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BUREAU OF CHEMISTRY AND SOILS
In Cooperation with Georgia State College of Agriculture

SOIL SURVEY
CALHOUN COUNTY, GEORGIA

BY

J. W. MOON, in Charge, and H. G. LEWIS

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SOIL SURVEY

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COUNTY SURVEYED

Calhoun County is in the southwestern part of Georgia. The western boundary is about 13 miles from Chattahoochee River, or the Alabama-Georgia line, and the southern boundary is approximately 55 miles north of the Florida State line. With the exception of Spring Creek, which forms about 3 miles of the southwestern boundary, Chickasawhatchee Creek is the only natural boundary line of the county. Calhoun County is roughly rectangular in shape, and is about 25 miles from east to west and 14 miles from north to south. It has a total area of approximately 287 square miles or 183,680 acres.

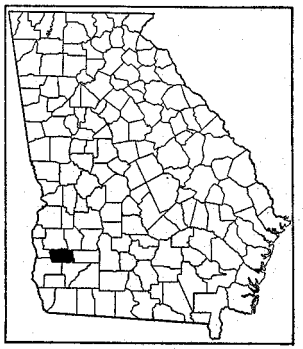

FIG. 1.—Sketch map showing location of Calhoun County, Ga.

That part of the county north of a line drawn roughly from Jonesville School to just south of Cordrays Mill and west of Ichawaynochaway Creek has an elevation ranging from 320 to 360 feet above sea level and is from 75 to 100 feet above the remainder of the county. This higher region is characterized by a rather rolling relief. Comparatavely steep slopes abound, and a great number of small surface streams follow V-shaped valleys along which are many small broken areas. A few small, circular limestone sinks occur in this better-drained area. There are also comparatively few sinks on a part of the Spring-Chickasawhatchee Creeks divide near and immediately north of Holt, although the elevation here is much lower than in the northwestern part of the county.

The remainder of the county is an undulating plain made up of low ridges and intervening flats marked by numerous sinks or depressions formed as a result of the underground solution of limestone. These limestone sinks range in size from less than 1 acre to 600 acres and in shape from almost circular depressions in the better-drained areas of the central-western and northwestern parts of the county to larger, more sinuous, and irregular depressions, many of which connect with one another by the winding, sluggish surface drainage ways common throughout the southern and eastern parts where the surface is rather flat. Throughout these parts of the county small streams are few and the drainage is principally through subterranean channels.

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The general slope of Calhoun County is in a southeasterly direction, and the difference in elevation is about 160 feet. The highest point, at Moye in the northwestern part of the county, is 360 feet above sea level, and the lowest, less than 200 feet, is in the extreme southeastern part. The elevation of Morgan, in the east-central part, is 337 feet. Although the general direction of both Ichawaynochaway and Chickasawhatchee Creeks, and thus the general direction of the drainage of the eastern half of the county, is southward, that of the western half follows the general southeasterly direction of Little Pachitla and Pachitla Creeks. These creeks with their tributaries drain all of the western half of the county except a narrow strip in the extreme central-western and southwestern parts, which is drained through Spring Creek. All the drainage waters of the county ultimately reach the Gulf of Mexico through Flint and Chattahoochee Rivers.

In 1854, 36 years after the establishment of Early County, Calhoun County was formed from the northern part of Early County and named for John C. Calhoun, the great South Carolina statesman. The Indians had been removed from this territory only about 37 years when Calhoun County was organized. Some of the early settlers came here while it was yet a part of Early County. Most of them came from Northern Georgia, the Carolinas, and Tennessee. All of them were American born, as, with very few exceptions, is the population to-day. After the removal of the Indians immigration increased materially. In 1880 there were more than 7,000 people in the county. During the next 30 years, according to the report of the 1910 census, the population increased about 60 per cent, reaching a total of 11,334. The most rapid increase was during the decade between 1900 and 1910. The 1920 census, however, showed a decrease of more than 10 per cent, bringing the total population of the county at present down to 10,225, or about 36 persons to the square mile. The entire population is classed as rural, and more than 50 per cent is negro.

Until 1924 Morgan, the oldest town in the county, was the county seat. It is located more than 5 miles from the nearest railroad, the Central of Georgia Railway, and in 1920 had a population of only 341. On account of the burning of the courthouse at Morgan, the county seat was moved to Arlington, in the extreme southwestern part of the county. Arlington, with a population of 1,331, is the largest town in the county and the only one accommodated by two railroads. Edison, named for Thomas Edison, is in the northwestern part of the county on the Georgia, Florida & Alabama Railway. In 1920 it had a population of 885. Leary, with a population of 465, is a trading center for the eastern part of the county. It is on the Central of Georgia Railway about 13½ miles east of Arlington.

