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U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE GEORGIA STATE COLLEGE OF AGRICULTURE,  
ANDREW M. SOULE, PRESIDENT; DAVID D. LONG,  
IN CHARGE SOIL SURVEY.

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SOIL SURVEY OF MILLER COUNTY,  
GEORGIA.

BY

RISDEN T. ALLEN AND E. J. GRIMES.

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W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

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[Advance Sheets—Field Operations of the Bureau of Soils, 1913.]



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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF SOILS,  
*Washington, D. C., February 25, 1914.*

SIR: In the extension of the soil survey in the State of Georgia work was undertaken in Miller County during the field season of 1913. This survey was made in cooperation with the Georgia State College of Agriculture, and the selection of this area was made after conference with the State officials.

I have the honor to transmit herewith the manuscript report and map covering this work, and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1913, as provided by law.

Respectfully,

MILTON WHITNEY,  
*Chief of Bureau.*

Hon. D. F. HOUSTON,  
*Secretary of Agriculture.*

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### MAP.

Soil map, Miller County sheet, Georgia.

# SOIL SURVEY OF MILLER COUNTY, GEORGIA.

By RISEN T. ALLEN and E. J. GRIMES.

## DESCRIPTION OF THE AREA.

Miller County is situated in the southwestern part of Georgia. It is bounded on the north by Early and Baker Counties, on the east by Baker County, on the south by Decatur County, and on the west by Early County. Colquitt, the county seat, is located near the center of the county. It is about 240 miles south of Atlanta, 250 miles southwest of Savannah, and about 40 miles north of Tallahassee, Fla. The area of the county is 275 square miles, or 176,000 acres.

In topographic features the county represents a portion of a plain<sup>1</sup> of dominantly level and undulating to gently rolling country, varied here and there by (1) rather shallow depressions (sink holes), ranging from patches about 25 feet in diameter to areas containing a square mile or more; by (2) low, rounded, narrow ridges and hillocks, which rise sufficiently above the general upland level to give local areas a gently rolling configuration; and by (3) the flat-bottomed valleys of streams and drainage ways. The sink-hole depressions are widely distributed over the county. All of them hold water for varying periods after rainy seasons, but, with few exceptions, are dry during the summer.

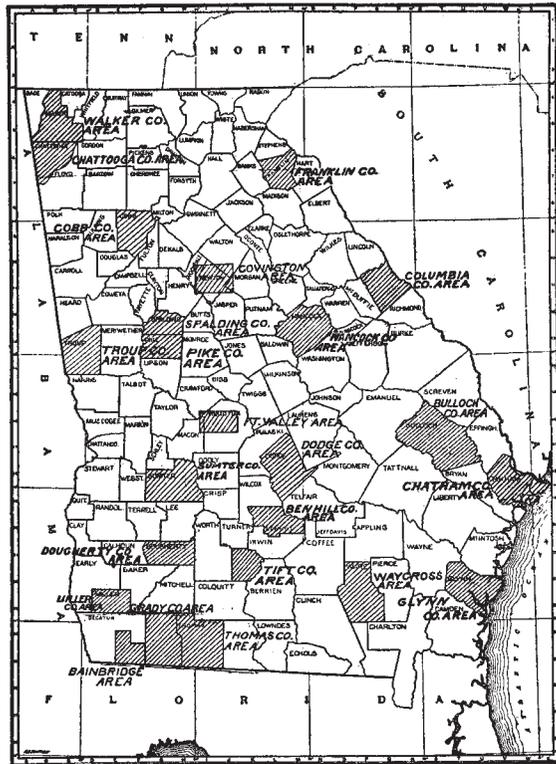


FIG. 1.—Sketch map showing areas surveyed in Georgia.

Miller, Colquitt, and Decatur counties are highlighted with diagonal hatching on the map. The map shows the county boundaries and names of various counties in Georgia, including Walker, Chattooga, Cobb, Spalding, Douglas, and many others. The map also shows major rivers like the Savannah and Chattahoochee.

<sup>1</sup> The Dougherty Plain described by Veatch in Bulletin No. 26 of Geological Survey of Georgia.

Bush and Middleton Ponds are said to hold water continuously. Among the most conspicuous of the sink holes are Indian, Byrd, Ham, Cow Pen, Big Nigh, and Lookout Ponds.

The most rolling areas are the comparatively narrow strips along stream courses, particularly along Spring, Aycocks, and Cypress Creeks. While these areas have a strikingly uneven surface as compared with the generally level lands of the county, the slopes are not steep enough to prevent cultivation and but few need to be terraced to prevent erosion. Practically all of the upland portion of the county, therefore, is well suited to tillage operations and to the use of labor-saving machinery.

The few streams of the county as a rule flow rather sluggishly, following a general southerly course, the direction of the surface slope. Spring Creek, the principal stream, enters the county from the north, flowing through the central part, and finally finding its way into Flint River south of the county line. The other streams, with the exception of East Cypress Creek, empty into Spring Creek either within the limits of the county or south of the county line.

All the streams have stretches of bottom land along their courses. These bottoms vary from a few feet in width along the smaller streams to as much as three-fourths of a mile along Spring Creek. As a rule the bottoms are flanked by gentle slopes, which mark their contact with the uplands. In the wider bottoms the location of the stream course is difficult, owing to the meanderings of the channels and to the fact that in many instances the channel divides into several subchannels, which wind irregularly through the dense swamp growth. Many of the smaller streams dry up during the summer. The bottoms are subject to overflow and the broader areas of the larger streams are either covered with water or remain in a soggy condition throughout the year. Much of the drainage of the county is through sink-hole depressions, the water percolating downward and finding its way into subterranean passages in the underlying rocks.

The uplands originally supported a dense growth of longleaf pine, but most of this has been cut for lumber. Some dogwood and scrub oak are to be found interspersed with the upland growth, while slash pine displaces longleaf pine in the low-lying areas. Small areas supporting a scant growth of hardwoods, including magnolia, white and red bay, beech, water, white, red, live, post, and blackjack oaks, red maple, dogwood, gum, and poplar, occur throughout the county, usually associated with the heavier members of the Grady soils. Such areas are usually styled "hammock lands." The swampy areas are densely wooded, the principal trees and shrubs being cypress, sweet gum, swamp maple, ash, bay, magnolia, holly, willow, tupelo gum, mayhaw, gallberry, yellow jessamine, smilax, wild grape, black haw, fetter bush, and various species of heaths.

Miller County was laid off from Early County in 1856, its boundary at that time being described by four straight lines. Recent acts of the legislature, however, have in some instances taken a part of the original territory in forming Decatur and Early Counties, and, on the other hand, some territory taken from other counties has been added. Settlement of the county began in the early part of the nineteenth century, with only a few families, and increased slowly until the close of the Civil War. These settlers came chiefly from the Carolinas and from the colonies in northern Georgia. Although there has not been rapid growth at any time, the population has steadily increased. With the building of the Georgia, Florida & Alabama Railway about the beginning of the twentieth century an impetus was given to the settlement of new areas. According to the census, the population of the county was 6,319 in 1900 and 7,986 in 1910. Of this number about 1,200 live in towns, leaving only 6,786 who make their homes in the rural districts. Owing to the large individual land holdings scattered throughout the county, considerable territory remains almost in its primitive state. According to the census report of 1910, Colquitt had a population of 600. At the time of making this survey the population had in all probability reached the 1,000 mark. Boykin, Nicholasville, and Corea are small railway villages of very little importance except as shipping points. Babcock, located just to the east of Boykin, is a sawmill town, and is connected with the Georgia, Florida & Alabama Railway by a tramroad owned by the mill at this point. It is the second town of importance from the standpoint of population, having about 500 inhabitants. Other inland villages are Cooktown, Mayhaw, and Lucile.

Railway connections with outside markets are supplied only by the Georgia, Florida & Alabama Railway, which enters the county from the north, traversing the central part and passing out to the south. A large number of log tramroads are to be found throughout all parts of the county, some of which, especially the Babcock lines, accommodate the section traversed by hauling heavy commodities, such as fertilizers, etc. The proposed railroad traversing the county from east to west would undoubtedly be a great stimulus to agricultural development.

The county is well supplied with dirt roads, which are maintained in excellent condition the year round. Rural free delivery mail routes have been established throughout the county.

