under.

The percentage of farms operated by the owners is gradually decreasing. In 1880, 64 per cent of the farms were operated by their owners. During the next 10 years the percentage decreased to 29 per cent, and now only about 19 per cent are operated by the owners. This decrease has resulted in a decline in the productiveness of the land, since ordinarily the tenants pay little attention to the maintenance or improvement of the soil. They generally devote the entire farm to one crop continuously unless encouraged to do otherwise by the owner.

Two systems are followed in Stewart County in leasing farm lands. A definite cash rent or its equivalent may be exacted or the land may be farmed on shares. When the land is rented for a definite amount the owners usually receive two 500-pound bales of cotton for an average-size farm of 30 to 35 acres. Under the share system the landlord furnishes all tools, implements, stock, and feed for the stock, while the tenant furnishes the labor, and the proceeds are divided equally between owner and tenant. The cost of the fertilizer is divided between the two. On some farms of naturally productive land with good improvements a rental of three 500-pound bales of cotton is paid for a "one-horse" farm.

An expenditure of \$120,911 for labor is reported in the 1910 census, a decrease of \$44,759 from that reported in 1900. No difficulty is experienced in securing farm labor. For ordinary farm work laborers are paid from 50 cents to \$1 a day, according to the nature of the work and the ability of the laborer. Cotton is picked at standard rates of 50 cents to 60 cents per 100 pounds of seed cotton. When employed by the month the laborers are paid about \$12 a month, with board.

According to the census of 1910, there are 214,502 acres of land in farms in Stewart County, with 122,253 acres classed as improved. The average size of the farms is 132.2 acres.¹ The land holdings range from a few acres to 5,000 acres or more. The county contains many large plantations of over 1,000 acres. The development of ag-

¹ The United States census classifies each tenancy as a farm.

riculture in Stewart County must depend largely upon these large plantations being subdivided and opened to settlement.

SOILS.

Stewart County is underlain by material of the Cretaceous and Tertiary periods. The former is represented by the Ripley series, which consists here of two members, the Providence and Cusseta formations, Upper-Cretaceous in age. The Tertiary is represented by the midway formation of the Eocene period.¹ The line between the Cretaceous and the Tertiary is irregular, extending from the eastern boundary in a general southwesterly and westerly direction across the county. Lumpkin marks the southern extremity of the Cretaceous material, which occupies the northern half of the county.

The soils of the county are differentiated into 43 types, exclusive of Meadow, Swamp, and Rough gullied land. These types are separated on the basis of derivation, character of material, such as color, texture and structure, and drainage and topography. The large number of soils in the county is partly due to the outcropping of strata of different underlying materials which have been exposed by severe erosion. The eroding forces have been especially active on account of the great differences in elevation between that part of the county which represents the original upland and the Chattahoochee River bottoms.

There is a difference in elevation between Lumpkin and the Chattahoochee River first bottoms, due west, of approximately 350 feet. This variation occurs within a distance of about 13 miles. The slope of the original upland plain was toward the south and southeast, but the tributaries of the Chattahoochee River flowing westward have cut back into the plain, exposing the many beds of differing soil-forming materials.

With a few exceptions, the several types of soil in Stewart County occur in complicated areas, and no very large areas of any one type are found. In many cases it is even difficult to classify satisfactorily the soil of a small area of 20 acres or more on account of the wide variation in the material. A local expression, "Twenty soils may be found within the length of an ordinary furrow," indicates the condition which actually exists over much of the county, so that it is not everywhere possible to delineate accurately on a map of the scale used the definite boundaries of the various types, and in many instances it is impossible to show all the soils which occur within narrow limits. In such cases the predominating soil is designated on the map and the phases and other soils within these boundaries are described in the report.

¹ Geology of the Coastal Plain of Georgia, Geological Survey of Georgia.

The soils of the county are grouped under three broad divisions, according to their derivation, namely: upland soils, old stream terrace or second-bottom alluvial soils, and overflowed first-bottom or recent alluvial soils.

The upland group comprises all of the soils not derived from stream-deposited sediments. The upland soils are the direct result of the weathering of very old unconsolidated sedimentary material of several Coastal Plain formations. Those soils having a common origin and similar physical characteristics, except texture, are grouped into series. Those found in the upland fall in the Greenville, Orangeburg, Ruston, Norfolk, and Susquehanna series. The differences in these series, especially in color, are due partially to chemical changes, principally oxidation processes. The Orangeburg and Greenville differ in the color of the surface soil, and the Ruston differs from the Norfolk in that the former carries large quantities of ferruginous or ironstone concretions or accretions.

The terrace soils of the county are made up of old stream alluvium, deposited at earlier stages in the development of the streams. They are elevated above the first bottoms. Along the smaller streams these soils are so dissected by erosion that the bluffs dividing the terraces from the first bottoms are generally indistinct. From the Chattahoochee River inland the terraces are developed in a step-like series. The difference in elevation between the terraces ranges from about 5 to approximately 75 feet. The terraces are occupied by soils of the Cahaba, Chattahoochee, Amite, Kalmia, and Leaf series.

The alluvial soils subject to overflow are composed of material recently deposited by the streams. Of these soils the Hannahatchee sandy loam represents material washed from the surrounding upland soils, chiefly from the Susquehanna, Greenville, Orangeburg, and Ruston series. This type is quite variable but ranks with the most productive land of the county. The first bottoms of the Chattahoochee River, subject to heavy inundation, are of recently deposited alluvium derived, at least in large part, from soils of the Piedmont sections of the State. These bottoms are occupied by the Congaree silt loam, which shows some textural variations near the river bank.

Other classifications recognized in the county represent conditions rather than types of soils. The Rough gullied land comprises rough, severely eroded, nonagricultural upland slopes. Swamp includes the narrow first bottoms along some of the streams. It is subject to heavy inundation. Meadow consists of the variable alluvial first bottoms along the streams. It consists principally of sands washed in from the uplands.

The soils of the county range in texture from coarse sand to heavy clay, and in structure from loose and incoherent to impervious and plastic. They vary from nonagricultural land through soils of low to medium productivity to the strongest found in the southern part of the State and are adapted to a wide range of crops.

The following table gives the names and actual and relative extent of the several soils mapped. The distribution of the soils is shown upon the accompanying map.

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Rough gullied land.....	37,312	12.5	Greenville loamy coarse sand..	2,048	0.7
Susquehanna clay.....	33,536	12.4	Ruston sand.....	2,048	.7
Smooth phase.....	3,648		Greenville gravelly clay loam..	1,984	.7
Ruston coarse sand.....	29,632	9.9	Leaf loam.....	1,472	.5
Orangeburg sandy loam.....	16,512	7.7	Kalmia sand.....	1,344	.4
Compact subsoil phase.....	6,656		Orangeburg sand.....	1,344	.4
Hannahatchee sandy loam....	14,912	5.0	Amite loamy coarse sand.....	1,216	.4
Greenville coarse sandy loam..	14,080	4.7	Amite sandy loam.....	1,216	.4
Greenville sandy loam.....	13,312	4.5	Kalmia gravelly sandy loam...	1,088	.4
Orangeburg coarse sandy loam..	13,120	4.4	Orangeburg clay.....	1,024	.3
Norfolk sand.....	12,800	4.3	Kalmia fine sand.....	960	.3
Greenville clay loam.....	11,136	3.7	Congaree silt loam.....	896	.3
Meadow.....	9,856	3.3	Cahaba sand.....	768	.3
Ruston sandy loam.....	7,616	2.5	Orangeburg stony sandy loam...	640	.2
Ruston coarse sandy loam....	6,144	2.1	Ruston gravelly sandy loam...	512	.2
Susquehanna sandy loam.....	6,080	2.0	Chattahoochee sandy loam...	448	.1
Swamp.....	5,376	1.8	Chattahoochee loamy coarse sand.....	448	.1
Cahaba sandy loam.....	4,928	1.6	Amite coarse sandy loam.....	256	.1
Kalmia fine sandy loam.....	4,736	1.6	Cahaba loamy coarse sand....	192	.1
Norfolk fine sand.....	4,672	1.6	Cahaba coarse sandy loam....	192	.1
Orangeburg coarse sand.....	4,480	1.5	Kalmia coarse sandy loam.....	192	.1
Susquehanna fine sandy loam..	4,288	1.4	Chattahoochee coarse sandy loam.....	64	.1
Cahaba fine sandy loam.....	4,160	1.4			
Kalmia sandy loam.....	3,968	1.3			
Ruston fine sandy loam.....	3,200	1.1			
Cahaba clay.....	2,368	.8			
			Total.....	298,880	.....

GREENVILLE SERIES.

The soils of the Greenville series are reddish brown to dark red, and generally loamy. The subsoils consist of red, friable sandy clay. The types occupy level to gently rolling areas in the Coastal Plain uplands. They are closely associated with the members of the Orangeburg series in their distribution and, like them, are derived, for the most part at least, from the unconsolidated beds of sands and clays. The subsoils, however, are influenced to some extent by the limestone that often underlies the series.

GREENVILLE LOAMY COARSE SAND.

The surface soil of the Greenville loamy coarse sand consists of a reddish-brown, friable coarse sand, extending to an average depth of about 8 to 10 inches. The subsoil is a coarse sand, containing sufficient interstitial fine material, red clay, to give it a decidedly loamy character and a dull-red color. This fine material acts as a binder in holding the coarse particles closely together, much as cementing material would, and thus prevents the loose, incoherent structure such as that of the Ruston and Orangeburg coarse sands. Even in the surface soil there is a sufficient quantity of fine particles to cause the soil, on drying, to become slightly compact. In a few places coarse sandy clay occurs at a depth of about 30 inches.

The topography of the Greenville loamy coarse sand is level to gently undulating. The type occupies some of the smoothest areas in the county, such as the crests of ridges and interstream areas. Throughout the type the drainage is good. Rainwater is readily absorbed, and the texture and structure of the soil favor the retention and circulation of moisture.

The Greenville loamy coarse sand is not an extensive soil. One of the largest and most typical areas occurs in the southeastern part of the county, at Pisgah Church. Another typical area lies one-half mile north of Ben Daniel Church. Other areas of importance are scattered throughout the south-central and southeastern sections of the county.

This is an important soil, considering its relatively small acreage. It is easily cultivated, and can be worked under a wide range in moisture conditions, little permanent injury being caused even when it is plowed in a wet condition. Fall plowing is not so essential as in the case of the other soils of the Greenville series found in this county.

A wider range of crops can be successfully grown on this soil than is usually the case with such sandy soils. Early truck crops succeed, as do the general farm crops, such as cotton, corn, oats, and forage crops. The yields secured are usually much lower than this soil would be capable of producing with proper management. The ordinary yield of cotton is about one-half bale per acre; corn, 15 bushels; oats, 12 to 15 bushels; and cowpeas, one-half ton of hay. Sugar cane produces a dark-colored sirup of inferior flavor compared with that produced on soils having yellow subsoils.

All of the type has been cleared of its virgin forest growth and is utilized for farming. The value of the land ranges from \$15 to \$60 an acre, depending upon location and improvements.

GREENVILLE COARSE SANDY LOAM.

The Greenville coarse sandy loam consists of a reddish-brown or red coarse sandy loam or loamy coarse sand, which extends to depths ranging from about 8 to 12 inches. This is underlain by a deep-red friable coarse sandy clay, which extends to a depth of 3 feet or more, becoming somewhat heavier with increasing depth. In places there is immediately beneath the surface soil a layer of dark-red coarse sandy loam, sometimes as much as 10 inches in thickness. Upon exposure for some time after cultivation the fine clay particles, which give the soil its red color, are washed out and the immediate surface becomes a brownish-gray coarse sand.

As mapped in Stewart County this type includes some areas which have a sandy loam surface soil, but which the presence of some coarse particles renders decidedly gritty. In some places it was necessary to separate this type from the Greenville sandy loam by a rather arbitrary line, owing to the way these two soils grade into each other. The type differs from the Orangeburg coarse sandy loam in having a red instead of a gray or reddish-gray surface soil, but in this case also the soils pass one into the other so gradually that it is sometimes difficult to place the boundary lines.

The Greenville coarse sandy loam is typically developed in the vicinity of Pleasant Valley Church, about 6 miles west of Richland. Typical areas are also found within a mile of Lumpkin. The larger part of this soil is found in close proximity to the Webster County line, extending in rather irregular areas from Richland southward toward Lime Spring Branch. Other areas occur in the vicinity of Adams Mill, Providence School, Humber School, and at various places along Hodchodkee Creek. Many other small areas of the type are developed within this section of the county.

The topography is gently undulating to rolling, the type occupying stream divides, slopes, and the upper part of narrow ridges. The drainage is uniformly well developed. Terracing is necessary to prevent the gulying and washing of sloping areas at times of heavy precipitation.