Transportation facilities in practically all parts of Calhoun County are good. Two railroads, a branch of the Central of Georgia Railway and the Georgia, Florida & Alabama Railway, traverse the county. A splendid system of public roads accommodates all parts of the county. For the greater part, these roads are well graded and maintained in splendid condition throughout the entire year, and many of the bridges across the streams are of concrete or steel construction.

Rural mail delivery routes extend to all parts of the county, and telephone lines are numerous, especially in the western part.

CLIMATE

The climate of Calhoun County is characterized by short, mild winters and long, rather hot summers, which, however, are not uncomfortable because of the Gulf breezes. Rainfall is ample and is usually well distributed throughout the growing season. The lightest rainfall of the year occurs during the fall and early winter months.

January, with a mean temperature of 48.2° F., is usually the coolest month of the short, open winters. The lowest temperature, −2°, was recorded in February, but such temperatures are extremely rare. Temperatures lower than 20° are uncommon. The cold continues for only a very few days and is nearly always followed by a number of warm, balmy days which generally terminate with a rain. Normally, the farmers proceed with their outdoor work without discomfort throughout the entire winter, and when rainfall is not too heavy during December and January most of the fields are plowed before the 1st of March. Temperatures during summer seldom reach 100°, and there are often periods of several days when the temperature ranges between 65° and 75° and at times falls as low as 55° in June. The mean summer temperature, as recorded at Morgan, is 80.6°. The lowest recorded summer temperature, 51°, occurred in June, and the highest, 104°, occurred in July.

The mean annual rainfall, according to the records kept at Morgan, is 49.74 inches. The rainfall in the driest year recorded (1904) was 35.57 inches and in the wettest (1906) was 62.90 inches. The rainfall is rather evenly distributed throughout the year and is ample throughout the growing season for the production of crops. During fall, the driest season of the year, there is little more than half the precipitation of the preceding summer months.

The latest recorded killing frost occurred on April 15, and the average date of the last killing frost is March 17. The earliest recorded killing frost occurred on October 25, and the average date is November 9. This gives a normal frost-free season of about eight months.

The climate here allows the growing of a wide variety of crops. Because of the mild winters and the rather evenly distributed rainfall, grazing crops for hogs and cattle can be utilized the year round. There are a number of crops which grow here during winter, and any of the small grains and several legumes can be grown as winter cover crops and grazed when desired. On soils adapted to them and in the proper conditions, such truck crops as cabbage, collards, lettuce, beets, onions, and turnips are very successfully grown during winter. Many of the less hardy vegetables, such as peas, beans, and potatoes, may be planted in the last part of February or the first part of March with reasonable assurance that they will not be killed by frost.

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

Normal monthly, seasonal, and annual temperature and precipitation at Morgan

[Elevation, 337 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1904)	Total amount for the wettest year (1906)	Snow, average depth
	° *F.*	° *F.*	° *F.*	*Inches*	*Inches*	*Inches*	*Inches*
December	49.6	83	10	3.89	3.92	3.88	0
January	48.2	80	13	4.01	5.23	8.61	Trace.
February	50.3	83	−2	6.05	4.32	3.47	0.6
Winter	49.4	83	−2	13.95	13.47	15.96	.6
March	59.8	91	22	5.21	3.82	4.38	0
April	65.4	92	32	3.74	1.74	.59	0
May	74.0	101	41	3.08	1.61	9.27	0
Spring	66.4	101	22	12.03	7.17	14.24	0
June	79.7	102	51	4.24	2.11	8.66	0
July	81.2	104	60	5.56	3.73	9.88	0
August	80.9	102	60	5.73	4.42	4.63	0
Summer	80.6	104	51	15.53	10.26	23.17	0
September	77.0	100	44	3.14	.87	2.96	0
October	66.0	94	30	2.27	Trace.	5.19	0
November	57.0	86	20	2.82	3.80	1.38	0
Fall	66.7	100	20	8.23	4.67	9.53	0
Year	65.8	104	−2	49.74	35.57	62.90	.6

AGRICULTURE

The history of the agricultural and economic development of Calhoun County is, in a general way, very similar to that of all southwestern Georgia. Upland areas were originally covered by a heavy growth of pine, principally long-leaf, and of hardwoods, largely of the various species of oaks common to this region, hickory, and some dogwood. Along the watercourses there were fewer pine and a greater variety of hardwood trees, including gum, cypress, tulip poplar, beech, and some swamp maple, bay, magnolia, sycamore, and ash, with a dense undergrowth of water-loving shrubbery.

The central and western parts of the county were first settled. The agricultural products of the early settlers consisted primarily of those supplying their home needs, such as corn, oats, wheat, rice, potatoes, and some sugar cane, rye, and later a little cotton. Each settler raised chickens, hogs, and cattle only for his individual use. The hogs and cattle were allowed to graze in the open forest. This simple system of agriculture prevailed until transportation facilities had developed to some extent and trading markets had been established. Then an exchange of commodities gradually became more practical and economical. This development was extremely slow

until just prior to the Civil War, when Chattahoochee River had become a commercial outlet to markets. During and after this time, agricultural development was materially hastened by the growth and development of naval stores and lumbering industries, which assisted in opening up many large areas for cultivation.