## CLIMATE.

The climate of southwestern Georgia, in which Miller County is situated, is characterized by long, warm summers and short, mild winters, and suited to a diversified agriculture. Farming operations can be carried on during practically all the year.

The summer weather usually begins about the last of March and continues until about the first of November. The mean temperature of the spring months is 65° F. and that of the summer months is 79° F. July and August, the hottest of these months, have a mean temperature of 80° F. The highest temperature so far recorded is 104° F., occurring in July. Notwithstanding the high temperature sunstrokes are practically unknown. The nights are tempered by the south and southwest breezes from the Gulf. Snow is almost unknown. The ground seldom freezes, and then only a fraction of an inch in depth. The mean temperature for the winter months is 49° F. The temperature may go as high as 83° F. in winter and as low as -1° F., but temperatures lower than 30° F. are rare. Usually there will be three or four days of cold, bracing weather, followed by an equal number of warm, sunshiny days, frequently terminating in a rain. The relatively high humidity of winter makes the cold more noticeable and somewhat more penetrating than the same temperatures in more northern States. The weather is so mild that roses, violets, and japonicas bloom throughout the winter. The Satsuma orange flourishes without much protection, and such vegetables as onions, lettuce, beets, cabbage, spinach, turnips, and collards can be grown with little or no protection during the winter. The winters are very favorable to the growing of cover crops such as rye, oats, vetch, and clover, all of which furnish excellent pasturage and reduce the cost of wintering stock. The spring plowing is usually done in January and February, although it may be done with comfort during any of the winter months. The first corn is planted about the middle of March and cotton is planted about the last of March or the first of April. Early vegetables like beans, radishes, and Irish potatoes may be planted by the middle of February and be reasonably safe from frost. The native vegetation is usually well started by this date.

From the Weather Bureau records it is ascertained that the average date of the last killing frost in spring is March 10 and of the earliest in fall November 13, giving an average growing season for tender vegetation of 247 days, or about 8 months. The date of the latest killing frost in spring is April 8 and of the earliest in the fall October 21, making the shortest growing season to be expected 195 days, or 6½ months. The long growing season is favorable to a wide range

of crops, and it is possible to obtain two or three crops from a field in a year.

The mean annual precipitation is 50.6 inches, which is usually well distributed throughout the year, although periods of excessive rainfall and drought may occur. The summer months show a mean of 15.5 inches, the greatest amount of rain falling during the growing season, when it is most needed, and the minimum during the cotton-picking season, when least desired. The total amount of precipitation for the driest year is 46.1 inches, which is only 4.5 inches less than normal. The total amount for the wettest year is 58.4 inches, the excess occurring during the growing season. The rainfall is adequate for all crops grown in this section of the South if proper attention is given to the tilling of the soil so as to conserve its moisture.

The following table, showing the normal monthly, seasonal, and annual temperature and precipitation at Morgan, which is about 30 miles north of Colquitt, in Calhoun County, is fairly representative of the climate of Miller County:

*Normal monthly, seasonal, and annual temperature and precipitation at Morgan, Calhoun County.*

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.....	48	80	10	3.6	2.2	6.5	T.
January.....	48	80	13	3.9	4.1	3.0	0.1
February.....	50	83	-1	7.2	6.1	2.7	0.8
Winter.....	49			14.7	12.4	12.2	0.9
March.....	58	87	20	5.6	5.9	1.7	0.0
April.....	64	90	31	3.4	3.2	4.0	0.0
May.....	74	98	41	2.8	3.8	2.6	0.0
Spring.....	65			11.8	12.9	8.3	0.0
June.....	78	102	51	4.2	2.1	6.0	0.0
July.....	80	104	55	4.9	5.2	6.0	0.0
August.....	80	100	58	6.4	7.6	14.8	0.0
Summer.....	79			15.5	14.9	26.8	0.0
September.....	76	100	41	2.9	2.3	0.3	0.0
October.....	66	93	26	2.5	1.4	3.6	0.0
November.....	55	86	20	3.2	2.2	7.2	0.0
Fall.....	66			8.6	5.9	11.1	0.0
Year.....	65	104	-1	50.6	46.1	58.4	0.9

## AGRICULTURE.

Miller County comprises large areas of productive, well-drained soils, which are amenable to comparatively easy cultivation and are suitable for the production of a wide range of crops, including cotton, corn, oats, peanuts, cowpeas, soy beans, bur clover, vetch, beggarweed, sugar cane, sorghum, sweet potatoes, Irish potatoes, watermelons, cantaloupes, cucumbers, cabbage, peas, and a large number of other vegetables, strawberries, blackberries, dewberries, pears, peaches, and pecans. About 30 per cent of the area of the county is poorly drained. A part of such land is entirely unsuited in its present condition for agriculture, and the remainder is suited only to the production of moisture-loving crops, such as rice and sugar cane. The stream bottoms can not be used at all and their reclamation would entail considerable enlargement of the stream channels or diking to prevent overflow. A part of the other class of poorly drained land, the depressions in the uplands, is covered by water most of the year and consequently can not be used in its present condition, while other parts can be cultivated, either with a reasonable degree of safety or upon a rather precarious basis, depending upon seasonable conditions. With ordinary rainfall a variety of crops can be grown on a part of these lands, while in dry seasons other areas that would be too wet under usual conditions can be farmed profitably. By digging channels and laterals agriculture could be established upon a safe basis over a considerable portion of the depressed lands. The drainage could also be improved by digging wells or otherwise making openings into the underlying porous rocks to allow downward passage of excess water. The profitableness of such artificial reclamation is doubtful when the price at which the unused areas of well-drained soils can be purchased at present. The returns upon the investment for reclamation would probably not be sufficient to induce immediate prosecution of drainage operations upon an extensive scale. However, the installation of better drainage systems would result in a marked improvement of the general healthfulness of the county.

Farming operations were begun in this territory about 1830 in the vicinity of Spring Creek. The efforts and attention of the early settlers were largely directed to the cultivation of corn and other food crops and the raising of sheep and cattle. With the development of the country cotton soon became the important money crop, and it has continued to hold this position until the present time. Aside from cotton the most important crops grown at the present time are corn, cowpeas, oats, sugar cane for sirup, and peanuts as a field-forage crop for hogs. Some sugar-cane sirup is marketed, but the other crops, including vegetables and melons, are produced principally for home use.

The agriculture of the county is gradually improving, but it can not be said to be anywhere near the stage of highest development. The turpentine and lumber industries have taken up a considerable part of the efforts of the inhabitants of this section for at least two decades, but with the large areas of land suitable for cultivation the county should attain a high state of agricultural development in the near future. Much depends, however, upon the opening up of the large holdings of cut-over land to settlement. Development has been retarded by the tendency of the owners of large tracts to keep their holdings intact.

In 1909 approximately 12,000 bales of cotton were grown in Miller County. This output could be greatly increased by the more general employment of intensive methods of soil management and by utilizing the large area of uncultivated upland soils, which are admirably adapted to this crop. With the advent of the boll weevil there is likely to be a temporary reduction of the yield, but by practicing the methods to be used under boll-weevil conditions<sup>1</sup> it is believed that good yields will still be secured.

The present practices in the cultivation of cotton conform closely with the methods generally used throughout the cotton belt. The seed is planted on ridges, the young plants being barred off with turning plows, chopped and cut to a stand with hoes, and subsequently cultivated by running between the rows several times with shovel or sweep plows, alternately throwing the soil toward and away from the plants, but finally leaving them on beds separated by gutterlike intervals. Ordinarily one or two hoeings are needed to remove grass and weeds from the stalks. This method of culture seems to meet the requirements of the crop quite satisfactorily.

Cotton can be successfully grown upon all the well-drained soils of the county. It produces best, however, with the same treatment and fertilization, on the Orangeburg and Greenville soils. It can also be grown upon some of the poorly drained soils, but these are not as well adapted to its production as the better drained lands.

Not enough corn is grown in the county to supply the local demand. The crop is cultivated like cotton, although the treatment is less intensive. It is planted either on ridges or in water furrows and cultivated by running furrows on both sides of the plants, leaving them at the last cultivation on high beds.

As with corn, oats are not given the careful attention employed in the production of cotton. The crop is generally sown too late in the season and on soil which is imperfectly prepared. It is grown in this section generally as a feed crop.