Owing to the coarser and looser nature of the surface soil, the Greenville coarse sandy loam is somewhat more easily cultivated than the sandy loam and clay loam of the series. This type is also somewhat earlier than these heavier soils and is more subject to drought. It is farmed in the same way as the other sandy soils of the county. The yields of the various crops are about equal to those obtained on the Greenville sandy loam and depend largely upon the attention given to cultivation. It requires about the same treatment as the Greenville sandy loam. The land originally supported a growth

of oak and hickory, with some longleaf and shortleaf pine, but this has been removed.

GREENVILLE SANDY LOAM.

The Greenville sandy loam consists of a red friable sandy loam or loamy sand, underlain at an average depth of about 9 inches by dark-red, friable, heavy sandy clay, which becomes somewhat heavier and slightly stickier at lower depths. The texture of the surface sometimes ranges close to a coarse sand, but it averages a medium sandy loam, with subangular to rounded grains. It is not uncommon to find some reddish-gray material in the immediate surface, especially where the Orangeburg sandy loam is approached. After standing undisturbed for some time the surface assumes a grayer color, on account of the removal of the finer red particles by rainwash, but subsequent plowing restores the characteristic red color. In places rounded ferruginous pebbles are scattered over the surface, but these are not abundant enough for such areas to be classified as a distinct type. There are also included with this type small areas where the surface material has been washed off, giving rise to Greenville clay loam. Such areas are too small to be shown separately on a map of the scale used.

The Greenville sandy loam is an important type in Stewart County. It comprises a large part of the land now devoted to agriculture. It occurs principally in that part of the county drained by Hodchodkee and Pataula Creeks and their tributaries. One comparatively large area extends from the town of Richland northward. Several areas occur in the vicinity of Lumpkin, while a body of considerable size is encountered at Brooklyn, in the northeastern part of the county.

The type occupies stream divides that have a gently undulating to sloping topography, the slopes toward the streams, some slight knolls associated with the Orangeburg soils, and sometimes the steeper slopes along stream courses. Its general topography varies from gently undulating to sharply rolling. The surface relief insures ample drainage and in some places a too rapid run-off. To prevent erosion it is necessary to terrace the steeper slopes, but on the smoother areas ordinary rainfall is largely absorbed and retained.

Originally this type supported a deciduous-tree growth, consisting chiefly of oak and hickory, with some shortleaf and longleaf pine. There is also some walnut, dogwood, sassafras, persimmon, and an occasional cedar on the few timbered areas. Nearly all of this land was cleared for agricultural use early in the occupation of the county, and nearly all of the type is at present under cultivation. Broom sedge spreads rapidly over the uncultivated fields.

This soil has a high agricultural value. The sandy surface permits easy cultivation, working up readily into an excellent seed bed when in the proper moisture condition. Some care is necessary in this respect, for if broken when too wet there is danger of clodding, especially when the subsoil is near the surface.

The Greenville sandy loam is used for general farming, to which it is very well suited. Where rotations are employed, thorough preparation and cultivation given, and acreage applications of about 300 to 500 pounds of commercial fertilizers made, cotton yields as much as a bale or more, corn 20 to 40 bushels, oats 20 to 25 bushels, and cowpeas from three-fourths to $1\frac{1}{2}$ tons of hay per acre. The average yields on the type are considerably lower than those stated, because of inefficient methods on a good many farms.

In some counties of Georgia peaches, pears, and small fruits, particularly strawberries, are profitably grown on this type of soil.

GREENVILLE GRAVELLY CLAY LOAM.

The surface soil of the Greenville gravelly clay loam consists of a reddish-brown to reddish gravelly clay loam to sandy clay loam, with an average depth of about 5 inches. The subsoil is a dark-red, friable gravelly sandy clay, which extends to a depth of 36 inches or more. Typically the gravel is found throughout the soil section, but it may occur only on the surface, in the soil, or in the subsoil. The gravel consists of iron-cemented sandstone or claystone, and the particles, though small, are in many places sufficiently numerous to make plowing somewhat more difficult than on the Greenville clay loam.

The type is not extensive in Stewart County. One relatively large area is mapped about $3\frac{1}{2}$ miles east of Lumpkin, and another, beginning about one-fourth of a mile southeast of Brooklyn, extends southward about $1\frac{1}{2}$ miles as a narrow strip. The other areas occur in the southern and eastern sections of the county or within the general limits of the red sandy soils. The type occupies narrow ridges and upper slopes of ravines, and is encountered around the heads of small streams. It sometimes occurs in areas too small to map separately. The soil, on account of its topographic position and open character, is always well drained.

The Greenville gravelly clay loam is a good agricultural type, capable of producing a bale of cotton and as much as 40 bushels of corn, 40 bushels of oats, and a ton or more of cowpea hay per acre. On the majority of farms the yields at present are considerably lower than these, as most of the land is farmed by tenants. The type is in need of organic matter. The breaking and tillage of this soil requires a much heavier equipment than the sandy types, and it is not properly handled.

The Greenville gravelly clay loam is in part forested with hardwoods, such as oak, hickory, and dogwood, and with shortleaf pine.

The value of land of this type is practically the same as that of the adjoining types, ranging from \$20 to \$60 an acre, depending upon improvements and topography.

GREENVILLE CLAY LOAM.

The typical Greenville clay loam is a dark-red to dark reddish brown clay loam or sandy clay loam 5 or 6 inches deep. This passes into a dark-red sandy clay which continues to 36 inches.

In some places, especially on the tops of ridges and along the foot of slopes, the surface soil of this type is a reddish-brown sandy loam, passing at a depth of 2 to 5 inches into a red sandy loam and quickly into a red sandy clay.

In places where the soil has not been disturbed by plowing the immediate surface is usually grayish brown and somewhat lighter than typical, but ordinary plowing brings enough of the red clay to the surface to make both texture and color more nearly like the type description. This phase occurs in areas of varying size and in various topographic positions.

Eroded patches of the Greenville clay loam also occur. These are found on knolls, slopes, and in other like positions. In such areas all the lighter-textured material has been washed off and the friable sandy clay subsoil exposed. These washed spots are too small to be shown on the map.

It is not uncommon in this type to find areas carrying varying quantities of gravel similar to that in the gravelly soil just described, but the quantity is insufficient to separate such areas as a coarser-textured type. While this type is associated generally with other Greenville soils, it can easily be distinguished by its generally heavier texture and its deeper red color. The material stands in perpendicular walls in road cuts, and in places has a dark-chocolate color and an oily appearance.

The Greenville clay loam is one of the strongest upland soils of the county. Although, because of its heavier texture, it is not adapted to as wide a range of crops as are the more sandy soils, the yields of the general farm crops are higher. Cultivation of this soil is also limited to a narrower range in moisture conditions. When plowed too wet it clods badly, the clods subsequently drying out and being difficult to pulverize, and when dry the land is too hard and compact to plow satisfactorily. Yet, with all these limitations, this soil once built up is quite durable, and larger yields can be obtained upon it than on any other of the upland types. The soil absorbs a large quantity of moisture, but very slowly, and during heavy rains much of the water runs off instead of sinking into the

soil and subsoil. Where the land is plowed deeply and subsoiled much of this moisture is retained for the growing crops, and for this reason it is an excellent practice to increase the depth of plowing about 1 inch each year until a depth of at least 12 inches is reached. By breaking the land too deeply at one operation the soil may be materially injured, as the turning up of too much of the raw clay at one time is harmful.

The Greenville clay loam is almost entirely confined to the southern part of the county. There are no large areas. The type is extensively developed in the vicinity of Wesley Chapel and of Bethel Church, and about 1 mile southwest of Adam Mill. Around Providence Church are found areas of the sandy surface phase, while several miles east of Lumpkin there are small areas which contain some gravel. This soil is also extensively developed in the vicinity of Richland and Buelah Church. Many other areas of varying size are found throughout the southeastern part of the county.

The Greenville clay loam occupies gently undulating stream divides, gentle slopes from the tops of ridges toward the stream courses, high knolls, and slightly rolling country along some of the stream courses which flow through sandy areas. Although the topography is not very rolling, it is necessary in many places to terrace the land to prevent injurious erosion. Numerous streams in this section of the county provide ample drainage outlets for all of this type, and only in one or two depressed areas is there any tendency for water to accumulate.

This type is derived from beds of heavy sandy clay occurring in the smoother part of the county and about 7 to 100 feet in thickness. The area of this type is gradually being increased by erosion of the sandy loam members of the series.

The Greenville clay loam, which is locally designated as "red clay land," formerly supported a growth of hickory, oak, dogwood, and some shortleaf pine. This has been removed in clearing the land for agriculture. Some locust remains, and in the abandoned fields sassafras and young pine.

Most of the Greenville clay loam is under cultivation, being devoted to the production of cotton, corn, oats, and cowpeas. Cotton yields from one-half to 1 bale or more per acre, depending upon the management of the land. Corn yields vary from 10 to 50 bushels per acre. Oats produce from 15 to 40 bushels per acre, and cowpeas from one-half ton to 1½ tons of hay. The yields of these various crops are materially increased by deeper plowing and better preparation of the seed bed, by turning under crops of cowpeas, and by fertilizing with high-grade fertilizers in liberal amounts. Although

the cultivation of this soil requires considerable care and labor, the results are very satisfactory.

Land values range from \$20 to \$100 or more an acre, depending upon location and improvements as well as topography.

ORANGEBURG SERIES.

The soils of the Orangeburg series are marked by their gray to reddish-brown color and open structure. The subsoils consist of a red friable sandy clay. The series is confined to the uplands of the Atlantic and Gulf Coastal Plain, being most extensively developed in the section extending from southern North Carolina to central Texas. The soils are derived from unconsolidated deposits of sand and clays.

ORANGEBURG COARSE SAND.

The Orangeburg coarse sand is a loose, incoherent coarse sand, gray at the surface and reddish to yellowish immediately beneath and from 6 to 14 inches deep. The subsoil is a light-red, loose coarse sand, which in some places becomes heavier or loamy in the lower part of the 3-foot profile and in some small areas along the brows of hills a coarse sandy clay may be encountered below a depth of about 35 inches. Over the surface and throughout the soil mass there is found some fine to coarse rounded quartz gravel.

The Orangeburg coarse sand is developed chiefly in the southeastern part of the county. One of the largest areas occurs along the Randolph County line east of the Summerfield bridge. Another large area is encountered about 5 miles south of Lumpkin on the lower Lumpkin-Eufaula Road. Areas of various size are scattered about irregularly over this part of the county. The most extensive area occupies rolling country comprising a series of ridges and valleys or depressions, while the smaller areas occur on knolls, slopes, and level upland stream divides. In several instances this soil is developed on long gentle slopes which flatten out as the stream courses are approached.

This type is well to excessively drained, both as a result of the topography and the open structure of the soil and subsoil material. The soil has little power to hold moisture, and crops suffer from lack of moisture during dry spells.

As with the other soils of the Orangeburg series, the coarse sand is derived from sedimentary Coastal Plain deposits, but the type is formed from deep beds of coarse sand, the underlying strata of sandy clay lying too far beneath the surface to have any influence upon the agricultural value of the land.

By reason of its open nature and low water-holding capacity, together with its rolling topography, this soil is not so well suited to

general farming as to trucking. A very small acreage of this soil is under cultivation, and the areas which are farmed are generally associated with stronger soils. During seasons of ample rainfall cotton yields about one-third to one-half bale per acre and corn 10 to 20 bushels, with fertilization.

ORANGEBURG SAND.

The Orangeburg sand consists of a grayish sand, underlain at a depth of about 6 inches by red sand of medium texture. This grades into a brick-red loamy sand, which at about 3 feet rests on a red, friable sandy clay similar to the subsoil of the Orangeburg sandy loam.

This type is limited in extent. The largest tract lies 2 miles north of Alston Mill. Several hundred acres are mapped in the vicinity of Trotman in the southeast corner of the county, a small area is found north of Lumpkin, and other small areas are scattered over the county.

The topography of the Orangeburg sand is undulating to gently rolling. The soil is well drained and easily cultivated though somewhat leachy. It dries out soon after heavy rains and crops are frequently injured by drought.

This type occurs in such small scattered areas that it is of little agricultural importance. In texture it is better fitted for use in growing early peaches than general farm crops. Its proper management will include a rather liberal use of commercial fertilizer and organic manures.

This soil is used mainly for the production of cotton and corn, which produce poor yields, except where heavily fertilized and where a rotation of crops is practiced.

The forest growth consists of some longleaf and shortleaf pine, a scattered growth of oak, and some hickory and persimmon.

ORANGEBURG STONY SANDY LOAM.

The Orangeburg stony sandy loam consists of a gray, loose, coarse sand or sand containing fragments of ferruginous rock, underlain by a brick-red, compact, fine sandy clay, also stony, which extends to a depth of 3 feet or more. The rock fragments are both large and small and more plentiful over the surface than within the soil mass. The color of the soil material is noticeably brighter than in case of the Greenville material, and the structure is apparently more compact.