The first direct railroad outlet for the county was provided in 1882 when the present branch of the Central of Georgia Railway between Albany, Ga., and Lockhart, Ala., was extended across the southern part of the county to Blakely, Ga. This had a marked effect on the progress of the agricultural, lumbering, and turpentine industries. These industries were further stimulated when, 20 years later, the Georgia, Florida & Alabama Railway was extended in a north-and-south direction across the western part of the county. Even at the present time, especially in the northeastern part of the county, the turpentine and lumbering industries are of considerable importance.

Most of the merchantable timber of the uplands has been removed. Along the watercourses and in swampy areas there are considerable stands of heavy timber consisting of gum, various species of oak, some rather small cypress, a few other hardwoods, and scattered pine. Practically all of the present supply of merchantable timber, including both pine and hardwood, is now under lease and is being rapidly removed.

Some cotton was grown prior to the Civil War, but cotton did not take its place as the principal cash crop until after the war when financial depression demanded such a crop. Then cotton became the one cash crop of the county and all business centered about its production until the advent of the boll weevil eight or nine years ago.

The coming of the weevil greatly increased the cost of cotton production by reducing yields and forced, out of sheer necessity, a radical reduction in acreage and a more diversified system of farming. This change is the latest and one of the most radical and significant in the agricultural and economic history of the county. Prior to the advent of the weevil about 85 per cent of the farms in the county were operated by tenants and on credit, the bills being settled in the fall when the cotton was marketed. Every business and profession in the county depended directly or indirectly on the cotton crop. Consequently, when this crop, in such great measure, failed, some banks and other business and industrial enterprises became insolvent. The tenants soon began leaving the farms in search of work in the towns and cities; many went north. This resulted in many vacant farmhouses, idle fields, a decided slump in land values, and a heavy loss to landowners. Many farmers lost their holdings. Some gave up in despair, but many persisted and are now gradually reestablishing their farms as profitable enterprises. The reconstruction of the farming system now in progress calls for more diversity. The cotton acreage has been materially reduced, and this crop is being replaced to some extent and supplemented by peanuts. The tendency at present is toward a system of rotation, but this postweevil system of farming is as yet in its infancy. It will most probably develop to a sufficient degree within the next decade to leave no doubt that the boll weevil is an agricultural and economic blessing in disguise. Several farms in the county are now giving good returns.

On the better soils successful farming is principally a problem of management. This fact is becoming generally accepted by the farmers.

Although cotton has, in part, been replaced as a cash crop, principally by peanuts and to a less extent by velvet beans and hog and poultry production, it is still the foremost money crop. If one may judge by past and present prevailing market prices and the promising results of successful cotton growing under weevil conditions by the proper use of calcium arsenate, it will probably become a more profitable and important cash crop in the future than it is at present. The average yield throughout the county in 1919, according to the 1920 United States census, was slightly less than one-fifth bale to the acre, and, according to the 1925 farm census, the average yield in 1924 was one-third bale. Although a part of this difference results from a relative decrease in the number of boll weevils in 1924, it is largely explained by the fact that farmers are learning to produce cotton under weevil conditions. The United States census report of 1910, showing an average yield of one-half bale to the acre in 1909, is the only report showing a yield higher than that of 1924. Several of the better farmers of the county report yields ranging from 250 to 400 pounds of lint cotton to the acre. The successful cotton farmers usually use a crop rotation including legumes which leave considerable organic matter on the fields; they make a thorough, though not always a deep, preparation of the seed bed. Fields intended for cotton should be, and sometimes are, plowed in the fall. About 400 pounds of a 9–3–3 [1] mixture of commercial fertilizer is applied at the time of planting. A top-dressing of about 50 pounds of nitrate of soda applied near the first of June is generally found to be profitable. Cotton is planted during the last half of March or in the first few days of April. The crop is given shallow and very frequent cultivations to hasten maturity and minimize weevil destruction. Those who use the weevil spray make from five to seven applications of calcium arsenate. The first application or the second is usually made in the form of a sirupy liquid, and the subsequent applications are sprayed on the plants as a dry powder. Toole is the variety of cotton most commonly grown in the county. Its characteristic spreading, open foliage, and medium earliness of maturity fit it well to weevil conditions.