Peanuts are being grown by some farmers as a field forage crop for hogs. This crop does well on all of the well-drained sandy loams and

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<sup>1</sup> See Farmers' Bulletin No. 507.

can be easily grown in conjunction with other crops, as, for instance, between cotton and corn. In addition to the value of the peanut as a hog feed, the vines and roots benefit the soil by adding to it organic matter and nitrogen. The tops also make a nutritious hay.

The best farm practice includes the growing of summer and winter legumes in rotation with the general farm crops and nonleguminous special crops, such as vegetables, potatoes, and melons. The legumes serve the important purposes of increasing the organic-matter content of the land and of adding nitrogen gathered from the air through the agency of root nodules. They have an additional value as supplemental forage and hay crops.

Cowpeas thrive on all the well-drained soils, making a good growth of vines, though they may not produce an abundance of seed. Several varieties are grown, including Iron, Whippoorwill, Duera, Black, and Crowder. Yields of from 1 to 2 tons per acre of cowpea hay of excellent quality can be easily secured.

Velvet beans produce a heavy growth of vine, frequently being so rank when grown with corn as to make it difficult to harvest the latter crop. Growing into a dense mass of long, tangled vines, it is next to impossible to cut this crop for hay. It is, however, very beneficial to the soil and affords excellent grazing.

Soy beans, beggarweed, lespedeza, and vetch are valuable summer legumes that can be grown successfully as soil improvers and as grazing and forage crops. Bur clover and vetch are excellent winter legumes which find the well-drained uplands favorable to a prolific growth.

Of the wild grasses suitable for grazing, broom sedge, "water grass," and wire grass are probably the most valuable. Wire grass is not considered particularly nutritious, but cattle relish the young growth, and untilled lands are frequently burned off in the spring to facilitate grazing on it. Probably the most valuable grass of this general region is Bermuda grass. This usually withstands the parching effect of summer weather in such a way as to supply good grazing during the hottest seasons. Sandspur, crowsfoot, and crab grass are sometimes cut for hay, the latter frequently succeeding crops like watermelons in a luxuriant growth.

Nearly every farmer grows a small patch of sugar cane for making sirup, and some have a surplus for market. Sirup of a superior quality is produced on the Norfolk soils. Cane grown on Ruston and Tifton soils and the deep phase of the Orangeburg produces a sirup which is fairly good in point of color; that grown on the Greenville and the shallow phases of the Orangeburg soils yields a product possessing a darker color than is desired by a discriminating market. Notwithstanding the inferior quality of the sirup from the Orangeburg and Greenville soils, they produce heavy yields and this compensates

for the better prices secured for the superior sirup produced on less productive soils. It is believed that the sandy type of the Grady series could be used for the production of sugar cane in dry years or when the drainage has been improved artificially.

Yields range from about 75 to 300 gallons per acre under the ordinary methods of production, depending upon character and condition of the soil, degree of fertilization, and thoroughness of cultivation. Much heavier yields can be secured by more liberal applications of fertilizers of higher grade than generally used. The crop is grown on ridges and cultivated in very much the same manner as corn. The period of cultivation, however, is longer, usually from early summer or late spring until about the latter part of July. Harvesting and sirup making ordinarily begin in October. The sirup is manufactured in open kettles at favorably located points.

Watermelons can be successfully grown on the deep sandy loam and sand types which have good drainage, especially when heavy applications of fertilizers are made. Cantaloupes and cucumbers do well on the well-drained sandy loams. The Orangeburg, Norfolk, Tifton, and Ruston soils are well suited to the requirements of sweet potatoes, producing heavy yields with liberal additions of fertilizers or manure. A large number of vegetables, including cabbage, Irish potatoes, tomatoes, English peas, navy beans, radishes, squashes, onions, okra, beets, carrots, parsley, asparagus, lettuce, and eggplant, can be easily produced, but they require rather heavy applications of complete commercial fertilizers or barnyard manure. The well-drained sands give the earliest crops of vegetables, medium early crops being secured from the sandy loams.

Pears and plums can be grown successfully on practically all the upland types of soil. Le Conte, Kieffer, and Bartlett pears are the varieties that give the best results. The trees are subject to the devastating effect of blight, a disease which can not be prevented or cured, although it can be controlled in a manner by pruning the diseased branches and by bodily removing the most severely affected trees and burning the wood. Figs thrive without any attention whatever. Scuppernong grapes grow luxuriantly with but little attention.

The Orangeburg soils are usually suited to strawberries, and the crop can be grown quite well on the sandy loams of the Norfolk, Tifton, Ruston, and Greenville series, and possibly also on drained areas of the Portsmouth and Grady soils. Blackberries and dewberries grow wild throughout the county. These crops are rarely known to fail. The wild mayhaw fruits bountifully in wet places, the tree being one of the most characteristic growing in the sink holes which hold water for a considerable part of the year. Jelly of a highly attractive color and delicious flavor is made from the fruit of this tree.

Pecans succeed on all of the upland soils, especially on the sandy loams, but the nut has not yet been produced in sufficient quantities to be classed as an important product. A few small orchards and scattered trees of the improved "papershell" varieties are doing well.

The raising of stock is not an important industry in the county, most farmers raising only enough animals to furnish meat for home use. Cattle thrive during the summer on the native grasses, and with the numerous forage crops which may be grown, beef and dairy products can easily be produced for market.<sup>1</sup>

Owing to the large acreage devoted to cotton as compared with other crops, and to the extent to which the soils withstand continuous cotton production, the farmers have not generally been impressed with the necessity for a system of crop rotation. The continuous clean cultivation of the crops, however, causes gradual deterioration of the soils, especially when no organic matter other than the cotton stalks is supplied. With the development of a diversified system of agriculture, crop rotations will necessarily come into practice.

Most farmers apply commercial fertilizers to cotton, corn, and sugar cane, usually in applications of 200 to 300 pounds per acre for cotton, 200 pounds for corn, and somewhat heavier applications for sugar cane. The commonly used mixtures are low-grade, factory-prepared brands, analyzing as a rule about 8-2-2. Some use better grades, such as mixtures analyzing 8-2-4, 10-2-5, and 8-2-3, and make heavier acreage applications. As a rule little discrimination is used in applying fertilizers, the same practice prevailing on the different soils and with the different crops.

According to the Thirteenth Census, there were 1,019 farms in Miller County, of which 418 were operated by the owners, 599 by tenants, and 2 by managers. The average size of the farms in 1910 was 107 acres, having gradually decreased from 190 in 1880.<sup>2</sup> Some of the farms are operated on shares, the owners receiving from one-third to one-half the crop, according to what they furnish in the way of implements, stock, feed for stock, seed, and fertilizer. When renting for cash they receive from \$3 to \$6 per acre. Laborers are paid from \$18 to \$20 per month, with board. Day wages range from \$1 to \$1.50, the highest wages being paid during the harvesting seasons. Considerable difficulty is experienced in getting sufficient competent laborers for the farms, on account of the higher wages paid in the turpentine and lumber industries.

#### SOILS.

Miller County lies within the Coastal Plain region, and its soils are derived from the Coastal Plain deposits. These deposits represent

<sup>1</sup> See Farmers' Bulletins Nos. 261, 349, 379, 411, and 498.

<sup>2</sup> As the census enumerates each tenancy as a farm, the average size of individual holdings is larger than this.

consolidated and unconsolidated material which was originally deposited in water after having been transported by running water from land areas. Such transported material probably varied some in its source and in conditions under which it was laid down. For example, the calcareous rocks of the region represent material which was deposited under conditions unlike those occurring when the unconsolidated, noncalcareous material was laid down—conditions which favored the accumulation of calcareous deposits along with noncalcareous deposits, the whole having been mixed and subsequently consolidated into rock.

In the remote past the waters which covered the Coastal Plain region receded and the sedimentary deposits were exposed to the influence of weathering, vegetation, and erosion. These agencies have combined to modify the character of the deposits and to alter the surface configuration of the land. Through the solvent powers of the atmospheric and ground water, coupled with the oxidizing power of the atmosphere, important changes have been brought about since the emergence of the land. The uplifted materials, under this influence, have undergone changes of color, structure, and chemical composition. The rock platform of the area, including arenaceous limestones and calcareous sandstone, has been altered at least locally by solution and probably by oxidation in such a way as to give rise to definite soil material, and in places the rock, under the influence of solution and moving water, has been disintegrated and removed in such a way as to give rise to underground openings and to cause local slumping of the surface to form the common sink-hole depressions of the area. The action in this case has consisted of solution of the cementing material, calcium carbonate, followed by disintegration of the rock and bodily removal of the residuary products by the force of gravity or running water.