The type occupies sharp ridges and steep slopes. Some areas occur as rounded hilltops, mainly in association with areas of Rough gullied land. The soil is found only in small bodies.

The principal forest growth is shortleaf pine and blackjack oak. The type has no agricultural value, on account of its unfavorable topography and the resistance offered to cultivation by the rock fragments and the rather intractable character of the material.

Several small areas of this soil vary somewhat from the typical, having a gray, sandy surface soil and a yellowish-red, heavy, sticky clay subsoil, with large quantities of silicious limestone rocks scattered over the surface. These areas are the Henderson sandy loam, but since they occur in patches too small to be mapped separately they are included with this type.

ORANGEBURG COARSE SANDY LOAM.

The surface soil of the Orangeburg coarse sandy loam consists of 6 to 14 inches of gray to brownish-gray loose coarse sand to loamy coarse sand, generally becoming heavier and darker with depth. In small spots, which are not numerous where the subsoil is nearer the surface, the surface material is a reddish-brown coarse sandy loam. These darker areas are the Greenville coarse sandy loam, but can not be separated on account of their small size. Immediately below the surface soil a loamy coarse sand is encountered. This becomes heavier with depth, passing through a coarse sandy loam into a bright-red sandy clay or coarse sandy clay, usually at depths between 14 and 30 inches, and extends to a depth of several feet. In places the subsoil is mottled with yellow.

The Orangeburg coarse sandy loam is not restricted to any particular part of the county. It occurs in areas ranging from 10 to several hundred acres in size, which are more numerous in the southern half than elsewhere. The areas are generally well defined, but occasionally merge into the adjoining types, so that boundary lines could not be definitely placed. The type occupies undulating stream divides, knolls, and slopes. The coarser textured material is generally encountered on the slopes toward the stream courses. There are some eroded and broken areas, and it is often necessary to protect the slopes by terracing. Owing to the porous nature of the soil and the rolling and sloping topography, the drainage is good.

Crops on the Orangeburg coarse sandy loam are more subject to injury by drought than on the sandy loam. It is also an earlier soil. It is used for the same crops as the Orangeburg sandy loam, but the yields are somewhat lower than on that type. This type is deficient in organic matter. The coarse texture permits the oxidation and leaching of such organic matter as becomes naturally incorporated in the soil, and it is necessary to add to the supply at frequent intervals.

The type was originally forested with various species of oak and some longleaf and shortleaf pine. Most of it is now under cultivation, though some areas once cultivated are at present overgrown with broom sedge and others with a second growth of shortleaf pine.

The best part of this type for general farming is that with a level to gently undulating topography, and with the sandy clay subsoil at a depth of 12 to 18 inches.

ORANGEBURG SANDY LOAM.

The typical Orangeburg sandy loam is a grayish-brown to brownish-gray loamy sand to light sandy loam which either passes, at a depth of about 6 to 14 inches, into red friable sandy clay or grades through a subsurface layer of yellowish to reddish loamy sand or light sandy loam into red, friable sandy clay, usually at depths between 15 and 24 inches.

In the northwestern part of the county, 4 or 5 miles northeast of Omaha, an area of Orangeburg fine sandy loam too small to map separately has been included with the sandy loam, and variations of a coarser texture also occur, the type as mapped including patches of Orangeburg coarse sandy loam. Variations in topography cause differences in the depth of the surface material, as well as in its color, which may be gray on the highest points where the sand is deepest to reddish on slopes where a large quantity of the original sand has been washed off. In the latter situations there are numerous patches of the Greenville sandy loam which are too small to be shown on the soil map. Small rounded iron concretions are sometimes scattered abundantly over the surface.

Another variation of this type occurs in a large area about 4 miles southwest of Lumpkin. In this area the soil consists of a pale-yellow loamy sand, which grades through a sandy loam into a yellow sandy clay, extending to a depth of about 24 to 30 inches, where the characteristic red sandy clay subsoil is encountered.

The Orangeburg sandy loam is one of the more extensive types in the county, occupying, with its compact subsoil phase, described hereafter, a little more than 23,000 acres, or approximately 8 per cent of the area of the county. One of the largest areas is that between Richland and Red Hill Church, in the eastern part of the county. Another large area occurs at Lumpkin and southeast, around Independence Church. The type is distributed throughout the southern part of the county in areas containing from twenty to several hundred acres. It also occurs in the northwestern part of the county, one of the largest areas in this section lying $3\frac{1}{2}$ miles west of Union, beginning at Mount Zion Church and extending southwest nearly to Hannahatchee Creek.

The Orangeburg sandy loam occupies some of the smoothest areas in the county. (See Pl. III.) It generally occurs on the level summits of the stream divides and on gentle slopes, though in a few instances it is found on steeper hillsides and in sharply rolling country. In general, however, the topography is level to gently rolling. Numerous streams and gullies have cut into the type and drainage is well established.

The Orangeburg sandy loam is a productive type, giving good yields of the general farm crops—corn, cotton, oats, cowpeas, and rye. In some sections of the South it is used in the production of truck crops, such as cucumbers, peas, cabbage, tomatoes, potatoes, cantaloupes, and watermelons. It is used with good results in some parts of the country in peach growing. The type is devoted mainly to the production of corn, cotton, and oats. The yields vary widely because of the different methods of farming employed. Where it is farmed by tenants and only small quantities of fertilizer are used, cotton yields from one-third to one-half bale, corn about 10 bushels, and oats 13 to 15 bushels per acre. Under the better methods used by progressive farmers yields of a bale of cotton, 30 bushels of corn, and 40 bushels of oats per acre are not uncommon. Cowpeas with careful cultivation yield three-fourths to 1 ton of hay. Larger yields are obtained where the type is plowed to a depth of 8 to 10 inches and then subsoiled and thoroughly harrowed until a finely pulverized bed is produced, where the crop is frequently cultivated, and where applications of 400 to 800 pounds per acre of high-grade fertilizer are made. The soil is easily cultivated on account of its light texture and favorable topography. Rainwater passes rapidly through the soil and into the subsoil. The first requirement in the improvement of this type is an increase in the organic-matter supply, which is very low. In places the construction of substantial terraces is necessary in order to prevent erosion.

Orangeburg sandy loam, compact subsoil phase.—The soil of the Orangeburg sandy loam, compact subsoil phase, is prevailingly a gray to yellowish-gray loamy sand, which grades through yellowish sandy loam into red sandy clay, beginning usually at about 8 to 10 inches. The sandy clay is moderately compact or stiff when dry, and noticeably more plastic when wet than the typical Orangeburg subsoils. The subsoil is mottled with or contains ochreous-yellow material, the color of which is believed to be due to some peculiar condition of weathering, though the material may be different in origin from that forming the typical red sandy clay subsoil. Such yellowish material is most conspicuous in the lower subsoil, being especially abundant where the substratum of whitish clay, which seems to weather into yellowish products, is nearest to the surface. In some respects, particularly in its plasticity, the subsoil approaches that

of the Susquehanna clay, but as a rule it is considerably more friable. The subsoil material thus appears to represent a gradation between the typical Orangeburg subsoils and the Susquehanna subsoil. The difference, however, is not sufficient to warrant the establishment of a new series, for, while the subsoil is somewhat stiffer than the typical Orangeburg, it is still a sandy clay possessing sufficient friability for the material to be properly classed as Orangeburg. It is possible that the stiffness of the subsoil material may be due to an incomplete stage of weathering, as compared with that reached by the typical subsoil. As mapped, the phase includes many eroded areas, where the surface material has been washed away, leaving the stiff red clay exposed. These areas are too small to be shown on the map. The phase generally occupies slopes of irregular configuration and also undulating to gently rolling divides, which, however, seldom rise to the altitude of the typical Orangeburg sandy loam.

This phase is less valuable than the typical soil, partly on account of the less favorable topography and partly because the sandy surface material is shallower and there are more included areas of raw clay, recently exposed by erosion.

The compact subsoil phase of the Orangeburg sandy loam is developed mainly in the southeastern part of the county. It occurs in bodies of various size from the Webster County line as far west as the lower Lumpkin-Eufaula Road. Its development seems to be chiefly within a low belt of country, on both sides of the Pataula Creek. Bodies of this phase are also found in the northwestern corner of the county.

On account of the somewhat plastic nature of the subsoil and the shallow surface soil, cultural operations are more difficult than on the typical Orangeburg sandy loam, a heavier farm equipment being required. It has also been found that plowing must be done when the moisture content is most favorable, for if plowed when even a little wet clods are formed, which are later difficult to break down. When the land is either too wet or too dry it is practically impossible to plow the material at all. It is locally called "cowhide land" and sometimes "lime land." Under favorable seasonal conditions good yields of the staple crops are obtained on this phase, but in no instance are the yields as good as on the typical soil.

ORANGEBURG CLAY.

This type consists of a brick-red, rather compact sandy clay which extends to a depth of 3 feet or more without important change, except that it frequently contains varying amounts of ochreous-yellow material similar to that encountered in the compact subsoil phase of the Orangeburg sandy loam. The material is somewhat stiffer and

more plastic than the typical Orangeburg sandy loam subsoil, yet it is noticeably more friable than the Susquehanna clay. The color of the material is a lighter shade of red than that of the Greenville soils.

This soil is really a clay type formed from the subsoil of the compact phase of the Orangeburg sandy loam. It is the product of erosion, comprising areas from which a former sandy covering has been removed. In a number of places the upper few inches consists of a sandy loam, but generally the depth of such material is not sufficient to make the type a sandy loam or clay loam.

This type is not extensively developed in the county. The greater part of it occurs along Fort Branch, in the southeastern part of the county, with several smaller areas in the vicinity of Union and Pleasant Grove Church, in the northwestern section. It is developed along the slopes of the streams where the surface material of sand has been washed away. Although it has a sloping topography, the drainage is not thorough, as the imperviousness of the material holds the drainage waters in every depression, such as plow furrows and wagon tracks.

This type is difficult to handle, even more so than the compact subsoil phase of the Orangeburg sandy loam. The land can hardly be plowed when too wet or too dry, as under these conditions it is almost impossible to turn. Good yields of cotton and corn are obtained when seasonal conditions are favorable. Cotton yields from one-third to 1 bale, corn from 12 to 30 bushels, and oats from 15 to 25 bushels per acre. In seasons which are either too dry or too wet the yields are materially decreased. Agricultural conditions on this type are generally rather poor.

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

Mechanical analyses of Orangeburg clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
252505.....	Soil.....	0.5	5.5	5.8	9.8	22.2	7.8	48.3
252506.....	Subsoil.....	1.1	7.9	8.2	8.2	18.0	6.4	50.2

RUSTON SERIES.

The soils of the Ruston series are gray to grayish brown, and are underlain by a reddish-yellow to yellowish-red or dull-red, moderately friable sandy clay subsoil. The series holds an intermediate place between the Orangeburg and Norfolk soils in the color of its subsoils, and a similar place between the Orangeburg and Norfolk on the one side and the Susquehanna on the other, in point of subsoil

structure. Occasionally the lower subsoils are mottled with gray and shades of yellow. The soils are closely associated with the Orangeburg and Susquehanna, and are probably derived from practically the same formation as the Orangeburg.

RUSTON COARSE SAND.

The Ruston coarse sand as mapped in this county consists of a gray to dark brownish gray coarse sand, underlain at a depth varying from about 4 to 8 inches by a loose coarse sand which varies in color from light yellowish red to deep reddish yellow. The strength of color in the surface soil is entirely dependent upon the quantity of organic matter present. Sometimes the soil contains sufficient to make it slightly loamy. The line of demarcation between the soil and subsoil is generally very clearly defined. The subsoil varies widely. In some places it is light reddish yellow, approaching the color of the Norfolk subsoil, while in other places it is red, like the Orangeburg subsoil. This is a gradational type between the Norfolk coarse sand and the Orangeburg coarse sand, and areas of these two types, too small to be mapped separately, are included with it. Fragments of a coarse-grained ferruginous sandstone are scattered over the surface in some places and may be found in the soil and subsoil.

The Ruston coarse sand, which is the third most extensive type in the county, is developed in a belt of country which begins in the northeastern part of the county and extends in scattered tracts to the southwest corner. The type includes the large areas locally called "sandy land" which occur between the level of the smooth upland plain and the belt of hilly clay land. It is typically developed several miles south of Renfroes, 2 miles north of Lumpkin, on the road to Louvale, and in the vicinity of Spring Hill Church, in the southwestern part of the county.

The Ruston coarse sand occupies long, smooth slopes and smooth, rounded ridges. Very little, if any, of the type has level topography. Bodies of this soil are interrupted by areas of Rough gullied land, which occur about the heads of many streams rising in this belt of country. This condition gives the region in which the soil is found a generally rough topography, although the type itself is gently undulating to slightly rolling. Owing to the lay of its surface and its porous nature the type is well drained.