For the last 15 years corn has been the most extensively grown crop in the county, but it has not been the most important, as yields are low. The United States census of 1880 reported the average yield of the county in 1879 as less than 5 bushels to the acre, but since that time average yields have been about 10 bushels, and the highest yearly average reported, slightly more than 12 bushels, was for the 1924 crop. The corn is very much neglected; it is often planted on the poorest soils; on only a few farms is it fertilized. A few farmers report yields ranging from 35 to 40 bushels to the acre, but many are producing only 6 or 8 bushels. Most farmers grow velvet beans along with the corn. These materially increase the yield of feedstuff to the acre, though probably they decrease, somewhat, that of corn. The beans are usually planted

[1] Percentages, respectively, of phosphoric acid, ammonia, and potash.

from 12 to 20 days after the corn unless the corn is planted rather late in the season, in which case they are seeded at the same time. Beans are either planted between the hills in the row with the corn or in alternate rows. They are excellent soil builders and should always be grown either with the corn, or as a manure crop after the grain is harvested. Velvet beans are an excellent feed for hogs and can be well used as feed for cattle and mules. It is not necessary to harvest them for feed, as they remain in splendid condition in the fields nearly all winter. With corn, they yield from one-fourth to 1 ton to the acre.

Peanuts are second only to cotton as a money crop and are a close second to it. Two kinds are grown here, the Spanish peanut for market and the running peanut for hog grazing. When the latter variety are grazed they increase the productiveness of the soil. There seems to be a difference of opinion, however, as to the effect Spanish peanuts, when harvested, have on the soil. Some say there is no crop more injurious to the soil; others say they observe no effect either way; and a few say the growing and harvesting of the Spanish peanuts, in their experience, seems to improve the soil. The explanation probably is that if the nuts are left in the field to mature fully before harvesting the crop is not injurious and is possibly beneficial to the soil, but if they are harvested green or immature the effect on the soil is detrimental. The prices for nuts usually range from $85 to $135 a ton, although either lower or higher extremes are reached. The vines are used for roughage and make fair feed when they are properly cured. Only about half the time, labor, and expense are required to grow and harvest peanuts than are required for cotton. About the same preparation of the seed bed is required for both crops, but peanuts receive little or no fertilizer. The yields are about one-third ton to the acre.

When climatic conditions are not abnormal, oats can be grown with fair success. The average yield is reported as being rather low, that of 1924 being about 20 bushels to the acre. With an application of 75 or 100 pounds of nitrate of soda to the acre, yields of 40 bushels are not uncommon on many soils. Oats have been a standard crop since this territory was first settled. The census report of 1880 gives their acreage as 5,526 acres in 1879, and that of 1925 reports an acreage of only 251 acres threshed for grain and 433 acres fed unthreshed in 1924. The decrease in acreage has been more or less regular during the last 45 years. Fields seeded to oats will also produce an additional crop of hay the same year if they are seeded immediately following the harvesting of the grain. This practice is followed by most farmers throughout the county. This hay crop may be of one or of a mixture of such plants as cowpeas, sorghum, velvet beans, or soy beans. The yield on average soil is about one-half ton to the acre. Legumes should be universally grown in the county, as they are very helpful in establishing a system of rotation which will improve the condition and fertility of the soil, especially if the hay crop can be left on the field or fed on the farm and the manure returned to the fields.

On nearly every farm in the county sugar cane is grown for the manufacture of sirup for local needs. This crop requires a well-drained rather fertile soil with a high moisture content. It seems

that the lighter-colored soils produce cane which makes a brighter and clearer-colored sirup. The 1925 farm census reported 101 acres devoted to this crop in 1924. Prior to 1910, the yield is reported as ranging from 100 to 160 gallons to the acre, but since that time the yield has been much lower.

The pecan industry is young in this county, but it has grown very rapidly during the last 8 or 10 years. There are now about 5,000 acres, and probably more, devoted to the growing of pecan trees. Ninety per cent of these orchards are less than 8 years old. One of the largest if indeed not the largest pecan orchard in the United States is owned by the Keystone Pecan Co. and covers an area of 3,000 acres in the eastern part of the county immediately north of Leary. A number of other orchards, ranging in size from 10 to 100 acres, are scattered over the county. Probably not more than 10 per cent of the trees have reached the age of commercial production. Most of the orchards are on Greenville sandy loam, Orangeburg sandy loam, and Greenville loamy sand, and a considerable number of trees which appear to have a somewhat more healthy and thrifty growth are growing on Carnegie sandy loam and Tifton sandy loam. Owing to the youth of this industry in the county there are practically no available statistics, although the 1920 census reports 2,103 trees producing 12,269 pounds of nuts, or nearly 6 pounds a tree, in 1919. Many of these trees reported five years ago were very young and producing few or no nuts, and many of the older ones are seedlings. The 1925 farm census reports 7,748 trees of bearing age and 33,374 trees not of bearing age in 1924. All the young orchards are of improved varieties.