Vegetation has played an important rôle in bringing about changes in the superficial material, principally by storing decomposing vegetable matter in the soil. Running water has, since the uplift of the land, been continuously active in modifying the surface configuration by washing out stream valleys and drainage ways, by carrying soil material from a higher to a lower level, particularly by washing the finer material into underground cavities and by washing the finer particles from the surface portion of the soil, translocating them to lower levels in the soil sections or bodily working them out of the soil mass and carrying them to other locations, thus either leaving a coarser textured material on the higher areas or adding finer material to the surface portion of lower lying areas upon which the translocated material has been washed. Also, flowing water has bodily swept the coarser material from the steeper, sloping areas, exposing the underlying clay.

The soils have been divided into types as determined by texture; that is, the relative content of the various grades of sand, silt, and clay. These types have been grouped into series, the members of which have like general characteristics of color, structure, drainage conditions, and origin. There are nine such series represented in the county. These are the Norfolk, Grady, Ruston, Tifton, Orangeburg, Portsmouth, Leon, Greenville, and Plummer. These are all upland series, the bottom lands being mapped as Swamp. The Norfolk series is the most extensive, occupying 60.2 per cent of the area of the county, followed by the Grady, 16.5 per cent, Ruston, 9.1 per cent, the Tifton, 6.9 per cent, and the Orangeburg, 2.6 per cent. The descriptions of the several series and of the included types are given in subsequent pages. The names and areas of the different soils are shown in the following table:

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk sandy loam.....	66,560	46.9	Ruston sandy loam.....	3,968	2.3
Deep phase.....	14,464		Orangeburg sandy loam.....	3,968	2.3
Flat phase.....	1,664		Portsmouth sand.....	640	.4
Grady sandy loam.....	20,864	11.9	Orangeburg sand.....	576	.3
Norfolk sand.....	17,408	10.0	Leon sand.....	320	.2
Tifton sandy loam.....	12,224	6.9	Greenville sandy loam.....	256	.1
Ruston sand.....	12,032	6.8	Plummer sand.....	256	.1
Grady clay loam.....	8,128	4.6			
Swamp.....	6,912	3.9	Total.....	176,000	.....
Norfolk coarse sand.....	5,760	3.3			

### GRAY SOILS.

#### SEDIMENTARY MATERIAL—SANDS AND CLAYS.

##### NORFOLK SERIES.

The Norfolk soils are characterized by the light-gray to yellowish-gray color of the surface soils, and by the yellow color and friable structure of the subsoils. They occupy nearly level to rolling uplands throughout the Coastal Plain, and have been derived from unconsolidated deposits of the Coastal Plain, chiefly sands and clays. The members of this series are variously adapted to early, medium, and late truck crops, and to general farm crops. In the Coastal Plain as a whole the sandy members predominate. These soils are usually deficient in organic matter. The Norfolk soils are the most important types in Miller County.

## NORFOLK SANDY LOAM.

The surface soil of the Norfolk sandy loam consists of a light-gray to brownish-gray loamy sand or light sandy loam, which passes into a pale-yellow light sandy loam or loamy sand at about 6 inches. The subsoil, beginning anywhere between 10 and 20 inches in the larger areas, varies from a light-yellow to light greenish yellow, friable sandy clay, extending to a depth of more than 3 feet. There is a slight difference between the texture of the soil in the extreme eastern part of the county and that in the western part. In the former locality the surface soil contains a slightly higher percentage of the finer grade sands, while in the latter section it is noticeably coarser than the typical soil through the central part of the county. This variation in the type across the county is so very gradual that in no place could any distinct division be made. It is largely accounted for by the difference in surface features of the two sections. The eastern side of the county is more rolling, and it is probable that a larger proportion of the finer grade materials have been carried away in suspension than is the case with the flatter areas along the western border of the county. In some localities there is a noticeable quantity of iron concretions on the surface and disseminated throughout the soil section, but the admixture is not sufficient to cause a classification of these areas with the Tifton sandy loam. Occurring throughout the type are patches of the Grady soils, which owing to their small extent could not be shown on the map. There are also slight depressions where the surface drainage has not been so well established in which the soil is darker in color and contains a larger quantity of vegetable matter than the typical soil, and the subsoil frequently shows mottlings of drab and gray and is slightly heavier in character than the subsoil of the more elevated areas.

The Norfolk sandy loam is the most extensive and by far the most important type agriculturally in the county, there being more land of this type under cultivation than of all the other types combined. It is developed in all parts of the county. Some of the larger and more continuous areas occur in the vicinity of Kimbrel, Newberry, Spooners, and Harmony Schools. Included in these areas are small bodies of Grady, Ruston, Orangeburg, and Tifton soils.

The surface of the type varies from almost level to undulating and gently rolling. The level to undulating topography is found in the western part of the county and the more rolling tracts in the northeastern part. Most of the type is well drained, and it is only upon the broad, level to undulating areas that artificial drainage is necessary to any great extent.

Longleaf pine, principally, with some shortleaf and slash pine, dogwood, ash, and hickory form the forest on this soil. Most of the

merchantable timber has been cut, and the greater part of that remaining is owned by lumbermen. Wire grass flourishes everywhere and furnishes excellent grazing.

The Norfolk sandy loam has a wide crop adaptation, and, owing to its general distribution, is devoted to all the crops grown in the county. The principal products are cotton, corn, sugar cane, oats, peanuts, and sweet potatoes. The soil is also well suited to Irish potatoes, sorghum, forage crops, and beans. Tobacco would probably do well, especially on the finer textured areas of the type. The yields per acre range from one-third to 1 bale of cotton, 15 to 30 bushels of corn, 175 to 350 gallons of sirup, 75 to 350 bushels of sweet potatoes, and 15 to 30 bushels of oats. The soil is capable of producing much higher average yields, but the above figures represent what may be expected under the prevailing methods of soil management. Under proper methods of cultivation and fertilization small patches of this soil have produced as high as 2 bales of cotton per acre. With ordinary fertilization it can be made to produce as high yields of corn as any other type. Sugar cane is usually grown on the slopes or in the poorly drained areas near stream courses and yields fairly well, the quality of the sirup being good and the color light.

Commercial fertilizers of the ordinary grades are used in all parts of the county at the rate of from 150 to 300 pounds per acre for all crops.

Land of the Norfolk sandy loam sells at from \$15 to \$30 an acre depending upon location and improvements.

*Norfolk sandy loam, deep phase.*—The deep phase of the Norfolk sandy loam differs from the typical soil mainly in the depth and lighter texture of the soil material overlying the sandy clay subsoil. Generally the surface soil consists of a light-gray loamy sand of medium texture, below which is found a pale-yellow loamy sand, extending to a depth of about 20 to 30 inches, and resting on the typical subsoil.

This phase occurs in various parts of the county, but the more prominent areas of it are situated southwest of Cooktown, in the vicinity of Twilight School, and northeast of Colquitt.

It occupies undulating to gently rolling and almost level areas. The loose and open structure of the deep sandy covering permits a free and rapid passage of water, thus insuring excellent natural drainage. The forest growth is similar to that of the typical soil.

On the whole this phase is not as productive of the staple crops as the typical soil. It is well suited to the production of Irish potatoes, sweet potatoes, watermelons, cantaloupes, radishes, English peas, and pecans. The shallower areas are better for cotton, corn, oats, sugar cane, and forage crops. Sweet potatoes yield from 60 to 250 bushels,

corn and oats from 10 to 20 bushels, and cotton from one-fourth to one-half bale per acre.

This phase is not so easily improved or maintained in a good condition as the typical soil. Fertilizers leach out more readily, on account of its loose, open structure.

Land of the Norfolk sandy loam, deep phase, sells for \$10 to \$15 an acre.

*Norfolk sandy loam, flat phase.*—The surface soil of the Norfolk sandy loam, flat phase, is slightly darker in color than that of the typical soil, owing to the presence of a larger quantity of organic matter. It has in general, however, the same texture and depth as the typical soil. The subsoil is not materially different from that of the main type, except in local spots, where there are some mottlings of drab and gray with the yellow. This condition is due to the poor drainage and aeration.