The Ruston coarse sand is a soil of low productiveness. The open and incoherent nature of the subsoil allows the drainage waters to percolate through it rapidly, and crops suffer during periods of drought. Through cultivation for a year or two the organic material contained in the soil is lost by oxidation and leaching, making the soil even more leachy and more subject to drought than at first.

The Ruston coarse sand originally supported a growth of longleaf and shortleaf pine, with some oaks of various species and an occasional hickory. This timber was removed early in the history of the county, when the land was first cleared for cultivation. Upon the uncultivated areas there is now a scattering of second-growth longleaf and shortleaf pine, some scrub oak, and a heavy growth of broom sedge.

Much of the land is used for pasture. A very small percentage is utilized in the production of the general farm crops. Where so used it is allowed to lie out of cultivation, or rest, every second or third year. Cotton ordinarily yields from one-fifth to one-third bale per acre, but heavier yields are produced under careful management. Various grades of fertilizer are applied at the rate of 200 to 300 pounds to the acre. Corn ordinarily yields from 8 to 15 bushels per acre.

The value of this land varies from \$5 to \$20 an acre, the price depending upon location and improvements.

RUSTON SAND.

The Ruston sand is a loose, incoherent sand ranging from about 9 to 20 inches in depth. The surface soil to a depth of 4 to 6 inches has a light to dark grayish color, but as depth increases it becomes yellowish. The subsoil consists of a yellowish-brown to reddish, slightly loamy sand. In places a few inches of reddish sandy clay is encountered within the 3-foot section, and as a rule this type is underlain at $3\frac{1}{2}$ to 4 feet by a sandy-clay stratum.

Practically all of the Ruston sand is found in the extreme southeastern corner of the county, in the vicinity of Trotman. A few small areas occur in the northeastern part of the county. Very small areas, too, are included with the Norfolk sand in the northwestern section of the county. As mapped in the vicinity of Trotman, this type includes areas of Norfolk sand and Ruston fine sand too small to be shown separately.

The Ruston sand generally occupies high ridges between small drainage ways, the slopes around the heads of streams, and occasionally more nearly level areas. Owing to its gently rolling to rolling topography and loose structure this type is naturally well drained.

The type is not extensively cultivated. It was formerly used largely for corn and cotton. It is naturally somewhat leachy, and this condition has been intensified by the failure to maintain the supply of organic matter. At present much of the land is out of cultivation and rapidly growing up in scrubby forest.

The soil is a better type for trucking than for general farming. Cotton, oats, and corn do fairly well with proper management. Yields of one-third bale of cotton, 20 to 25 bushels of corn, and 30 to 35 bushels of oats are obtained. Commercial fertilizers are necessary to obtain these yields. The type is noticeably more productive than the Norfolk sand, but less so than the Orangeburg sand.

The characteristic forest growth on this type consists chiefly of scrub oak and hawthorn.

RUSTON GRAVELLY SANDY LOAM.

The Ruston gravelly sandy loam is a gray to yellowish-gray or yellow coarse sand underlain at about 8 to 12 inches by yellowish coarse sand or loamy sand, which at about 18 to 30 inches passes into yellow coarse sandy clay. The subsoil is frequently quite compact and somewhat reddish or mottled yellow and red in color, but under most of the type it is yellow and friable. In spots the clay subsoil is near the surface.

A characteristic feature of the type is the large quantity of ferruginous pebbles or accretions scattered over the surface and disseminated through the soil mass. These pebbles occur in varying quantities, the larger proportion being found in areas on the slopes and on the crests of ridges.

Less than a square mile of the Ruston gravelly sandy loam is found. Several small areas occur in the vicinity of Lumpkin. Others lie near Elim Church, in the southwestern part of the county, and north and northeast of Union. The type occupies gently rolling to sharply rolling ridges and slopes. Owing to its small extent and rough surface it is of little agricultural importance.

RUSTON COARSE SANDY LOAM.

The surface soil of the Ruston coarse sandy loam consists of a gray to grayish-brown, loose, coarse sand, becoming yellowish gray as it grades into the subsoil. In some places the color is darker on account of a higher content of organic matter. The subsoil begins at about 6 to 14 inches and consists of a deep-yellow coarse sand which passes into a reddish-yellow to dull-red coarse sandy loam. This, at about 20 to 30 inches, is underlain by a friable coarse sandy clay of reddish-yellow to yellowish red color.

About 10 square miles of this soil is mapped. It occurs in relatively small areas in different parts of the county. The larger bodies lie in the southwestern part of the county, between Bethel Church and the south county line. Areas of varying size are encountered in the vicinity of Lumpkin and a few miles south of that town. Besides the areas shown there are other patches too small to be in-

licated on the map, included with the Ruston coarse sand and Ruston sandy loam.

The type occupies knolls, ridges, and slopes. It is developed frequently along the lower slopes near the streams. The surface slope favors surface drainage, while the open and loose texture of the soil permits the ready percolation of the rains. The type is thus excessively drained, especially where the surface soil is deep. The capacity to absorb moisture prevents erosion.

The yields obtained on the Ruston coarse sandy loam vary considerably, depending upon the season and the method of handling the soil. Naturally it is not a very strong soil. It is mainly in need of organic matter, the addition of which will tend to lower the rate of loss of moisture. The type is well suited to general farm crops. Yields of one-fourth to two-thirds bale of cotton and 10 to 20 bushels of corn per acre are common, although higher yields are produced where the type is properly fertilized and cultivated.

RUSTON SANDY LOAM.¹

The Ruston sandy loam consists typically of a gray to brownish-gray sand to loamy sand, which in many places changes to yellowish gray as the subsoil is approached. The subsoil is encountered at 8 to 12 inches below the surface and is a yellow to reddish-yellow loamy sand, becoming heavier with depth and grading through a sandy loam into a friable, somewhat heavy sandy clay of dull-red to reddish-yellow color, frequently mottled with various shades of yellow and in places with gray. There is considerable variation in the depth at which this lower stratum lies. It may be found anywhere from about 15 to 34 inches, but on the average is found about 20 inches, below the surface.

The areas representing slight variations from the typical soil are more extensive than the typical development. On narrow ridges and slopes the subsoil is near the surface and consists of a tough, compact sandy clay, apparently not so thoroughly weathered as the typical subsoil. Here fragments and blocks of ferruginous sandstone are scattered over the surface and through the soil mass, sometimes in such quantities that their removal is necessary in preparing land for cultivation. Usually this phase is found adjoining areas of Rough gullied land. Areas of it occur northeast of Shady Grove Church, about 5 miles northwest of Lumpkin, and in smaller tracts throughout the western part of the county, especially in the northwestern section.

¹As mapped in Stewart County the surface soil of the Ruston sandy loam is variable in texture. It ranges from a fine to coarse sand, while in some places nearly all of the material has been washed away, leaving the raw clay exposed. The textural differences occur in both the typical soil and the phases to such an extent that they can not be indicated on the map.

Another phase of the Ruston sandy loam is characterized by a noticeable plasticity of the subsoil. Here the subsoil is encountered at an average depth of about 8 inches, and consists of a reddish-yellow or slightly yellowish-red, sticky, tough, and rather plastic sandy clay, which is harder and tougher when not so moist and more plastic when containing considerable moisture. Mottlings of red and various shades of yellow are common in the lower subsoil, while in local areas strata of dull-red material occur. Mica particles are present in varying quantities. This phase occupies the crests of low, narrow ridges and steep slopes which grade into the Susquehanna clay type. One point of difference between this phase and the higher-lying phase last described is that the latter is influenced by the underlying beds of compact sandy clay, while this phase is modified by beds of heavy, plastic clay which often occur within the 3-foot section. It is developed chiefly within the general region of the Susquehanna soils.

The Ruston sandy loam is encountered in all parts of the county. It is typically developed in areas of moderate size about 2 miles southwest of Lumpkin, on the upper Lumpkin-Eufaula road. Other typical areas of small size occur in the southern and southeastern sections of the county. Most of the other areas mapped represent variations from the typical soil.

The typical soil is encountered in well-defined, smooth areas forming the stream divides. It is also found on narrow ridges with gentle slopes to the streams. In the case of the phases the topography is considerably more broken and eroded, some areas being almost unsuitable for agricultural use. In such areas terraces are necessary to prevent the washing. There are no low depressed areas or seepage areas in the type.

The typical Ruston sandy loam is well suited to the production of the staple crops of this county, although the yields are somewhat lower than on the Orangeburg sandy loam. It is a somewhat better soil than the other members of the series, except the fine sandy loam, and seems to mature vegetables somewhat earlier. Corn yields from 8 to 20 bushels per acre and cotton from one-fourth to three-fourths bale. Considerably higher yields are produced on this type in other sections of the State.

RUSTON FINE SANDY LOAM.

The Ruston fine sandy loam consists of a gray to yellowish-gray fine sand, underlain at about 6 to 12 inches by a pale-yellow fine sand, which gradually becomes heavier with depth, and grades through a yellow, friable fine sandy loam into a yellowish-red or reddish-yellow, friable fine sandy clay between 18 and 30 inches below the surface. At lower depths the clay is generally quite tough

and mottled gray, red, and various shades of yellow. On some of the slopes where the sandy surface soil has been removed by erosion the subsoil material is found at shallower depths.

The Ruston fine sandy loam is a transitional type between the Norfolk fine sand and the Susquehanna clay. The surface soil is composed of the fine sand which gives rise, where deep enough, to the Norfolk soil, while the heavier material represents a gradation toward the strata of heavy clay which give the Susquehanna.

The Ruston fine sandy loam is comparatively inextensive in Stewart County. Several bodies occur in the southwestern section, south of Coffinton. Some of the largest areas occur along the northern county line, east of Mount Gilead Church. Small, unmapped bodies are encountered in the areas of Ruston sandy loam and Susquehanna fine sandy loam.

This type occurs on gentle slopes and along the crests of narrow ridges. The surface is more or less rolling and the slopes steep enough to cause erosion, except where the land is protected by terraces. The relief affords ample drainage.

As a rule only the more nearly level areas on the tops of ridges are cultivated. Under such favorable conditions the Ruston fine sandy loam is an excellent soil for general farming or for trucking. The fine-textured material of the surface is friable and mellow, clods forming from wet plowing being easily broken in cultivation. The subsoil is very retentive of moisture and fertilizers.

Owing to the unfavorable topography, much of the area is better suited for use as pasture than for cultivation. A large proportion of the land lying out of cultivation is covered with broom sedge and used at present as grazing land. Where farmed, from one-third to two-thirds bale of cotton and 10 to 20 bushels of corn per acre are obtained. The soil is generally farmed by tenants under methods not conducive to large yields.

Originally the areas of this soil supported a growth of longleaf and shortleaf pine. The second growth is shortleaf pine.

NORFOLK SERIES.

The soils of the Norfolk series are characterized by the light-gray to grayish-yellow color of the surface soils and by the yellow color and friable structure of the subsoil. They occupy nearly level to rolling uplands throughout the Coastal Plain and have been derived from unconsolidated deposits of sand and clay.

NORFOLK SAND.

The surface soil of the Norfolk sand consists of 6 to 12 inches of yellow or gray loose sand, passing below into grayish-yellow sand. There is no definite line of demarcation between the soil and the sub-

soil, which is a pale-yellow loose sand, sometimes becoming whitish in the lower part, and extends to a depth of about 30 inches. The type is underlain by a substratum of heavy clay such as gives rise to the Susquehanna soils, and this clay in places, especially on the brows of hills, has some influence upon the subsoil.

As mapped in Stewart County, the soil shows some variation, areas occurring in which the material inclines to be coarser or finer than described. There are also found small patches of other Norfolk, Ruston, and Orangeburg soils, but these could not be separated on a map of the scale used in this survey, and would have no agricultural significance.

The Norfolk sand is found in all parts of the county. One of the largest single bodies occurs in the southern part of the county, beginning near County Line Church and extending east and northeast. Comparatively large areas occur in the vicinity of Louvale, in the northern part of the county. Other areas are scattered over the county, particularly in the northwestern section, in tracts 70 to 250 acres or more in extent.

The topography varies from smooth or level to undulating and broken. In general, those areas in the southeastern and southern parts of the county are level to gently undulating, those in the northern part level to gently sloping, and those in the northwestern part rolling to broken. Drainage is well established, and in places excessive.

The Norfolk sand belongs to a type of soil better adapted to vegetable production than to general farming. Most of the type farmed in the county is used in the production of corn, oats, and cotton. Ordinary yields per acre are 8 to 15 bushels of corn, 10 to 20 bushels of oats, and one-fifth to one-half bale of cotton. The larger yields are obtained where rotation of crops is given some attention and where large quantities of fertilizer are applied.