Prior to the invasion of the boll weevil there was not a sufficient quantity of pork produced in the county to supply local needs, but during the last six or eight years good breeds, principally Duroc-Jersey, Poland China, and some Berkshire and Hampshire, have been introduced, bringing pork production to a surplus. Carloads of hogs are now rather frequently shipped from the county to near-by markets. With the improved stock, the economic ease with which the splendid hog feeds, peanuts and velvet beans, can be produced, and the abundance of pasture land suitable for hog grazing, there is no apparent reason why the production of hogs on a commercial scale should not continue to progress. The 1925 farm census reports 7,649 hogs in the county on January 1.

Although the number of cattle and probably of hogs may have decreased, the quality has been improved considerably during the last few years. The 1925 farm census reports 2,704 cattle in the county on January 1. There are few good grazing pastures in the county. The growth consists predominately of broom sedge and wire grass, neither of which is very nutritious. When pastures are burned over in early spring the young succulent growth is readily eaten. A few small pastures of carpet grass, dallis grass, and Lespedeza have been developed, and more should be established on the better-drained Grady sandy loam and associated soils. Many of the cattle are maintained by feeding velvet beans, cottonseed meal and hulls, and roughage.

Neither a system of rotation nor a study of the adaptation of the various crops to the different soils has become very well recognized or established. Cotton, corn, peanuts, and oats have been planted rather

indiscriminately on all well-drained upland soils, but it is becoming generally understood that peanuts are well adapted to the lighter-textured sandy loams and that cotton does better on the sandy loams with shallower surface soil.

Farm methods generally followed in this county are similar to those common throughout southern Georgia. Light 1-horse plows are commonly used both in the preparation of the seed bed and in cultivating the crop, but 2-horse plows, tractors, and riding cultivators are becoming more popular. Labor-saving machinery is used only by the most progressive farmers. The absence of such machinery has been caused largely by the abundance of cheap labor. Under present conditions of less abundant and higher-priced labor, such equipment is rapidly coming into use. Climatic conditions and the system of farming do not necessitate large farm buildings. Most of the work animals are mules.

The tendency in the county at present is toward a more or less definite system of crop rotation. Under the old preweevil system of cotton and corn farming, it was not uncommon for a field to be used continuously for one of these crops, especially cotton, for a period of 10 years and even longer. With the sharp reduction in cotton acreage and the apparent success of velvet beans and peanuts, a diversification and rotation can be readily established to meet the needs of any farm. The present condition of the soils over the county demands the adoption of such farm practice, and the farmers are beginning to appreciate that fact.

Commercial fertilizers are one of the major expense items for the farmer in this county. The expenditure for fertilizer, according to the United States census, was $171,305 in 1919. This is 50 per cent greater than for 1909, and nearly five times the amount spent for fertilizers in 1899. The 1925 farm census reports an expenditure of $111,457 on 1,147 farms in 1924. The fertilizer mixture used has varied considerably from time to time, but the most popular mixture at present analyzes 9–3–3. The bulk of the fertilizer is used on cotton, at a rate varying from 200 to 400 pounds to the acre. Very little complete fertilizer is applied to other crops, although applications of nitrate of soda for corn, oats, and cotton are rather common. There seems to be a considerable difference of opinion among the farmers as to the fertilizer requirements for the peanut crop.

At present labor is not so scarce as it was a few years ago, and yet is not so plentiful as it was before the World War. Most of the farm laborers are colored. Wages range from 75 cents to $1.25 a day according to the skill and ability of the laborer and to the character of the work. According to the United States census reports, labor expenditures for 1919 were $71,025. This is about 10 per cent greater than for 1909 but is not so great as for 1899. The 1925 farm census reports the cost of labor (money wages only) as $21,925 in 1924.

The number of farms in the county gradually increased from 717 in 1880 to 1,509 in 1910. During the last 15 years, however, the number has decreased somewhat, the 1925 farm census reporting 1,378 on January 1. The average size of the farms in the county has fallen from 213 acres in 1880 to 86 acres in 1920 and to 64.4 acres

on January 1, 1925. Fifteen farms contained between 500 and 5,000 acres each, which may account for many of the idle fields and cut-over tracts. The percentage of farms operated by owners has steadily decreased from 36.1 per cent in 1880 to 14.1 per cent January 1, 1925. The percentage of farms operated by tenants has correspondingly increased.

Tenancy is generally on a share basis. Either the tenant supplies only his labor and one-half the fertilizer and receives one-half the proceeds of the farm, or he supplies the labor, the work animals, implements, and three-fourths of the fertilizer and receives three-fourths of the products of the farm.

SOILS

Calhoun County is in the coastal plain region or the so-called red lands. The surface soils are dominantly light in color. In well-drained uplands they range from gray and brown to red. The darkest-colored soils occur in the depressions, or sinks, and here the surface color is dark gray.

The soils are prevailingly poorly supplied with organic matter. This area was forested until reclaimed for agriculture, and consequently there has been little chance for the accumulation of organic matter in the soils. In the wooded areas there is a noticeable accumulation of coarse, partly decomposed vegetable matter in the surface layer, to a depth varying from 1 to 3 inches, but this has not really become a part of the soil as is the case in the grass-covered region of the Central States.