This phase occupies a few flat or very gently undulating areas occurring in close association with the Grady, Ruston, and Norfolk types in the northwestern part of the county. Practically none of it is under cultivation, owing largely to the fact that it is inadequately drained. It lies at a sufficient elevation above the drainage ways to allow of fairly easy artificial drainage through open ditches, and commonly sells at about \$8 to \$10 an acre.

#### NORFOLK SAND.

In the typically developed areas of the Norfolk sand the surface soil is a gray medium sand to light loamy sand, from 6 to 8 inches deep, underlain by a pale-yellow sand of slightly coarser texture to a depth of 3 feet or more. In the forested areas of the type the surface soil, owing to the accumulation of organic matter, is slightly darker in color in the first few inches, but passes into the typical gray in the lower depths. Small areas lying adjacent to the loamy sand are not infrequently brownish in the surface portion, being underlain by a pale-brown sand to a depth of 3 feet, below which there are usually faint mottlings of pink or red. The type is prevailingly loose and incoherent in structure and a good tilth is easily secured.

The largest areas of the Norfolk sand occur in the southern part of the county, in and around Boykin, Babcock, and south of New Light Church along the Miller-Decatur County line. There are several isolated areas of minor importance scattered throughout the county. They are usually level to undulating or sloping. The topography of the main bodies of this soil is level or slightly undulating, and in some instances quite rolling in comparison with the rest of the county. The topographic position of the type insures excellent surface drainage, and this, with its open texture and structure makes

it a warm, early soil. The same features cause the land to be droughty in years of low rainfall.

The Norfolk sand is best used for growing early truck crops. English peas, beans, cantaloupes, watermelons, collards, cabbage, radishes and strawberries would do well with the liberal use of commercial fertilizers. The soil is deficient in organic matter.

At the present time most of the type under cultivation is devoted to general farming, cotton, corn, sugar cane, peanuts, oats, and sweet potatoes being the principal crops. Cotton yields on an average about one-fourth bale per acre, rarely exceeding one-half bale, corn 10 to 15 bushels, oats 10 to 18 bushels, and sweet potatoes from 60 to 150 bushels. Sugar cane does well in years of sufficient rainfall and under judicious fertilization and management, yielding from 100 to 250 gallons of an excellent grade of sirup.

The Norfolk sand is at present largely covered by a dense growth of scrub oak, which determines in a large measure its value. The price varies from \$7.50 to \$20 an acre.

#### NORFOLK COARSE SAND.

The surface soil of the Norfolk coarse sand is a gray coarse sand, usually slightly darkened in the surface 6 inches with organic matter. Numerous small quartz gravel and iron concretions are scattered over the surface and throughout the soil section. The subsoil is a pale-yellow or faintly brownish yellow coarse sand, extending to a depth of 3 feet or more. In a few instances a rather sandy clay substratum occurs at about 4 feet, but as a rule the coarse material of the typical subsoil extends to a considerably greater depth. The soil is loose and incoherent and can be worked at almost any time of the year, regardless of the moisture content, without injurious effects. It is usually deficient in organic matter.

The Norfolk coarse sand is found principally in the southeastern part of the county along the Decatur-Miller County line and in the vicinity of Twilight. There are a few isolated areas, including narrow ridges surrounding some of the flats and ponds. In general it has the most uneven topography in the county.

Although the Norfolk coarse sand is largely covered with a native growth of scrub oak, small areas have been cleared and farmed for many years. The principal crops are corn, cotton, oats, sweet potatoes, and sugar cane. Corn ordinarily yields 10 to 25 bushels per acre, potatoes 75 to 150 bushels, and cotton from one-fourth to one-half bale with the application of 200 pounds per acre of fertilizer of an 8-2-2 formula. Sugar-cane sirup of an excellent quality is produced, but the yields are so light, even with heavy applications of high-grade fertilizer, that a very small acreage is planted to this crop.

When cleared land of this type sells for \$7 to \$15 an acre, depending upon location and improvements; uncleared areas bring much less.

#### RUSTON SERIES.

The soils are gray to grayish brown and are underlain by reddish-yellow to yellowish-red or dull-red, moderately friable subsoils, prevailing of sandy clay. 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 subsoil structure. Occasionally the lower subsoils are mottled with gray and shades of yellow. The soils are closely associated with the Orangeburg and Susquehanna. In crop adaptation they are practically the same as the Orangeburg, although in general slightly inferior in point of yield.

#### RUSTON SAND.

In the larger and best developed areas the Ruston sand consists of about 8 to 12 inches of a brownish-gray loamy sand, medium in texture, passing gradually into a brownish, reddish-yellow, or yellowish-red sand, which extends to a depth of 3 feet. Below this depth there is a tendency for the subsoil to pass into a reddish sandy clay identical with the subsoil material of the Greenville and Orangeburg soils. There are numerous variations in the color, as well as in the percentage of fine material occurring in the soil mass. In small areas throughout the larger bodies the surface material extends to a depth of 18 to 24 inches, and is usually much lighter in color and somewhat coarser in texture, though containing sufficient clay and silt to render it slightly loamy and sticky when wet. Such areas usually contain higher percentages of fine material in the lower depths than the typically developed areas, and for this reason the soil is less droughty.

The type occupies broad, level to gently rolling interstream areas, and also occurs as belts bordering a few of the streams of the county, It is most typically developed in the extreme southeastern corner of the county, in the northeastern part along East Cypress Creek, and in small, isolated areas throughout a large part of the county, usually associated with the Norfolk coarse sand, sand, and sandy loam.

On account of its topographic position and open character, most of the type is well adapted to cotton and early truck crops. The lightest phases have a tendency to be more or less droughty, but this condition can be largely corrected by increasing the humus content. At present corn, cotton, oats, and sugar cane are grown to a considerable extent. Cotton yields from one-third to three-fourths bale per acre, corn from 12 to 25 bushels, and oats from 15 to 25 bushels. The areas of this type having a reddish-brown sandy clay subsoil in the lower depths are the most desirable for the cultivation of the crops

now grown, while the lighter phases should be used for truck and forage crops.

The tree growth on the Ruston sand consists of a few hardwoods, interspersed here and there with pine. Where in forest, the price of this land ranges from \$8 to \$15 an acre, depending on the character of the growth. Cleared areas are valued according to the location and improvements, but the price of farm land rarely exceeds \$15 an acre.

#### RUSTON SANDY LOAM.

The soil of the Ruston sandy loam is a gray to grayish-brown loamy sand or light sandy loam varying in depth from 8 to 12 inches. Below this depth there is in some instances an increase in the amount of fine material or a transition in the upper middle part of the soil section to a heavy sandy loam to a depth of 15 to 18 inches. Below this depth, and not infrequently below 8 to 12 inches, the typical subsoil is encountered, consisting of a reddish-yellow or yellowish-red to dull-red, friable, sandy clay extending to a depth of 3 feet or more. Generally the clay content, and in some instances the reddish color increases in the lower part of the 3-foot section.

This soil constitutes an intermediate type between the Norfolk sandy loam and the Orangeburg sandy loam, and in some instances there are sufficient ferruginous pebbles to suggest the Tifton sandy loam. As a rule the sand grains of this type are principally of the medium grades, although in some of the areas the coarser particles are prominent in the surface portion, and scattered areas may be found where such material is disseminated throughout the subsoil.

The Ruston sandy loam is found in narrow strips and small bodies in all parts of the county. Some of the most important areas lie in the southeastern part of the county, east and northeast of Babcock. Smaller areas occur north and east of Cooktown, northwest of Colquitt, and in and around Twilight. Numerous other areas occur as strips bordering areas of Grady and Orangeburg soils. It occupies the broad, gently rolling, and undulating slopes, merging usually into the smoother topography of the Norfolk sandy loam or the level to flat topography of the Grady sandy loam and clay loam.

Near the line of contact with the Grady clay loam and sandy loam a number of minor variations in the subsoil of the Ruston sandy loam are to be noticed. Mottlings of gray or yellowish-red streaks are of frequent occurrence, or else in the extreme depth of the 3-foot section the color usually becomes more distinctly the characteristic red of the Orangeburg sandy loam and shows a slight plasticity.

As a rule this soil is well drained. It contains sufficient coarse material to make it open, loose, and easily tilled with ordinary one-horse implements common to this section.

The forest growth consists principally of pine, with some oak. Among the oaks are to be found blackjack, post, black, Spanish, red, and white oak. Practically two-thirds of this type has been cleared and is now under cultivation.