This type was originally forested with longleaf and shortleaf pine, but most of it has been cleared. There are many old abandoned fields scattered through the type.

NORFOLK FINE SAND.

The soil of the Norfolk fine sand is a light to dark-gray fine sand 5 to 8 inches deep, usually grading quickly into pale-yellow fine sand. The subsoil is a pale-yellow, friable fine sand to a depth of 3 feet or more. The material of both soil and subsoil is usually loose and incoherent, but in numerous small, local areas a yellow fine sandy loam is encountered in the lower part of the profile, and sometimes a friable fine sandy clay occurs at a depth of about 34 inches. Such areas are found chiefly along the brows of slopes and where the surface sands have been removed by erosion. These areas approach

the Ruston fine sandy loam in character, but they are too small to map.

The Norfolk fine sand is typically developed in the northern part of the county about 3 miles northwest of Louvale and extending in irregular areas eastward to Green Hill Church. It is also found in small areas in the western part of the county southeast of Omaha and south of Coffinton. In this latter occurrence the areas are intermingled with the Ruston fine sandy loam. Other smaller, somewhat isolated areas occur throughout the western and northern parts of the county.

The type usually occupies rounded or flat-topped ridges having smooth slopes. Its typical occurrence is on narrow stream divides which break rather sharply into deep ravines as the streams are approached. In the areas between Louvale and Green Hill Church these divides are very narrow, sometimes being less than one-tenth of a mile in width. In other places they are somewhat wider, but never as much as a mile. In general the type is found in the highest elevations of the general region in which it is found. The soil is thoroughly drained.

The Norfolk fine sand comprises all the arable land within the region of its general occurrence, with a few exceptions, such as the bottom lands and a few small areas of Ruston fine sandy loam. On account of the fine texture of the material the soil becomes slightly compact where it stands for a long time without cultivation, and has a tendency to form clods when plowed too wet. These clods are easily broken by cultivation. The soil is very easy to handle and a light farm equipment is sufficient. The subsoil retains moisture fairly well.

Under the present system of farming the yields on this soil are low. Corn produces from 8 to 20 bushels per acre, and cotton from one-fifth to one-third bale. Applications of 150 to 250 pounds per acre of a medium-grade fertilizer are commonly used. Very little of the type is farmed. Many fields have been thrown out of cultivation and are growing up in broom sedge, with scattering shortleaf and longleaf pine and wild plum. The type originally supported a heavy growth of longleaf pine, but this has been removed.

Land values on this type, which is usually held in conjunction with surrounding types of soil, range from \$5 to \$15 an acre.

SUSQUEHANNA SERIES.

The types included in the Susquehanna series have a gray to reddish surface soil and a mottled red and gray, or red, gray, and yellow, plastic heavy clay subsoil. Red is nearly always the predominating color in the subsoil, the other colors appearing only as mottlings in the lower portion of the section. These may vary, often

being red, white, drab, yellow, and sometimes purple. These soils are developed most extensively in the higher parts of the Coastal Plain from the vicinity of Chesapeake Bay to central Texas.

SUSQUEHANNA SANDY LOAM.

The surface soil of the Susquehanna sandy loam consists of about 8 inches of sand, ranging in texture from a fine sand to coarse sand of gray to yellowish-gray color. The texture becomes heavier as the depth increases. As in case of the fine sandy loam of this series, between the soil and the subsoil proper there sometimes occurs a stratum of light yellow, friable sandy loam to friable sandy clay, but in other cases the transition is more or less abrupt. The subsoil is prevailingly a dark-red, plastic, sticky clay, mottled with shades of yellow and gray. In places below 20 to 24 inches the subsoil is somewhat more friable and crumbly and has a more yellowish-red color than above, again changing, at a depth of about 30 inches, into the characteristic tough, sticky, plastic, and impervious clay. Mica scales are present throughout the subsoil.

This type is formed from material similar to that giving rise to the Susquehanna clay, but occurs in areas where erosion has not removed all of a former covering of sand. In topography and drainage the type closely corresponds to the fine sandy loam of this series. Areas of this type occur in close association with the Susquehanna clay. The type generally occurs in smooth areas on knolls or gentle slopes. There is one large area about 3 miles northwest of Providence Church and another about 3 miles due north of that point. The type is prominently developed along the various branches of the Hannahatchee Creek and in the vicinity of Louvale Station. Small areas are scattered irregularly throughout the northern part of the county.

Very little of this type is under cultivation. Moderate yields of cotton and corn are produced on this soil under the prevailing systems of farming. The agricultural conditions on this type are rather poor.

A second growth of shortleaf pine, with some oak and hickory, is found on most areas of this type.

SUSQUEHANNA FINE SANDY LOAM.

The soil of the Susquehanna fine sandy loam is a gray to dark-gray fine sand, which grades at a depth of 2 or 3 inches into yellowish-gray fine sand or loamy fine sand. This is underlain abruptly at about 6 to 12 inches by stiff, plastic, sticky clay, showing in the upper part minute mottlings of various shades of yellow, and below more pronounced splotches of grayish and yellowish colors. In places the upper subsoil is dense red in color and is without mottlings. Where

mottled with gray and red, the clay is distinctly more sticky and plastic. Small mica particles are distributed throughout the subsoil.

On eroded spots the clay is frequently near the surface or is exposed.

In some parts of the county, chiefly in the north-central section, where most of this type is found, somewhat different conditions exist. Between the surface soil and the heavier part of the subsoil a stratum of fine loamy sand is encountered. This gradually becomes heavier as depth increases and passes through a yellow friable fine sandy loam into a yellow friable sandy clay, which in turn grades into the red plastic material. Where this condition exists the plastic and impervious material of the subsoil is usually found only below a depth of 24 inches. Frequently in small areas this phase approaches the Ruston fine sandy loam, and it includes patches of the Ruston type which are too small to be mapped separately.

The Susquehanna fine sandy loam is typically developed in the southwestern part of the county, about $1\frac{1}{2}$ miles northeast of Coffinton, and in the western part of the county, about 3 miles east of Florence, between Turner and Grass Creeks. It also occurs in the general region of Susquehanna soils in the north-central part of the county. One area occurs in the vicinity of St. James Church, while other areas of varying size are scattered throughout that section.

The type occupies gently rolling country, the crests and slopes of ridges, steep slopes along some of the streams, and areas having a somewhat rolling configuration with numerous rounded hills and corresponding depressions. It is not nearly so broken as the Susquehanna clay, and the topography of a large part of the type is favorable for cultivation. The topography promotes good surface drainage, although in some places the impervious nature of the subsoil causes internal drainage to be sluggish.

The Susquehanna fine sandy loam is similar in origin to the Susquehanna clay, but differs from it in the presence of a covering of sandy material. Much of this type is gradually approaching the characteristics of the Susquehanna clay, as this mantle of fine sand is being removed by erosion.

A very small acreage of this land is under cultivation. Much of it is occupied by a scattered growth of shortleaf pine, while some areas support a virgin growth of shortleaf and longleaf pine, oak, and hickory.

This is a fairly productive soil, especially for cotton, which yields about one-third to two-thirds bale per acre. Corn yields from about 8 to 15 bushels per acre.

Owing to the loose and friable nature of the surface material, the land is easily cultivated, and the subsoil, which is below reach of the plow, is very retentive of moisture and of fertilizers. Care is

necessary to protect the surface soil from erosion and to prevent the starting of gullies.

SUSQUEHANNA CLAY.

Typical Susquehanna clay consists of heavy, sticky clay of dull-red color, mottled with shades of red, yellow, and gray. Upon the surface, in local areas, there is a very shallow covering either of fine sand, sand, fine sandy clay, sandy clay, or clay loam, but this layer is no more uniform in depth and occurrence than in texture.

There is no clear line of demarcation between the surface soil and subsoil. The latter may be said to begin at about 4 to 6 inches and continues fairly uniform to a depth of about 12 inches, where mottlings of gray, yellow, and drab appear. Beginning at this depth and extending to about 24 inches, there is frequently a stratum of somewhat crumbly, yet plastic, yellow clay, mottled with gray and red. In the lower depths this material changes to a very plastic and sticky clay, mottled with gray and red colors. Mica particles are common throughout the subsoil, being especially noticeable in the stratum of more friable yellow material.

Much of the Susquehanna clay immediately overlies beds of marl or calcareous material, which in some places appears within the 3-foot section. This material consists of greenish-yellow or olive-colored plastic clay. It is generally found on slopes where the overlying heavy red clay beds have been thinned by erosion. Fossil shells and bones are encountered in this marl. In the western section of the county, about $1\frac{1}{4}$ miles east of Thompson Store, in what is called the "California Woods," there are found on some of the highest hills galled spots where the marl outcrops in areas too small to map. These spots are usually treeless. They really represent patches of Henderson clay. Patches of other soils are for the same reason also included with the Susquehanna clay. Much of the Susquehanna clay is locally called "lime land," owing to the limy character of the substratum.

The bulk of the material of the Susquehanna clay appears to be derived from a heavy clay bed, which lies below the sandy clays, giving rise to such soils as the Ruston, Orangeburg, and Greenville, and above the beds of marl or calcareous clays described above. Erosion has removed the overlying sandy strata, and, as stated above, in places has cut through the Susquehanna clay beds to expose the Henderson material. The Susquehanna clay occupies considerably lower positions than the sandy upland soils.

The Susquehanna clay is one of the most extensive types in the county. The main belt of this soil begins in the northeastern part of the county, in the vicinity of Green Hill Church, and extends in a southwesterly direction to the vicinity of Coffinton. One of the larg-

est continuous bodies occurs on both sides of Turner Creek and reaches to Grass Creek on the north and Ichabuckler Creek on the south. It connects with another large area about 4 miles northwest of Lumpkin, which extends northward to Hannahatchee Creek. Many large areas are scattered over the entire northwestern part of the county. This type in many places extends back into areas of other soils, along the slopes of stream courses. The type is not found in the southeastern section or the more elevated portions of the county.

The Susquehanna clay occupies steep slopes, the crests of rounded hills, and the tops of ridges. Erosion has so gullied the greater part of the type that there is practically no level land within its boundaries and much of it can not be profitably farmed.

The rough character of this land, which prohibits tillage operations over much of it, is the result mainly of erosion which has taken place since the land was cleared for cultivation. The Susquehanna clay was one of the first soil types farmed in the county. It was considered strong land, and produced as much as a bale of cotton per acre without the use of commercial fertilizers. There are to-day on this type many deserted but substantial farmhouses abandonment of which was compelled by the ruining of the fields by erosion.

Land of this type is best suited for use as pasture or for forestry. Most of the areas support a second growth of shortleaf pine, although there are many abandoned treeless fields covered with broom sedge. In the "California Woods" most of the original forest remains. This consists mainly of hickory, oak, poplar, and shortleaf pine. Lumbering has not extended here because of the inaccessibility of the land owing to its rough topography. The type can be profitably used as pasture land, as it supports native grasses which are of some value for pasturage, and it might be improved by introducing other grasses to supplement these. The production of live stock on this soil in conjunction with the farming of the rich alluvial lands of the associated stream bottoms, is a promising means of utilizing this land.

Susquehanna clay, smooth phase.—The soil of this phase is practically identical with that of the typical Susquehanna clay, viz., a red, plastic clay, mottled with yellow, greenish yellow and gray. In some places, however, owing to the more level topography, there is a surface veneering of fine sand, an inch or two in thickness, over the clay. This is not enough materially to change the texture of the soil when plowed.

The topography of this phase is smooth as compared with that of the typical soil. The areas are found on smooth ridges and gentle slopes, and in general the surface is undulating to gently rolling and favorable for cultivation.

Only about 6 square miles of this soil occur in the county. It is found in the northeastern part, in the vicinity of Renfroes and St. James Church, and in the southwestern part, near Coffinton. Several areas are distributed elsewhere through the Susquehanna belt.

The smooth phase of the Susquehanna clay, when properly handled, produces fairly good yields of cotton and corn. Under good management the former yields from one-half to three-fourths bale and the latter from 10 to 25 bushels per acre. Heavy plows and work stock are necessary to properly handle this soil.

CAHABA SERIES.

The surface soils of the types embraced in the Cahaba series are brown to reddish brown and the subsoils are yellowish red to reddish brown. The series occupies old stream terraces, lying largely above overflow, and represents the best-drained lands of such terraces. They are most extensively and typically developed in the Gulf Coastal Plain of Alabama and Mississippi. The materials forming these types consist mainly of Coastal Plain soils, with more or less mixture along the larger streams issuing from the Appalachian Mountains and Piedmont Plateau of material derived from the soils of those regions.

CAHABA LOAMY COARSE SAND.