In this region of rather heavy rainfall and warm temperature, active leaching continues throughout the year. This washing out of the soluble elements probably accounts for the fact that the surface soils do not contain so high a percentage of mineral plant-food elements as the subsoils. In this leaching, carbonate of lime has not accumulated, although calcium is present in the materials constituting the soil.

Underlying the soils of Calhoun County is the Vicksburg[2] formation, which consists of flinty and siliceous limestone, sand, and clay. The limestone has been extensively silicified, and the formation in many places is represented by flint fragments and large siliceous bowlders. This formation is deeply weathered, and the weathered product appears as a covering of deep-red sand and sandy clay varying from red to yellow. Below the heavy and well-oxidized layer the material is mottled, streaked, or blotched brittle sandy clay or sand. One of the characteristics of the soils of the Tifton and Carnegie series and of Greenville clay loam, pebbly phase, is the presence of large quantities of small, hard, rounded, smooth, brown or almost black iron pebbles, so-called concretions or accretions.

The most striking features of the textural profile of the well-developed soils in the county is the presence of a comparatively light-textured surface layer underlain by a deeper layer of heavier

[2] VEATCH, OTTO, and STEPHENSON, LLOYD WILLIAMS. PRELIMINARY REPORT ON THE GEOLOGY OF THE COASTAL PLAIN OF GEORGIA. Geological Survey of Georgia. Bul. No. 26. 1911.

texture, in many places much heavier, and a third still deeper layer which may vary considerably in texture but which is prevailingly lighter than the second layer and in most places is heavier than the first. The texture of these layers varies greatly in the soils of the region. The surface layers, which comprise the topsoil, or horizon A, range in texture from clay loam to sand and the subsoil, or horizon B, from clay to very light sandy loam or sand. The substratum, or horizon C, consists of unconsolidated geologic material which may vary widely in texture, structure, and color.

The thickness of these layers also varies widely. The surface layer varies from a very few inches in thickness in the clay loams to a maximum thickness of 2 or more feet in the most sandy soils.

The soils of Calhoun County may be classified in two main groups, as regards their profiles. The first broad group includes all the members of the Greenville, Norfolk, Orangeburg, Ruston, Blakely, Tifton, and Carnegie series. These soils possess what has been termed the threefold characteristics described; that is, they have well-defined A and B horizons, and the B horizon differs from the substratum, or C horizon.

These soils may be subdivided into two subgroups on the basis of the general features of the color profile or the successive color layers or horizons of the soil. The first subgroup, including the soils of the Norfolk, Tifton, Carnegie, and Ruston series, is marked by a color profile, in the virgin soils, about as follows: (1) A layer of dark-colored leaf mold mixed with the mineral constituents of the soil. If the surface material is mainly sand, the grains are as a rule gray or brown, are usually rather well mixed with the leaf mold, and are dark in color. This layer ranges from a mere film to a maximum thickness of about 3 inches. It is usually thickest in the sandy soils. (2) A pale-yellow or grayish-yellow layer, showing very little evidence of the presence of organic matter. This layer has a loose, single-grained structure. In the sandy soils it may extend to a depth of 2 feet or, in extreme cases, to a little greater depth. These two layers constitute the comparatively light-textured topsoil, or horizon A. (3) A yellow or reddish-yellow layer, or horizon B. This layer is typically developed in the members of the Norfolk and Tifton series. In the Carnegie soils the B horizon is reddish yellow, and in the Ruston it varies from yellowish red to yellowish brown. (4) Reddish, grayish, yellowish, or whitish mottled material corresponding to the third horizon of the textural profile. Since this layer is part of the parent material, its color varies not merely from soil to soil but also somewhat from place to place in an area of the same type of soil.

The second subgroup of soils differentiated on the basis of the color of the several layers includes the members of the Greenville, Blakely, and Orangeburg series. These soils are characterized by a series of color layers in which the upper layer is brown or reddish brown in the Greenville and Blakely soils and grayish brown in the Orangeburg. The last-mentioned soils have brownish-yellow subsurface layers. The second layer, or horizon B, is dark red or red in the Blakely and Greenville soils and bright red in the Orangeburg soils. The color of the parent material in these soils varies, like the corresponding layer in the first group of soils.

In the normally well-developed soils, such as members of the Norfolk, Tifton, Orangeburg, Greenville, Ruston, Carnegie, and Blakely series, the intermediate and comparatively heavy layer, or horizon B, is crumbly sandy clay in the Norfolk, Tifton, and Ruston soils but is somewhat heavier in the other soils mentioned. The surface soils, except in Greenville clay loam and Blakely clay loam, are typically very light in texture, being sands or light sandy loams. A markedly wide difference exists in the texture of the surface soils and the intermediate heavier layers. There is also much difference in the color, texture, and structure of the substratum, or horizon C (the parent material). The characteristics of the soils are described more particularly under discussions of the more important soils.