Cotton, corn, oats, sweet and Irish potatoes, sugar cane, and garden vegetables are grown with more or less success on this soil. Cotton probably occupies the greater acreage. The average yield is about one-third bale per acre, although more than a bale is produced on some of the best improved farms. Corn yields from 10 to 20 bushels, oats from 15 to 30 bushels, and sweet potatoes 75 to 200 bushels per acre. Sugar cane yields from 200 to 300 gallons of sirup per acre, but as a rule the quality is somewhat inferior to that produced on the Norfolk sandy loam.

Land of the Ruston sandy loam can be bought for about \$10 to \$20 an acre, depending upon location and nearness to transportation facilities.

#### LEON SERIES.

This series comprises the loose, light-gray to white sandy soils in the flatwoods region of the South Atlantic and East Gulf coast, which in their typical development have a subsurface "hardpan" stratum, encountered usually at a depth of 12 to 24 inches. This stratum averages from 8 to 10 inches in thickness and consists of a compact layer of fine sand or sand ranging in color from black or rusty brown in the upper 2 or 3 inches to rusty brown or slightly darker in the lower portion. It becomes less compact and lighter in color as the lower part of the stratum is approached, a white sand being frequently encountered underlying the stratum and within the 3-foot section. The material of this layer runs high in organic matter and very low in iron, and although the rusty-brown color would suggest cementation with iron the analyses indicate that the compactness is due to the presence of organic matter. In places the stratum lies sufficiently near the surface to be plowed up, under which condition it is claimed that crops give very poor results. The substratum is lacking in some phases. The hardpan typical of this soil apparently is absent or deeply buried in the soil as encountered in Miller County.

#### LEON SAND.

The Leon sand consists of a light-gray to white, loose and incoherent sand, 36 inches or more in depth. Small depressions throughout the areas of the type are slightly darkened in the first inch or two, owing to the accumulation of organic matter, but below this depth the color of the soil is pure white.

The Leon sand is confined to two small areas lying near the eastern boundary of the county. The surface of these areas is flat to gently

undulating. No definite boundary could be established, as the soil has been more or less influenced by admixture of material from the associated types. In comparison with the Norfolk soils, with which it is associated, the topographic position of this soil is rather low.

The Leon sand is of little or no agricultural value and no attempts have been made to cultivate it. In spots where sufficient organic matter has accumulated to enable the soil to retain moisture early vegetables might be grown. This type ranges in price from \$3 to \$8 an acre.

#### PLUMMER SERIES.

The soils of this series are gray and frequently mottled with dark-brownish colors and underlain at a depth varying from 8 to 20 inches by compact, light-gray material more or less mottled with streaks of brown and yellow. The lower portion of the subsoil usually consists of sandy clay or sticky sandy material, including pockets or layers of yellowish, plastic sandy clay. They are nearly always in a sticky condition, water frequently standing on the surface after heavy rains. A scattered growth of cypress, pine, and occasionally cabbage palmetto, constitutes the principal tree growth. This series is typically developed in the flatwoods region of the South Atlantic and Gulf Coastal Plain.

#### PLUMMER SAND.

The Plummer sand is a gray medium sand of slightly loamy texture, becoming light gray in color at from 4 to 8 inches, and extending to a depth of 3 feet or more. In the lower depths the soil is sometimes mottled with shades of brown, yellow, and white, and in places it becomes quite sticky at or below 3 feet.

This type is of small extent. It occurs as narrow strips, usually associated with the Grady sandy loam, the Grady clay loam or Swamp.

Owing to its naturally poor drainage, none of the type is under cultivation at present. With an adequate drainage system established, it would produce low yields of the crops now grown in the region, as well as cucumbers, beans, cabbage, lettuce, and strawberries.

Practically all of the type is now occupied by a scattering growth of slash pine, with a thick undergrowth of sedge grass. In the heavier depressions gum, maple, cypress, and other water-loving trees are found.

#### ORANGEBURG SERIES.

The soils of this series are marked by their gray to reddish-brown color and open structure. The subsoils consist of a friable, red sandy clay. The series is confined to the uplands of the Coastal Plain, being most extensively developed in a belt extending from southern

North Carolina to central Texas. This is a valuable series, the heavier members being admirably adapted to corn, cotton, cowpeas, peanuts, potatoes, and cigar tobacco.

#### ORANGEBURG SAND.

The surface soil of the typical areas of the Orangeburg sand is a gray or grayish-brown medium sand, from 8 to 15 inches deep, the average depth being 12 inches. This grades through a brownish-red to bright-red sand or loamy sand into a red light sandy clay at from 30 to 36 inches. Where the type occurs adjacent to the Orangeburg sandy loam the sandy subsoil, as a rule, comes nearest the surface. Cultivation of the soil is easy. Included in this type, for the reason that they were too small to show separately, are spots of the Greenville sand, having a reddish-brown surface soil and a red subsoil.

There are only three small areas of the Orangeburg sand in the county, the most important agriculturally occurring west and southwest of Corea and the other a little way northwest of Nicholasville. The topography is undulating to almost level and the drainage is ample. In years of heaviest rainfall crops on the more level spots are liable to be drowned out, but this occurs only in rare instances.

The forested areas of the type are covered mainly with a growth of longleaf and black pine, with some post, scrub, live and water oak, and cedar.

This is a poor soil and very little of it is cultivated; it is best suited to truck crops.

Corn and cotton are the principal crops grown, the yields being very unsatisfactory. Corn yields from 8 to 15 bushels per acre, and cotton rarely exceeds one-fourth bale.

#### ORANGEBURG SANDY LOAM.

The surface soil of the Orangeburg sandy loam consists of a gray to grayish-brown, medium to coarse light sandy loam, varying in depth from 8 to 12 inches. The subsoil is a heavy sandy loam in the first few inches, changing abruptly into a bright-red, friable sandy clay. Over all the areas of this type there are many small spots from which the surface soil has been removed by erosion. There are also small depressions in which sufficient organic matter has accumulated to impart a dark-gray to black color to the soil. In such areas the wash from adjacent soils has formed in places a surface mantle of variable texture, which frequently extends to a depth of from 16 to 20 inches before the true sandy clay subsoil is encountered. On some of the higher elevations, especially on the steeper slopes along the Grady soil boundaries, the subsoil of this type presents numerous differences in color and structure. In such areas there is usually more

or less ferruginous material, consisting of red to brown, iron-cemented pebbles. Considerable conglomerate of iron ore was noticed in a few places where the surface covering was extremely shallow, the subsoil being a sticky clay ranging in color from dull brown to red, mottled with gray and yellow.

With the exception of the small areas in which ferruginous material occurs, this soil is easily cultivated, and usually there is sufficient coarse to medium sand throughout the soil mass to aid in the percolation of rain water to the heavier subsoil stratum, where it is held for subsequent use.

The Orangeburg sandy loam is of limited extent, being found on the gentle slopes which usually border the areas of Swamp lying along the larger streams, or it may occur as slight, isolated ridges or knolls. The most important areas occur along Spring Creek, in the central part of the county, and Aycocks Creek, to the west.

Practically all the type has been cleared and is now under cultivation, although there is considerable work yet to be done in clearing the fields of stumps. Wire grass and broom sedge flourish, and constitute the principal sod growth.

The Orangeburg sandy loam is one of the most highly prized soils for general farming. It is well adapted to the production of cotton, corn, oats, forage crops, sweet potatoes, Irish potatoes, peanuts, pecans, and watermelons. At the present time the principal crops grown are cotton, corn, and oats. Corn yields from 15 to 30 bushels per acre, with an average of about 18 bushels; cotton from one-third to two-thirds bale, with an average of about one-half bale; and oats from 15 to 30 bushels, with an average of about 20 bushels. With better management this type should easily produce as high as 60 bushels of corn, 1 bale of cotton, and 35 to 50 bushels of oats per acre.

A complete fertilizer is used in growing cotton and corn—usually a 10-2-2 or 10-2-5 mixture. Ordinarily the applications range between 150 and 200 pounds per acre. Nitrate of soda is used in addition to mixed fertilizer in some cases.

This type ranges in price from \$18 to \$100 an acre, the latter price being obtained only for land in or near Colquitt.