The Cahaba loamy coarse sand is a grayish-brown to reddish-brown loamy coarse sand, underlain at about 8 to 12 inches by loamy coarse sand to coarse sandy loam of yellowish-red or reddish-yellow to dull-red color. In the lower part of the subsoil there is generally sufficient clay and silt to give the material a sticky character, and a substratum of coarse sandy clay is commonly encountered just below the 3-foot section.

This type, like the other Cahaba soils, can easily be distinguished from the associated Kalmia soils by the reddish or red color of the subsoil.

Less than 200 acres of this type of soil occur in Stewart County.

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

Mechanical analyses of Cahaba loamy coarse sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
252517.....	Soil.....	2.8	21.5	20.7	28.4	12.4	7.9	6.3
252518.....	Subsoil.....	2.4	16.4	17.5	23.6	9.3	9.5	21.3

CAHABA SAND.

The Cahaba sand consists of a dark reddish brown loose sand, containing little organic matter, underlain at an average depth of 10 inches by a red to light-red loose sand, which extends to a depth of 3 feet or more.

A little over 1 square mile of this soil is mapped, the most important areas occurring in scattered tracts in the vicinity of Omaha. The topography varies from level to gently undulating and the type is well drained.

The Cahaba sand is not so productive as the Cahaba sandy loam or loamy coarse sand. An average yield of 15 bushels of corn, 15 bushels of oats, or one-fourth bale of cotton per acre is obtained.

CAHABA COARSE SANDY LOAM.

The soil of the Cahaba coarse sandy loam consists of a loamy coarse sand, having a grayish-brown to reddish-brown color, and a depth ranging from about 6 to 24 inches, the average depth being about 8 inches. The subsoil is a yellowish-red, light coarse sandy loam in the upper part, gradually becoming redder with depth, and passing at about 12 to 14 inches into dull-red or yellowish-red friable coarse sandy clay. In places the heavy part of the subsoil is not reached above a depth of 24 to 30 inches.

Where developed in sufficient area the Cahaba coarse sandy loam is a valuable agricultural soil, but less than 200 acres exists in Stewart County, and for this reason the type has practically no influence on agricultural conditions.

CAHABA SANDY LOAM.

Typically the Cahaba sandy loam consists of a reddish-brown loamy sand to sandy loam, underlain at about 8 to 12 inches by dull-red sandy clay. As mapped in Stewart County the type is a gray to dull-red, friable sand to loamy sand, underlain at depths ranging from 6 to 30 inches by dull-red or yellowish-red friable sandy clay, which in places is somewhat stiff and tough in the lower part.

Variations of several kinds occur. Where the subsoil is near the surface the texture is usually heavier. In slight depressions the surface soil has a dark reddish brown or chocolate-brown color, due to poor drainage, and a high content of organic matter. In places the soil is gray and decidedly light in texture. In such areas the soil grades downward through a reddish-yellow or yellowish-red sub-surface stratum, gradually becoming heavier and redder, into the subsoil, which is usually encountered at about 18 to 24 inches, though in places not above 30 to 36 inches. The subsoil approaches a loamy

sand in texture. In one area of this type, southwest of Blufftown, on the Chattahoochee River, the surface soil consists of a reddish-yellow loamy sand which is apparently derived from the adjoining upland soils through colluvial action. The heavier clay subsoil is found in those areas lying nearest the river.

The type is confined to the terraces of the Chattahoochee River and its tributaries. It occurs in small areas, irregularly distributed throughout the western part of the county, from the northern to the southern county line. Typical areas occur within a few miles of Omaha. Patches of this soil, too small to be shown separately on the map, are included with other types. The terraces are developed at different levels. On the higher terraces the soil tends to be droughty; on the lower, it sometimes needs ditching to assist the drainage.

The Cahaba sandy loam is one of the most valuable terrace soils. It is mellow and easily worked into a good tilth, and the subsoil is, in general, retentive of moisture. The type produces from one-third to one-half bale of cotton, 15 to 30 bushels of corn, and 15 to 35 bushels of oats per acre with light applications of commercial fertilizer. These figures do not by any means represent the yields the soil is capable of producing, since much of the land is not properly farmed, being handled largely by tenants. Under proper methods of fertilization and cultivation, yields of a bale of cotton, 30 to 40 bushels of corn, 1 ton or more of cowpea hay, and 40 to 50 bushels of oats per acre may be obtained. The type is not only suitable for general farm crops, but also, where market and transportation facilities exist, for truck crops and peaches.

When transferred in large tracts the price of this soil ranges from \$20 to \$30 an acre.

CAHABA FINE SANDY LOAM.

The Cahaba fine sandy loam consists of a gray to brownish-gray loamy fine sand, which passes into a reddish-brown heavy fine sandy loam to light fine sandy clay at depths of 6 to 14 inches, and this, in turn, into a heavy reddish-brown to dull-red, friable fine sandy clay.

The depth to the clay subsoil is extremely variable, but will probably average approximately 12 inches. Where the clay is near the surface the soil is a dull red. In some places the subsoil is exposed. and where these areas are large enough to be shown separately they are mapped as Cahaba clay. In areas where the subsoil occurs at greater depths there is a subsurface stratum of reddish-yellow, friable fine sandy loam between the soil proper and the clay subsoil. There are some included patches in which clay subsoil is not

found within the 3-foot section, such areas representing the Cahaba fine sand.

The Cahaba fine sandy loam is developed chiefly in the western part of the county. The largest areas occur in the vicinity of Thompson Store. The type is found principally on the lowest terrace of the Chattahoochee River.

The surface of the Cahaba fine sandy loam is characteristically level. Although the type is not subject to overflow the drainage is not always perfect, mainly on account of the level surface and compact nature of the subsoil. Water sometimes stands on the surface after heavy rains for a week or more. Drainage conditions can easily be improved by ditching.

The Cahaba fine sandy loam is utilized almost exclusively for the production of cotton. Yields of this crop range from about one-third to 1 bale per acre, depending upon the methods employed and the season. The average yield is about one-half bale per acre. During wet seasons the crop is subject to rust. Corn yields about 15 to 40 bushels per acre and oats from about 15 to 40 bushels. This land is also used for the production of sugar cane and cowpeas, both for the seed and for hay.

CAHABA CLAY.

The Cahaba clay, locally called "red clay land," in its typical development consists of a reddish-brown or dull-red sandy clay 3 feet or more in depth, which is somewhat stiff and tough, especially in the lower part. There is practically no difference between the surface and subsoil material, except that the latter is slightly mottled with yellow at lower depths. In places a layer of fine sandy loam, 2 or 3 inches in thickness, is present on the surface; in other places the immediate surface soil is clay loam. The greater part of the type, however, consists of a clay from the surface downward. Upon drying, the soil cracks and crumbles into small aggregates.

The largest body of Cahaba clay is that along the Chattahoochee River west of Florence School. The other most important areas occur west and north of Omaha. With the exception of these areas the type occurs in small irregularly shaped bodies near the Chattahoochee River. Many of the small areas represent knolls and narrow strips from which a former sandy covering has been washed. Knolls of this kind, too small to be shown on the map, occur within areas of the other Cahaba types.

In general the surface of the Cahaba clay is nearly flat. Slight undulations occur, with corresponding shallow depressions, the difference in elevation, however, being scarcely perceptible. The type occurs on the lower terraces of the Chattahoochee River. Under ordinary conditions it is well drained, but ditches are installed in

places to carry excess surface water to the river, and in some locations, not so improved, rainwater stands for long periods, there being little movement of water downward through the impervious soil.

The Cahaba clay is a productive soil, but it is considerably more difficult to cultivate than the associated sandy types and must be handled when in just the right condition as regards moisture. Fall plowing is decidedly advantageous. A heavy farm equipment is required for the proper preparation of the land.

Under the system of farming practiced by tenants on the large plantations this type produces only fair yields. Cotton yields about one-third to one-half bale, corn 12 to 20 bushels, and oats 15 to 25 bushels per acre, with the use of commercial fertilizers. The soil is capable of producing much heavier yields with proper management.

Land of this type has been cleared and in cultivation since the early settlement of the county. It was originally forested with hardwoods.

CHATTAHOOCHEE SERIES.

The Chattahoochee series is characterized by the grayish color of the surface material and by the red color and friable structure of the subsoil. Its soils occur in well-drained situations on stream terraces standing well above overflow. The material from which they are derived is old alluvium deposited when the waters of the streams reached higher levels than at present. This material consists largely of wash from Coastal Plain soils, but along some of the larger streams issuing from the Piedmont and Appalachian Regions there is obviously present some wash from the soils of these regions. The characteristics of the Chattahoochee soils closely resemble those of the Orangeburg, but it does not necessarily follow that the mineralogical constitution is identical with that of the Orangeburg soils. The subsoil material is redder than that of the Cahaba and the structure is generally more friable. This seems to be the result of more complete oxidation resulting from better drainage. These types frequently occur near bluff lines where the drainage is perfect. The soil back from these situations is frequently Cahaba or Kalmia. The series holds the same relation to the Cahaba as the Orangeburg does to the Ruston.

CHATTAHOOCHEE LOAMY COARSE SAND.

The Chattahoochee loamy coarse sand consists of a grayish loamy coarse sand, underlain by red loamy coarse sand which is quite sticky in the lower part of the 3-foot section. The type occurs on the Chattahoochee and Hannahatchee River terraces, and is well above overflow. It has good to rather excessive drainage. The soil is well suited to the production of cotton, for which it is principally used.

Corn, oats, and a number of forage crops are grown with fair results. As less than 1 square mile of this type occurs in the county, it can have little influence on the agriculture.

CHATTAHOOCHEE COARSE SANDY LOAM.

The Chattahoochee coarse sandy loam consists of a grayish coarse sand, which grades into reddish loamy coarse sand, and this in turn into a red, friable coarse sandy clay. The type occurs on terraces of the Chattahoochee River in situations where the drainage is exceptionally well established. The soil is well suited to the production of cotton, corn, and oats, but so little of it is found in the county that extended discussion is unnecessary.

CHATTAHOOCHEE SANDY LOAM.

The Chattahoochee sandy loam typically consists of a grayish sand or loamy sand, underlain at about 5 to 10 inches by reddish sandy loam or loamy sand, which passes into a red friable sandy clay. Less than 1 square mile of this soil exists in Stewart County. It occurs on terraces of the Chattahoochee River. The drainage is well established. This soil is well suited to the production of corn, oats, and forage crops.

AMITE SERIES.

The types of the Amite series are marked by the brown to chocolate-brown or reddish-brown color of the soils, and by the reddish-brown to red color of the subsoils. There is frequently a substratum of water-rounded gravel at a considerable depth below the surface. The soils occur on stream terraces above normal overflow. The soils of this series represent the most fertile and highly prized soils of the river terrace. The various types being small in extent, no extended discussion is devoted to them.

AMITE LOAMY COARSE SAND.

The Amite loamy coarse sand consists of a brown to reddish-brown loamy coarse sand, passing below into dark-red loamy coarse sand. It occurs on the terraces of the Chattahoochee River, and its drainage is thoroughly established. The type is fairly well suited to the production of corn, oats, and forage crops. A little less than 2 square miles of this type is mapped in Stewart County.

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

Mechanical analyses of Amite loamy coarse sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
252541.....	Soil.....	4.3	24.5	17.9	28.6	13.5	7.4	3.8
252542.....	Subsoil.....	2.3	16.9	14.9	27.8	17.1	10.4	10.6

AMITE COARSE SANDY LOAM.

This type consists of a brown to reddish-brown loamy coarse sand, which grades through a red coarse sandy loam into a red, moderately friable coarse sandy clay.

Areas of this soil occur in well-drained situations on the terraces of the Chattahoochee River. They stand well above overflow and constitute good agricultural land, but their small extent makes the type negligible in the agricultural resources of the county.

AMITE SANDY LOAM.

The Amite sandy loam consists of a brown to reddish-brown sand or loamy sand, underlain at about 6 to 10 inches by dark-red sandy loam, which grades below into red, moderately friable sandy clay.

This soil occurs in well-drained areas on the Chattahoochee River terraces. Only about 2 square miles is found in this county. It is a good cotton soil and is used principally for this crop. Corn, oats, cowpeas, and sorghum are among the other crops which are successfully grown.

LEAF SERIES.

The soils of the Leaf series are of light-gray to gray color. The subsoils characteristically consist of compact gray or mottled gray and yellow silty clay, which grades downward into mottled red and gray or red and yellow, plastic clay, through which moisture and air move slowly. Iron concretions are of common occurrence on the surface. These soils are developed on stream terraces of the Coastal Plain region.

LEAF LOAM.

The greater part of the Leaf loam in Stewart County consists of a dark-brown to black, mellow loam, underlain at about 5 to 8 inches by a yellow or mottled yellow and gray, stiff silty clay, which passes below into mottled yellow, gray or drab, and bright red, plastic clay. This description conforms fairly well with the typical series description except as to the surface soil, which is here much darker. In some areas the surface soil varies from a heavy fine sandy loam to clay loam, the color of the material being generally lighter, or more as the type has been found elsewhere.