The second large group includes soils in which the threefold arrangement is not present. These soils, including the members of the Henderson, Grady, Plummer, and Leaf series, and swamp, are characterized by the absence of the comparatively heavy horizon and in some cases by the absence of any horizon development.

The various soils in Calhoun County are grouped into series on the bases of color, origin, and structural characteristics. The series are divided into soil types on the basis of difference in texture, or the proportion of sand, silt, and clay entering into the composition of the surface soil. The soil type is the unit of soil classification and mapping. Sixteen soil types and 4 phases of types, representing 11 soil series, and the miscellaneous material, swamp, are mapped in Calhoun County.

The topsoils of the Greenville soils range in color from brown to red, and the subsoils are red, heavy, stiff sandy clay or loamy sand. Small rounded brown or almost black iron concretions are present on the surface and in the soil of some of the heavier members. Greenville clay loam, with a pebbly phase, a smooth phase, and a shallow phase, Greenville sandy loam, and Greenville loamy sand were mapped.

The soils of the Norfolk series have gray surface layers, yellow or grayish-yellow subsurface layers, and yellow friable and crumbly sandy clay or sand subsoils. Norfolk sandy loam, with a deep phase, and Norfolk loamy sand occur in this county.

The soils of the Orangeburg series are characterized by gray or light-brown surface layers, yellow and brownish-yellow subsurface layers, and bright-red, friable and crumbly sandy clay or loamy sand subsoils which are lighter in texture and structure than the corresponding layer in the Greenville soils. Orangeburg sandy loam is the only member of this series in Calhoun County.

The surface layers of the Ruston soils vary from gray to grayish brown, the subsurface layers from pale yellow to brownish yellow, and the subsoils from reddish yellow or yellowish red to yellowish brown. The texture ranges from sandy clay to sand. These soils occur in close association with the Norfolk and Orangeburg soils. Ruston sandy loam and Ruston loamy sand are mapped.

The Blakely soils occur in close association with the Greenville soils but differ from them in having dark-brown or dark reddish-brown topsoils and dark-red or maroon-red firm, rather stiff, smooth clay subsoils which contain a few small black concretions or specks.

The Blakely soils show strong effervescence with a 15 per cent solution of hydrogen peroxide. Blakely clay loam is mapped.

The Tifton and Carnegie soils are included in the light-colored soils of Calhoun County and are characterized by the presence of a large number of small, rounded, brown or almost black iron concretions or accretions. These soils have gray or yellowish-gray topsoils and yellow sandy clay subsoils. The Carnegie soils differ from those of the Tifton series in having a shallower topsoil and a heavier subsoil, the material of which is somewhat stiffer, slightly sticky, and is of a deeper yellow color than in the Tifton soils. Tifton sandy loam and Carnegie sandy loam are mapped.

The members of the Henderson series have gray topsoils and mottled red and yellow tough stiff clay subsoils, containing a large quantity of soft chert or siliceous limestone. Henderson stony sandy loam is mapped.

The soils of the Grady series have gray or dark-gray topsoils and light-gray or bluish-gray heavy sticky subsoils mottled with yellow, red, or brown. They are poorly drained and occur in depressions or limestone sinks, mainly in areas of the heavier-textured upland soils. Grady sandy loam and Grady clay loam are mapped in Calhoun County.

The Plummer soils are very similar to the light-textured Grady soils, except in the second layer, which is friable loamy sand and may not become heavy for a considerable distance downward. Plummer sand is mapped in Calhoun County.

The Leaf soils occur on the second bottoms and have gray topsoils and yellow or drab heavy tough clay subsoils mottled with gray and red. Leaf sandy loam is mapped.

Swamp occurs along drainage ways and includes areas that are in a saturated condition or overflowed most of the time. The material varies so greatly that no type name could be assigned to it.

In the following pages of this report the soils of Calhoun County are described in detail, and their relation to agriculture is discussed. Their distribution is shown on the accompanying soil map, and their acreage and proportionate extent are given in the following table:

Acreage and proportionate extent of the soils mapped in Calhoun County, Ga.