#### TIFTON SERIES.

The soils are gray to grayish brown in color, and are underlain by bright-yellow, friable sandy clay subsoils. Small iron concretions occur on the surface and throughout the soil section. The presence of these ferruginous pebbles gives rise to the local names of "pimply land" or "pebbly land." The surface configuration varies from flat to gently rolling, and the drainage is always good. These soils are most extensively and typically developed in the central portion

of the Coastal Plain region, extending through southern South Carolina across Georgia into Alabama. Agriculturally, they are considered very valuable, and are adapted to cotton, sugar cane, corn, cowpeas, velvet beans, oats, rye, sweet potatoes, Irish potatoes, pecans, figs, plums, and a number of vegetables.

#### TIFTON SANDY LOAM.

The soil of the Tifton sandy loam consists of a yellowish-gray to grayish-brown medium loamy sand, 6 to 8 inches deep, passing into a pale-yellow light sandy loam, extending to a depth of about 10 to 14 inches. The typical subsoil is a friable, yellow sandy clay, extending to a depth of 3 feet or more. Scattered over the surface and disseminated throughout both soil and subsoil are ferruginous pebbles or small iron concretions, ranging in size from an eighth of an inch to one-half inch or more in diameter. While the quantity of these pebbles is large, they are so evenly mixed with the soil as to offer very little resistance to cultivation, except on some of the knolls and slight ridges. At 36 inches mottlings of red and deep yellow are sometimes encountered in the subsoil, and owing to its sticky, heavy nature, this material has the appearance of having been influenced by the Vicksburg-Jackson limestone, which underlies the region. The type is locally known as "pimpley land" and is found more or less extensively developed throughout the central portion of the Coastal Plain section of Georgia. The presence of prominent grains of coarse sand and numerous very small concretions gives to some areas of this type a rather coarse feel, but there are sufficient fine interstitial particles to produce a structure favorable to the retention of moisture. In extremely wet weather this soil is liable to run together, becoming hard and difficult to cultivate on drying out.

The Tifton sandy loam occupies nearly level and undulating uplands, the crests of ridges, and gentle slopes along some of the streams. The largest areas are found west of Widners School, around St. Marys Church, north of Nicholasville, east and southeast of Union Church, and north of Mayhaw. Isolated areas varying in size from a few acres to several hundred acres are of frequent occurrence in all parts of the county. The surface drainage, except in the minor depressions, is good.

The Tifton sandy loam is the most highly prized soil type in the county for the production of all the crops of the region, good yields being obtained with small applications of commercial fertilizers. The average yield of cotton is about one-half bale per acre, and as much as 2 bales has been reported. Corn yields from 15 to 35 bushels per acre, with a maximum of 60 bushels on the best managed farms in favorable seasons. Oats yield from 20 to 35 bushels per acre.

Peanuts, sugar cane, Irish potatoes, onions, melons, cucumbers, and strawberries do well.

The ordinary grades of commercial fertilizers are used. As with all the other well-drained soils of the county, much of this type is deficient in humus.

This type was originally covered with a heavy growth of longleaf pine, with a few deciduous trees. At present very little of this forest growth remains, the greater part having been removed by lumbermen. Stump land brings from \$15 to \$20 an acre, while improved land ranges in price from \$20 to \$40 an acre, depending upon location with respect to towns and shipping facilities.

#### RED SOILS.

##### SEDIMENTARY MATERIAL—SANDS AND CLAYS.

##### GREENVILLE SERIES.

These soils are brownish red 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 are derived, in part at least, from the same deposits. The subsoils are influenced to some extent by the limestone that often underlies the series. As a rule the soils are more retentive of moisture than the corresponding members of the Orangeburg series, and are admirably adapted to cotton, corn, forage crops, and oats. Alfalfa could be produced successfully on the heavier members of this series.

##### GREENVILLE SANDY LOAM.

The surface soil of the Greenville sandy loam consists of a reddish-brown to dull-red or red light sandy loam of medium texture and from 6 to 12 inches in depth. The subsoil is a red, friable sandy clay, becoming heavier with depth, and occasionally mottled with white, pink, gray, and yellowish brown below a depth of 3 feet. In places the subsoil grades into the partially disintegrated limestone rock. The soil is friable and can be easily maintained in a state of good tilth.

This type occupies rolling knolls and gentle slopes along Spring Creek, usually in association with the Orangeburg sandy loam. The surface drainage is good, and in some places on the steeper slopes terracing is necessary to prevent erosion.

The Greenville sandy loam is one of the strongest soils of the county for the production of all staple crops, but owing to its small extent is not of great importance and is not farmed in a way to bring

out its possibilities. The ordinary yield of cotton is about one-third to two-thirds bale per acre, of corn about 15 to 25 bushels, and of oats about 25 to 40 bushels.

### BLACK SOILS.

#### RESIDUAL MATERIAL—LIMESTONE.

##### GRADY SERIES.

The surface soils of this series are generally dark colored, often black, and the subsoils are mottled yellow, gray, and red, plastic, heavy clay, resting upon a limestone substratum. In places the subsoil is partly residual from the underlying limestone. These soils are characteristically developed in low, flat situations. They are poorly drained in wet seasons. The series is forested with oak, beech, gum, magnolia, pine, and haw. Where properly drained, good crops of corn, cotton, oats, and sugar cane can be secured.

##### GRADY SANDY LOAM.

The Grady sandy loam consists of a gray to drab sandy loam 6 to 8 inches deep, underlain by a mottled yellow and gray to bluish-gray, plastic and sticky clay. In many localities red mottlings are frequently found in the lower section of the subsoil, and the clay content also increases with depth. Owing to the occurrence of this type in intimate association with the Grady clay loam, no definite boundary could be established and along the line of contact of these types the surface material represents broadly a clay loam carrying varying quantities of sand to a depth of 8 to 10 inches.

Owing to their occurrence in the limestone sinks, the areas of this type are known locally as "pond lands." These sinks lie from 5 to 30 feet below the general upland level, the rise from the boundary of the areas being usually abrupt, though in some instances it is rather gradual. These flat bodies usually occur in chains and resemble in many ways old, ill-defined stream beds. During periods of heavy rainfall the less pronounced chain of sinks as shown on the soil map were found to serve as drainage ways. There are also many depressions that have no apparent connection with the others and in which the moisture is in part absorbed by the soil, while the greater part in all probability finds its way into underground passages. In numerous places limestone, which underlies this region, outcrops in the depressions, and the soil of this type has undoubtedly been greatly influenced in the lower depths by limestone material. The immediate surface soil is composed mainly of the material washed in from the adjacent uplands.

Mayhaw and water oak constitute the principal tree growth on this type, while a few live oaks and pines are also found near the uplands.

In its present state the Grady sandy loam is too wet for cultivation, being more or less flooded during the rainy seasons each year. It is used for pastures, to which it is best suited.

With a system of ditches and canals emptying into the underground passageways or into Spring Creek, this soil could be made to produce fair yields of alfalfa, corn, rice, grasses, cotton, and other crops.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Grady sandy loam:

*Mechanical analyses of Grady sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
252823.....	Soil.....	2.6	15.7	16.4	31.2	15.4	9.6	8.5
252824.....	Subsoil.....	3.0	18.2	15.4	19.4	6.0	4.8	33.1

#### GRADY CLAY LOAM.

The surface soil of the Grady clay loam consists of a dark-gray to drab-colored clay loam to heavy silty clay, from 4 to 6 inches deep. The typical subsoil to a depth of 3 feet or more is a drab-colored, extremely stiff, tough, plastic clay mottled with yellow, pinkish red, brown, and gray. Variations in the texture and depth of the surface material resulting from the wash from the adjacent soils are of frequent occurrence. Some of these small spots carry sufficient sand to give them the texture of a sandy loam, while others farther removed from the effects of the colluvial wash of the adjoining soils show only a trace of sand. These areas could not be shown on the map as distinct soils on account of their small size.

The areas included in the cypress ponds differ from the typical in that the depressions are deeper and covered by water during the greater part of the year. The soil consists of a dark-gray to almost black, heavy, silty sandy clay to silty clay loam to a depth of about 6 inches, underlain by a drab, impervious, stiff to heavy, waxy clay, practically free from the yellow, pinkish, and red mottlings found in the typical soil. These areas have a thick and sometimes heavy, dense growth of cypress, and for this reason are locally termed "cypress ponds."