The Leaf loam occupies depressions on the stream terraces in which the drainage is imperfectly established. Such depressions represent narrow, sloughlike drainage ways, small elongated ponds, or the low places in the undulating terraces. The ditches which drain the terraces are generally connected through these areas.

Most of this type is cleared and farmed in conjunction with the adjoining types of soil. When drained it gives good results with corn and fair results with cotton. It is also valuable for oats. Lespedeza does well.

The native vegetation consists of shortleaf pine, water oak, gum, magnolia, and other water-loving trees and shrubbery.

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

Mechanical analyses of Leaf loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
252550.....	Soil.....	0.8	3.2	3.2	19.7	30.1	27.1	16.0
252551.....	Subsoil.....	.5	2.7	2.8	16.8	25.9	22.4	28.7

KALMIA SERIES.

The surface soils of the types in the Kalmia series are gray to grayish yellow. The subsoils are mottled yellow and gray. The series is developed along streams of the Coastal Plain region on terraces lying largely above overflow. The soils occur typically and most extensively in the Gulf Coastal Plain region of Mississippi and Alabama. The materials forming the Kalmia soils are derived largely from the Coastal Plain soils, although on the larger streams issuing from the Appalachian Mountains and Piedmont Plateau more or less material washed from the soils of those regions is present. In the better drained situations the subsoil color is yellow, causing such areas to resemble very closely the corresponding members of the Norfolk series. These Kalmia soils are closely related to the Cahaba soils, differing essentially only in their poorer drainage and the consequent less oxidized condition of their subsoils. The surface is usually flat, and the drainage on this account is inadequate in most cases.

KALMIA SAND.

The Kalmia sand is a light-gray to dark-gray loose sand, changing to yellowish-gray sand at a depth of 3 or 4 inches, and underlain at 6 to 8 inches by pale-yellow loose sand extending to 3 feet. In some places the subsoil is loamy in the lower part of the 3-foot section. In some included areas of sandy loam a pale-yellow sandy clay is reached within the 3-foot section.

The Kalmia sand occurs in small areas, the largest of which is that along the Seaboard Air Line Railway, about 4 miles east of Omaha. Several areas occur in the vicinity of Louvale and Louvale

Station, and in the southwestern corner of the county near Thompson Store and Coffinton. Small areas are scattered elsewhere throughout the terrace sections of the county, chiefly in the vicinity of Omaha and Union. The type has a level to gently undulating surface and is well drained.

The Kalmia sand is used for cotton and corn. With light fertilization the yields range from about one-fourth to one-half bale of cotton and from 5 to 15 bushels of corn per acre. Crops on this type are subject to injury by drought.

KALMIA FINE SAND.

The surface soil of the Kalmia fine sand consists of a gray to pale-gray friable fine sand which changes to yellowish gray at about 4 inches and extends to a depth of 6 to 8 inches. The subsoil is a pale-yellow, friable fine sand which becomes lighter in color with increase in depth, and a little more loamy in the lower part of the 3-foot section. In a few spots fine sandy clay is encountered within the 3-foot section, and a stratum of such material is generally reached at depths between 40 and 60 inches.

The largest areas of this type lie about 3 and $3\frac{1}{2}$ miles southeast of Omaha. Another of the more important areas is developed along the north side of Hannahatchee Creek in the form of a narrow strip. Other areas are found 5 miles east of Florence and 1 mile south of Louvale. The Kalmia fine sand is not extensively developed in this county.

The type has a varied topography. In the areas southeast of Omaha, between the general level of the terraces and the uplands, it is level or gently sloping. That along Grass Creek is nearly level, with a gentle gradient toward the stream, while the area along Hannahatchee Creek is undulating or billowy, the surface having been modified by erosion since deposition. With the exception of a few depressed areas the type is well drained.

In agricultural value the Kalmia fine sand is intermediate between the Kalmia sand and Kalmia sandy loam. The soil is easily prepared and can be cultivated at almost any time without impairment of its physical condition. Crop yields are somewhat higher than on the Norfolk fine sand, which is very similar to this soil in physical features. Cotton yields are lower than the soil is capable of producing. The better farmed areas give yields ranging from one-third to one-half bale per acre. Corn yields 8 to 25 bushels per acre, the maximum being obtained on the land, properly cultivated and fertilized, with about 350 pounds per acre of commercial fertilizers.

KALMIA GRAVELLY SANDY LOAM.

The soil of the Kalmia gravelly sandy loam is a light-gray medium gravelly sand underlain at 2 to 4 inches by yellowish-gray gravelly sand, which extends to a depth of 10 inches. The subsoil consists of two distinct strata. The upper one, extending 10 to 30 inches, is a pale-yellow gravelly loamy sand, becoming slightly heavier with increased depth. The lower one, from 30 to 36 inches or more, is a yellow friable gravelly sandy clay. A large quantity of water-worn gravel, the particles ranging from the size of a pea to 4 inches in diameter, are scattered over the surface as well as throughout the soil section.

The Kalmia gravelly sandy loam includes all the gravelly areas on the river terraces. Most of it occurs on the terrace escarpments, usually between the second and third terraces. The small areas found along Hannahatchee and Talipahoga Creeks are exceptions.

Numerous small spots, which if large enough to be separated would be mapped as the Cahaba gravelly sandy loam, have been included with the Kalmia gravelly sandy loam.

This type is low in agricultural value. The soil is droughty and the topography and physical characteristics are unfavorable to agriculture. While some fairly good crops of cotton and corn are obtained, the land is best used for pasturage and forestry.

This type supports a forest growth of longleaf and shortleaf pine and oak, much of which is valuable timber.

KALMIA COARSE SANDY LOAM.

The soil of the Kalmia coarse sandy loam consists of gray to dark-gray, loose, coarse sand, which changes to yellowish-gray at about 4 to 6 inches. The subsoil, beginning at about 8 to 12 inches, is a light-yellow, loose, coarse sand, which gradually becomes more loamy with depth, grading through coarse sandy loam into friable coarse sandy clay at 18 to 30 inches. The lower material is light yellow, faintly mottled with shades of yellow and gray.

Only a few small areas of this type are mapped. Two of the areas lie southwest of Omaha, and a third along the Lumpkin-Florence Road, about 3 miles west of Providence Church. The type is found on low, flat stream terraces, and in places the drainage is poor.

The Kalmia coarse sandy loam is of low agricultural value. It is used for corn and cotton. Cotton gives low yields, especially in wet seasons. Corn produces from about 5 to 15 bushels per acre. The area of this soil is so small that it has little importance in the agriculture of the county.

KALMIA SANDY LOAM.

The Kalmia sandy loam consists of a light-gray to gray, loose sand, underlain at 8 to 12 inches by a pale-yellow loamy sand, which grades through yellow sandy loam into yellow sandy clay, faintly mottled with gray.

In some areas the surface soil is very much deeper than usual, the heavy sandy clay material lying at a depth of 24 to 36 inches. This condition represents a gradation toward the Kalmia sand. Another variation occurs in a large area in the southwestern corner of the county, where the content of fine sand is considerably greater than in the normal type, the quantity being sufficient to give a more loamy texture. Other small areas have quartz gravel scattered over the surface of small areas.

The largest area of the Kalmia sandy loam is found in the immediate vicinity of Omaha and extends south to Talipahoga Creek. Another large area begins about a mile south of Thompson Store and extends southward in an irregular body about a mile wide to within a short distance of Coffinton. There are a few small bodies also along Hannahatchee Creek in the vicinity of Louvale Station and about 2 miles southwest of that place.

The type occupies nearly level to gently undulating stream terraces. Generally, the soil is well drained, though a few low, flat areas need ditching to improve the drainage.

This type originally supported a heavy growth of longleaf and shortleaf pine and some oak and hickory. Most of this has been removed and the land put into cultivation.

Corn and cotton are the chief crops grown. The usual yields range from one-third to four-fifths bale of cotton and from 10 to 30 bushels of corn per acre. Higher yields are possible on individual fields where better methods are employed. Some of this type is used in the production of oats, the yields ranging from 8 to 20 bushels per acre. The yields of all crops could be considerably increased by better soil management. Cotton in some sections of the South produces a bale or more per acre on this soil type, and corn and oats as much as 40 bushels per acre.

Large yields of cantaloupes of excellent quality are produced on this soil. Watermelons, cucumbers, Irish potatoes, sweet potatoes, snap beans, English peas, and other garden vegetables do well. Sugar cane grown on this type produces a light-colored sirup of excellent flavor.

KALMIA FINE SANDY LOAM.

The soil of the Kalmia fine sandy loam consists of a fine sand, dark gray in the surface few inches and yellowish gray below. This

is underlain by pale-yellow fine sand to loamy fine sand that gradually becomes heavier with increase in depth, and at 12 to 18 inches friable fine sandy clay, pale yellow and mottled with gray, ocherous yellow, and occasionally with dull red, is reached.

As mapped, the type includes areas varying in size from mere spots to as much as 30 to 40 acres, in which the surface soil is of a somewhat darker gray color, and as much as 12 to 15 inches in depth, while the subsoil is a somewhat lighter, friable fine sandy clay of a mottled gray and yellow color, the gray being more conspicuous than in the subsoil of the typical development. This variation occurs in the more poorly drained situations, as in the circular and slough-like depressions and in areas at the foot of the upland slopes, where seepage water collects; also, where the type occupies level areas, such as low forelands along some streams, where the land is usually rather poorly drained.

Another variation occurs in which the subsoil is not encountered above about 24 inches, occurring usually between 24 and 30 inches. Areas with this deep soil are somewhat more productive than the Kalmia fine sand, and less productive than the typical Kalmia fine sandy loam. Patches of this kind are scattered throughout the type. They represent a transitional soil between the Kalmia fine sandy loam and the Kalmia fine sand.

The Kalmia fine sandy loam is confined to the western part of the county, where it occurs on the second bottoms of the Chattahoochee River, and extends back into the upland along some of the larger stream terraces. The type occupies a belt reaching from Florence in an interrupted belt south to the county line. Several areas occur on the north side of Hannahatchee Creek. Large bodies also occur along Grass Creek and along Turner, Ichabuckler, and Bustahatchee Creeks.

The Kalmia fine sandy loam lies on the highest terraces, and is flanked by bluffs or steep slopes on the upland side, and by gentle slopes toward the streams. The surface is generally level, though there are some trough-shaped areas or swales. The type has a gentle slope toward the streams, but this in some places is insufficient to insure proper drainage. Near Florence the soil is well drained, although the surface is nearly level. In the vicinity of Thompson Store and Coffinton artificial drainage is needed. This can be effected by ditching, though it may be necessary to deepen and straighten some of the stream channels in order to remove the drainage water satisfactorily.

The Kalmia fine sandy loam possesses good physical properties. Its surface and subsoil are friable, and favorable to good circulation of soil, air, and water, yet retentive of moisture. The soil is easily cultivated and may be farmed satisfactorily with a light farm

equipment. It is naturally adapted to a wide range of crops, including both the general farm crops and many truck crops. It is used at present for general farming under methods that do not bring out its possibilities. On the well-drained areas cotton yields from one-third to one-half bale and corn from 15 to 40 bushels per acre. The lower yields stated are those obtained on the tenant farms. The more poorly drained areas are used almost exclusively in the production of corn. About 150 to 250 pounds per acre of commercial fertilizer are applied to the cotton crop.

Land values on this type range from \$10 to \$30 an acre, depending upon improvements. But a very small part of the type is on the market.

HANNAHATCHEE SERIES.

The soils of the Hannahatchee series are characterized by the brown to reddish-brown color of their surface material and by the prevalent reddish-brown color of their subsoil. Locally the color of the subsoil is variable on account of incomplete mixing of the various grades of alluvium derived from different upland soils. These soils occupy the overflowed first bottoms of Coastal Plain streams, and are composed of wash from Coastal Plain uplands, carrying sufficient material from the Susquehanna, Orangeburg, and Greenville soils to give them a characteristic reddish color. It is this feature that distinguishes them from the brownish color of the Ocklocknee soils.

HANNAHATCHEE SANDY LOAM.

While varying considerably in color, texture, and profile characteristics, the Hannahatchee sandy loam is prevailingly a reddish-brown, rather heavy sandy loam, underlain at about 6 to 10 inches by a reddish-brown to dark-brown sandy clay to rather plastic silty clay. Frequently the lower subsoil, or that part below about 15 or 20 inches, is composed of reddish, drab, greenish-yellow, or mottled drab, reddish-brown, and rusty-brown sandy loam, sand, or sandy clay. Mottlings of rusty brown are not uncommon from the surface downward, while in places black concretionary oxide of iron material is present in the soil.