The Grady clay loam is found throughout all parts of the county. The most important areas of the typical soil occur in the southeastern part of the county, in Lookout, Nigh, and Big Ponds. The principal cypress-pond areas are found in Cow Pen, Byrd, and Middleton Ponds. This type occupies the basinlike depressions or sink holes which have been formed by the uneven dissolution of the underlying limestone rock and the subsequent collapse of the surface. The

deeper areas are usually circular in shape and hold water for a considerable part of the year. The cypress ponds usually occur surrounded by the typical soil or the Grady sandy loam, and, as a rule, have a relatively lower topographic position. In this situation they receive the run-off and seepage waters of the higher lying adjacent soils, and in a few instances remain covered with water the year around. All the type has poor drainage.

The material of the Grady clay loam, with the exception of the wash from the adjacent soils, is probably entirely residual from the underlying limestone. This fact is strongly indicated by the occurrence of fragments of the parent limestone rock over the surface and of partially disintegrated rock in the 3-foot section.

The native vegetation is quite varied, the principal trees being the cypress, pine, oak, hickory, mayhaw, and gum. Among the minor growths are the St. John's wort (*Hypericum fasciculatum*) and a few grasses and sedges.

None of the type has been reclaimed. It is probable that some of the smaller areas could be drained into the underground drainage ways by digging wells and dynamiting, but the drainage of the larger areas by gravity is not practicable at present.

Owing to the inadequate drainage and in part to the heavy texture and tenacious structure of the soil, practically none of this type is under cultivation. The principal use now made of it is for pasturage, to which it is perhaps best suited. Johnson grass with a little attention could in all probability be made to grow on this soil, and this would add to its value as a source of forage. If drained, its best use would probably be for the production of corn, sorghum, cotton, and forage crops.

The results of mechanical analyses of samples of the soil and subsoil of the Grady clay loam follow:

*Mechanical analyses of Grady clay loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
252816.....	Soil.....	1.1	4.6	6.7	24.7	16.9	19.1	27.0
252815.....	Subsoil.....	1.0	3.6	3.9	16.4	11.4	10.7	52.9

SEDIMENTARY MATERIAL—SANDS AND CLAYS.

PORTSMOUTH SERIES.

The Portsmouth soils are dark gray to black and are high in organic matter. The subsoils are light gray to mottled gray and yellow and the heavier members are always plastic, though usually carrying a noticeable amount of sand. These soils are developed in flat to slightly de-

pressed, poorly drained situations, and require ditching before they can be used for agriculture. The series is most extensively developed in the flatwoods or the low, seaward portion of the Atlantic Coastal Plain and that portion of the Gulf Coastal Plain lying east of the Mississippi River. Scattered areas are frequently found in the poorly drained depressions of the higher Coastal Plain country. When drained the soils are variously adapted to corn, strawberries, and truck crops, such as cabbage, onions, and celery.

#### PORTSMOUTH SAND.

The surface soil of the Portsmouth sand is a dark-gray to black loamy sand of medium texture, and from 10 to 15 inches deep, which grades usually into a light-gray to whitish sand, to an average depth of about 18 inches. Below this depth a brown, compact sand or hardpan layer is encountered, which usually extends to about 24 inches. Underlying this brown hardpan material is a gray or mottled gray and yellow medium sand, which extends to a depth of 3 feet or more.

This type is found in low, flat areas or slight depressions in close association with Swamp and with the Grady soils, along Dry and Cypress Creeks, west and northwest of Colquitt. It is poorly drained and remains wet and soggy the greater part of the year. At the present time the type supports a good growth of longleaf pine, some slash pine, and a heavy undergrowth of gallberry bushes and St. John's wort.

None of the Portsmouth sand is under cultivation, and before any agricultural use of it could be made an extensive system of ditch drains or tile would be necessary. With good drainage and thorough tillage it is probable that sugar cane, onions, corn, and Irish potatoes could be profitably grown.

#### MISCELLANEOUS MATERIAL.

##### SWAMP.

Swamp embraces the low, wet, densely wooded, flat areas along the drainage courses of the county. These areas lie only a few feet above the level of the stream channels and the frequent overflows maintain them in a swampy condition the greater part of the year. The streams spread out over these lands in such a way that it is often difficult, if not impossible, to determine the location of the main channel. An area of Swamp about a mile in width borders Spring Creek. It also occurs as narrow strips along the smaller creeks and branches of the county.

The surface soil of Swamp is quite variable, but in the main is composed of 4 to 8 inches of a fine black mud containing a large percent-

age of partially decomposed vegetation. In places it ranges from a fine sand to a heavy clay, the silty surface material being usually underlain by a bluish-gray to blue plastic clay to silty clay loam. The subsoil in places consists of white to gray sand or sandy loam, which in turn is underlain by a bluish silty clay. The soil material is strictly of alluvial origin. The areas are usually sharply bounded on both sides by the gradual ascent of the uplands, but may be bordered by areas of the Grady sandy loam.

Swamp in its primitive condition is covered with a dense growth of cypress, slash pine, ash, swamp maple, gum, and bay. The more elevated portions are covered with magnolia, sweet gum, water beech, fetter bush, switch cane, smilax, and various aquatic shrubs and vines. The cypress is being removed for lumber.

None of the Swamp has ever been reclaimed and consequently it has no agricultural value. The expense of reclaiming it would be prohibitive under present conditions.

#### SUMMARY.

Miller County is situated in southwest Georgia and has an area of 275 square miles, or 176,000 acres. Colquitt is the chief town and county seat.

The topography is flat to gently rolling, interrupted here and there by limestone sinks. Drainage for the most part is good.

The climate is mild, roses, violets, and japonicas blooming throughout the year. The mean temperature of the winter months is 49° F.; of the three warmest months, 79° F. The mean annual rainfall is 50.6 inches.

Transportation facilities are afforded by the Georgia, Florida & Alabama Railway, which traverses the central part of the county from north to south.

Farming operations began in the county about 1830. Cotton, corn, sugar cane, oats, and sweet potatoes are the principal crops. Cotton is the main money crop.

The soils of Miller County are derived from the Coastal Plain deposits. These deposits are consolidated and unconsolidated. The unconsolidated materials have given rise to the Norfolk, Ruston, Tifton, Orangeburg, Greenville, Portsmouth, and Plummer soils, while the calcareous or consolidated materials have given rise to the Grady soils.

The Norfolk sandy loam with its two phases is the most extensive and important soil in the county. The typical soil gives good results with the staple crops of the region. The deep phase being in effect lighter will give better results with vegetables, including water-

melons and cantaloupes. The greater part of the farmed land of the county is of this soil.

The Norfolk sand has an extensive distribution throughout the southeastern and southern part of the county. Much of it is too light to be of value for any crops except early truck crops and fruits.

The Norfolk coarse sand has a small extent. With heavy applications of commercial fertilizers and the incorporation of vegetable matter it can be made to give fair yields of the truck crops.

The Ruston sand is found in areas throughout the county. Its value depends largely upon the depth to the sandy clay subsoil. Under proper management this soil produces good yields of cotton, corn, and sweet potatoes. A light phase may be developed for trucking where transportation and market conditions are favorable.

The Ruston sandy loam is a productive soil used for growing cotton, corn, oats, sugar cane, and vegetables.

The Tifton sandy loam is considered one of the best soils of the county. All the staple crops, especially cotton, are grown profitably.

The Orangeburg sandy loam is not an extensive type in Miller County, but is a good general farming type.

The Orangeburg sand is considered a "poor" soil, but under proper management it can be used with fair success in the production of early truck, cotton, and sweet potatoes.

The Greenville sandy loam has only a small extent. It is a good soil for corn, cotton, oats, and forage crops.

The Portsmouth sand is poorly drained and undeveloped. Fair yields of the ordinary crops may be obtained where proper drainage conditions exist.

The Plummer sand is poorly drained and undeveloped.

The Grady sandy loam occurs to a small extent throughout the county and in its present condition is unfit for agriculture. When drained it should make a good soil for corn, cotton, oats, and forage crops.

The Grady clay loam is found throughout the county, but owing to its poor drainage and the difficulty of cultivation it is undeveloped. Under proper drainage conditions it would produce good yields of corn and hay.

Swamp is the low, wet, first-bottom land along the larger streams of the county. It supports a dense growth of water-loving trees and shrubs. If drained it would produce good yields of corn and probably of rice.

[PUBLIC RESOLUTION--No. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,* That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided,* That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the Congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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