Patches of light sandy loam or loamy sand, occupying the slight swells, and of silt loam and silty clay loam are included with the type because their small size and irregularity of distribution precludes their satisfactory separation. In the occasional poorly drained swales the color of the material is dark brown or brown. Such areas constitute patches of Ocklocknee material too small to map. The type also includes strips of yellowish or greenish-yellow sandy loam, which grades below into mottled yellow and greenish-yellow sandy clay. These occur as marginal strips where the adjoin-

ing upland slopes are occupied by yellow, greenish-yellow, or olive-colored marl beds or calcareous clay, or soil derived from such material. These strips really comprise a different type of soil, but owing to their small size and intricate association with the reddish soils they are not mapped separately.

An important variation of this type, occurring in the northern part of the county along Hannahatchee Creek and its larger tributaries, consists of a reddish-brown, brown or yellowish-brown fine to medium sandy loam, with a slight surface veneering of fine to medium sand. The sandy loam is underlain by heavier material alternating with light material, such as a coarse sand alternating with sandy clay and heavy plastic clay. The lighter textured material of the subsoil is reddish in color, while the heavy material is usually drab, gray or bluish gray. Another variation of the type has a surface soil which is heavier than the subsoil. This development occurs along many of the smaller streams, where it is associated with the Susquehanna soils. The soil is a reddish-yellow or red heavy sandy loam to sandy clay, underlain at various depths, usually 6 to 12 inches, by yellow, gray or brown fine to medium sand. Small strips in the wider bottoms and along the narrow, fingerlike bottoms of the small streams in the Susquehanna clay section form another prominent variation of this type. Here the soil and the greater part of the subsoil consist of a heavy, plastic clay, while the lower subsoil is usually a sand. A representative area of this variation lies in the northeastern part of the county, about a mile southwest of Pine Grove School.

The Hannahatchee sandy loam is found almost exclusively in the northern part of the county. The most extensive areas occur in the north-central section, along Hannahatchee Creek and its many tributaries. A small area occurs in the southwestern part of the county along Soapstone Creek.

The type occupies overflowed bottoms of streams and is composed of recent alluvial deposits. The topography is nearly level. Ditching is generally necessary to provide good drainage. Overflows may be largely prevented by keeping the stream channels open. Some parts of the type have been materially improved by clearing the channels of streams and constructing dikes.

The Hannahatchee sandy loam is the most productive soil in the county. Yields of 1 bale of cotton per acre without the addition of fertilizers are common. The average yield ranges from one-half to 1 bale. Corn produces from 20 to 40 bushels per acre, depending upon the season, the yields being heaviest in dry seasons. Cowpeas for hay yield from three-fourths to $1\frac{1}{2}$ tons or more per acre. Oats do very well. Sugar cane is also a successful crop.

CONGAREE SERIES.

The soils and subsoils of the types in the Congaree series are brown to reddish-brown, there being comparatively little change in texture, structure, and color from the surface downward. Occasionally grayish and yellowish mottling is encountered in the subsoil of the poorly drained areas. These soils are developed in the overflowed first bottoms of the streams of the Piedmont region and in similar positions in the Coastal Plain along streams issuing from the Piedmont. The material forming the soils is washed from the drainage basins of the streams, mainly from the Piedmont region.

CONGAREE SILT LOAM.

The Congaree silt loam is somewhat variable in character. The surface soil consists predominantly of a brown to reddish-brown silt loam. There is very little difference between the soil and the subsoil, although the latter is usually somewhat lighter in color and heavier in texture. Small mica particles are present in both the soil and subsoil. The soil is smooth and friable and easily worked into a good tilth.

Like most alluvial soils the Congaree silt loam includes spots of varying texture, and being subject to overflow it undergoes modifications from flood to flood.

Less than 2 square miles of this soil is mapped. It occurs in very narrow strips at various points along the Chattahoochee River. While naturally a valuable soil its area is so small that it has but little influence on the agriculture of the county. It is generally used for the production of corn, yields of 20 to 50 bushels per acre being obtained. Late overflows sometimes damage the crop and larger yields are obtained in dry than in wet years. The need of fertilizers is less than on the uplands.

The native trees consist mainly of sycamore, water oak, hickory, and poplar.

MISCELLANEOUS MATERIAL.

ROUGH GULLIED LAND.

The Rough gullied land includes areas which, as the result of erosion, are so steep and broken as to be unfit for agriculture. Much of the land classified under this head supports forest. Some areas are available for pasture, but a considerable total area is not even suitable for this use, as there are many deep gullies with steep or perpendicular sides on which no vegetation can find a footing. Providence and Trotman "Caves," to the west and north of Lumpkin, are examples of such areas. (See Pl. II.) On the other hand, the less gullied areas include some patches of arable land. These

were not separated on account of their small size. Between these two extremes there are many variations with respect to the extent to which the land is dissected.

The most common occurrence of Rough gullied land is on the slopes leading to stream valleys. Such areas occur throughout the upland portion of the county, except in the Susquehanna clay hills section.

The forested slopes support a growth of shortleaf pine, with some longleaf pine and oak, and these are the areas that can be used for pastures.

In the southwestern part of the county in the Patterson Hills and in another large area about $1\frac{1}{2}$ miles southwest of Spring Hill Church, a somewhat different condition is encountered. Here the Rough gullied land consists of narrow-topped ridges with precipitous slopes, covered with ferruginous sandstone fragments. No level land is found here and the slopes are generally too steep even to afford good pasturage.

Another phase of Rough gullied land includes deep gullies, commonly called "caves," formed by long-continued washing. The sides of these large gullies are perpendicular, and are incapable of supporting either trees or grasses. Many of these caves are found in the vicinity of Providence Church, in the west-central part of the county and 2 miles northwest of Pleasant Valley Church. One of the largest within the county has developed in the memory of the present generation, having started with the formation of a small gully from the run-off of a barn. The caves, some of which are about 100 feet in depth and above 200 to 500 feet in width, ramify over large areas. There is little possibility of this gullied land being restored to a condition favorable to cultivation.

Except where some measure is taken to check the progress of the gullies they extend with destructive effect at a rapid rate. Establishing tree growth in the bottoms of the gullies and thus forming a bulwark for filling in the heads of the gullies has been found the most effective method of resisting their encroachment upon the cultivated areas.

SWAMP.

Swamp comprises areas in the stream bottoms which are subject to heavy overflow and which are inundated or in a saturated condition the greater part of the year. The material is made up of wash from Coastal Plain soils and is quite variable in texture and color. Much of the soil is a reddish silty clay loam, underlain by greenish-yellow, yellow, drab or mottled sandy clay. There are numerous areas in which the surface material has a dark-brown to black color. In many places the material is decidedly sandy.

Swamp is chiefly developed along Pataula Creek, in the southeastern part of the county, along Slaughter Creek in the northeastern corner, and along Hodchodkee Creek in the vicinity of Ray Bridge, in the southwestern part of the county. It extends back from the main streams for a short distance and grades into Meadow.

The land is forested with beech, magnolia, ash, swamp maple, sweet gum, and a variety of swamp pine. Swamp palmetto is also common.

In its present condition Swamp has no value, except for its forest and for pasture. Reclamation would be expensive, but where reclaimed this land is capable of producing good crops of corn, oats, and forage.

MEADOW.

The Meadow classification includes poorly drained, overflowed first bottoms in which the soil material is widely variable in color and texture. The material is prevailingly a reddish, yellowish, and grayish loose coarse sand or sand. The channels of the streams flowing through these bottoms are broad and shallow. The water spreads out quickly after each rainfall over the entire bottom, adding sandy material washed down from the near-by slopes. The current is so rapid that little heavy material, such as is laid down by the deeper inundations common to Swamp areas, is deposited.

The land is commonly called "sand flats." Its most general occurrence is in the southern part of the county. The broad bottoms of the upper part of the Pataula, Hodchodkee, Bladen, Turner, and other large streams and their tributaries, which drain the southeastern and south-central portions of the county, and of those streams which flow into Randolph and Quitman Counties before emptying into the river, are occupied chiefly by Meadow. The largest areas occur at the confluence of streams.

As a rule Meadow supports little vegetation. The most common growth is alder, interspersed with willow and blackberry briars. This land has little agricultural value owing to its sandy character, the frequent overflows, and the repeated overwash of fresh material. In places the areas represent broad stream courses, the streams not having established definite channels, and much of the type is similar to Riverwash. The topography is flat to level.

SUMMARY.

Stewart County, Ga., is situated in the southwestern part of the State in the Coastal Plain section. It has an area of 467 square miles, or 298,880 acres.

The topography varies from level or gently undulating to badly broken. The roughest topography of the Coastal Plain is found in

this county. In general, the surface is badly dissected by erosion, leaving level interstream areas. The section within the Flint River basin is gently undulating to gently rolling. A number of terraces lie along the principal streams.

The county lies mainly in the drainage basin of the Chattahoochee River.

The population of Stewart County was 13,437 in 1910, a decrease as compared with 1900.

Lumpkin is the county seat. Richland is an important business and railroad center.

The county has good railroad facilities, two branches of the Seaboard Air Line traversing it.

The climate is characterized by mild winters, with occasional cold periods, and comparatively hot summers.

Cotton is the most important crop grown. The average yield is a little over one-third bale per acre. Corn is of secondary importance, about 20 per cent of the improved land being devoted to this crop. The ordinary yields range from 8 to 10 bushels per acre. Oats, cowpeas, wheat, and rye are the crops of minor importance in the county.

Live-stock products produced on the farms are not sufficient to supply local needs.

Forty-six types of soil are recognized in the county. These range from loose, coarse, incoherent sands through various textures to heavy, sticky, impervious clays, and have been grouped in series. They include valuable upland, river-terrace, alluvial, and nonagricultural soils.

The Greenville soils are among the most productive of the upland types. The loamy coarse sand is the lightest textured type and is adapted to early truck crops. The coarse sandy loam and sandy loam are well adapted to general farm crops. The gravelly clay loam and the clay loam are excellent soils for general farming, but are not well adapted to truck. These soils produce larger returns than any other group of upland soils.

The Orangeburg coarse sandy loam and sandy loam types are the most productive of the series, and are well suited to the production of truck and general farm crops. The coarse sand and sand are more suitable for trucking than for general farming. The stony sandy loam is best devoted to grazing, while the clay type is difficult to handle and requires favorable seasonable conditions to secure fair yields.

Of the Ruston soils the fine sandy loam type is the most productive, but it does not occur in extensive areas. The sandy loam, in its best phase, is valuable both for trucking and for general farm crops. The coarse sandy loam is somewhat less productive than the

sandy loam, the main difference being in the texture of the surface soils. The coarse sand and sand types are of low agricultural value. The gravelly sandy loam is inextensive and of little value for agriculture.

The Norfolk sand and fine sand types are better trucking than general farming soils, although fair yields of cotton and corn are obtained.

The Susquehanna clay has a large total area, but is not suitable for agriculture on account of erosion. The area mapped as the Susquehanna clay, smooth phase, represents practically the only area of that type which can be farmed. It is a productive type, but its crop adaptation is limited, and it can be worked only under a narrow range of moisture conditions. The sandy loam and fine sandy loam of the Susquehanna series are fair cotton and corn soils.

The Cahaba are the strongest of the river terrace soils in the western part of the county. They are utilized for the production of corn and cotton, the yields varying according to the different methods of handling. The fine sandy loam, sandy loam, and coarse sandy loam are the most productive types. The sand and loamy coarse sand are well adapted to the production of truck crops. The clay is productive but difficult to handle.

Three members of the Chattahoochee series are recognized, the loamy coarse sand, coarse sandy loam, and sandy loam. These soils are devoted principally to cotton. They are well suited to the general farm crops common to this region.

The Amite series is represented by three types, the loamy coarse sand, coarse sandy loam, and sandy loam. These are excellent cotton soils, and are used principally for this crop. They also produce good yields of other general farm crops.

The Leaf loam is developed in small areas. It is well suited to corn and oats.

The Kalmia fine sandy loam and sandy loam are productive soils and can be profitably utilized for either trucking, where markets exist, or for general farming. The fine sand and sand are less productive, but are better suited to early truck crops. The coarse sandy loam and the gravelly sandy loam are not extensively developed and are of a somewhat lower agricultural value.

The Hannahatchee sandy loam is a very productive type which is found along the various streams flowing through the general region of the Susquehanna soils. It produces large yields of cotton, oats, and corn without the use of commercial fertilizers.

The Congaree silt loam is a first-bottom type, occurring along the Chattahoochee River. It is a fertile soil, well adapted to corn.

Meadow comprises the sand flats which occur along some of the streams. This land supports little or no vegetation.

Swamp includes first-bottom land along stream courses, which is wet throughout the greater part of the year, and supports a heavy growth of water-loving vegetation.

The Rough gullied land classification includes broken, severely eroded areas that are totally unfit for agricultural use.

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