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Tifton sandy loam	4,736	2.6	Norfolk loamy sand	8,064	4.4
Carnegie sandy loam	5,632	3.1	Blakely clay loam	3,904	2.1
Greenville sandy loam	23,040	12.6	Henderson stony sandy loam	576	.3
Greenville clay loam	6,528		Leaf sandy loam	960	.5
Pebbly phase	11,456	11.7	Plummer sand	6,144	3.4
Smooth phase	3,136		Grady sandy loam	15,808	8.6
Shallow phase	384		Grady clay loam	3,840	2.1
Greenville loamy sand	7,936	4.3	Swamp	23,360	12.7
Orangeburg sandy loam	18,368	10.0			
Ruston sandy loam	9,728	5.3	Total	183,680	
Ruston loamy sand	3,328	1.8			
Norfolk sandy loam	16,960	14.5			
Deep phase	9,792				

TIFTON SANDY LOAM

In wooded areas, Tifton sandy loam, to a depth of about 2 inches, consists of pebbly gray loamy sand which appears dark because it contains organic matter. This grades into grayish-yellow or brownish-yellow pebbly loamy sand, or light sandy loam which extends downward to the subsoil, a depth varying from 10 to 18 inches. The subsoil consists of bright-yellow or yellowish friable, crummy slightly sticky sandy clay or fine sandy clay which is everywhere pebbly, and is in general slightly heavier and deeper yellow in color than is the subsoil of Norfolk sandy loam. The subsoil extends to the highly mottled sandy clay parent material, which is present in most areas at a depth ranging from 5 to 7 feet. On the flatter areas, the subsoil may become mottled or streaked with brown at a depth varying from 30 to 36 inches. In cultivated fields, the surface layer, to a depth of 5 or 6 inches, is yellowish-gray pebbly sandy loam which in many places appears brownish in color because of the iron oxide concretions and accretions present on the surface.

The presence of these small, rounded, smooth iron oxide concretions and accretions on the surface and throughout the soil is its outstanding visible characteristic. These pebbles are everywhere abundant, constituting a percentage varying from 10 per cent to 25 per cent of the total mass of the topsoil and a smaller percentage of the subsoil. In uncleared areas, these rounded ironstone pebbles are not so noticeable as in cultivated fields. Agriculturally, Tifton sandy loam, like Norfolk sandy loam as mapped in this county, might be subdivided into two parts on bases of elevation and drainage. In the northwestern part of the county the soil occurs at higher elevations, is well drained, and is slightly more productive than less well drained areas in the southwestern part, most of which occur on rather low, smooth ridges in close association with the Grady soils. In some places in the northern and northwestern parts of the county, Tifton sandy loam is intimately associated with Carnegie sandy loam, and small areas of both soils are included in mapped areas of each. The same condition exists with Tifton sandy loam and Norfolk sandy loam, especially east of Arlington in the south-central part of the county.

Tifton sandy loam is inextensive in this county, although a few large areas are in the northwestern and central parts. The largest and most typical area is just north of Jonesville School.

Tifton sandy loam in general is smoothly undulating, although a part of it is nearly flat and a few areas occur on distinct slopes or rather sharp ridges. In the southern part of the county the surface is marked by lime-sink depressions; in the northern part these are not so common, and drainage and sanitary conditions are much better.

Tifton sandy loam originally supported an excellent growth of long-leaf pine, with some oak and a few hickory and dogwood. The commercial timber has been cut off, and about 90 per cent of the soil has been cleared and is now in cultivation. The remainder supports various mixtures of forest growth or is used for pasture.

Tifton sandy loam is one of the best soils in the county. It is productive, and the productivity can easily be maintained. It is easily cultivated and can be worked within a wide range of moisture

conditions. It is one of the earliest soils to warm up in spring and is retentive of moisture.

This is an excellent soil for the production of the common farm crops. From one-half to two-thirds bale of cotton, from 12 to 40 bushels of corn, from 30 to 40 bushels of oats, and from 25 to 35 bushels of peanuts to the acre are not uncommon yields. From 200 to 400 pounds to the acre of a 9–3–3 mixture of fertilizer are usually applied to cotton. This application is followed on most of the best farms by a top-dressing of nitrate of soda. Peanuts receive little or no fertilizer, and corn and oats commonly receive applications of only nitrate of soda. Truck crops, pecans, and peaches do especially well.

Current prices of this soil range from $20 to $75 an acre, depending on the condition of the soil, the location, and improvements.

The following table gives the result of mechanical analyses of samples of the surface soil, subsurface soil, and different layers of the subsoil of Tifton sandy loam:

Mechanical analysis of Tifton sandy loam

No.	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
258021	Surface soil, 0 to 4 inches	1.7	7.8	6.5	45.6	12.1	19.4	7.0
258022	Subsurface soil, 4 to 10 inches	1.6	8.4	6.9	42.3	12.7	18.8	9.5
258023	Subsoil, 10 to 72 inches	.8	6.4	5.3	38.7	12.1	12.5	24.5
258024	Subsoil, 8 to 30 feet	1.8	12.3	7.7	33.9	13.5	15.3	15.7
258025	Subsoil, 30 to 40 feet	.1	.4	.6	8.2	7.3	68.6	14.9

CARNEGIE SANDY LOAM

In the virgin condition, Carnegie sandy loam has from a 1-inch to 3-inch surface layer of rather dark brownish-gray loamy sand or sandy loam which contains pebbles and considerable organic matter and which is directly underlain by yellow or brownish-yellow pebbly sandy loam which continues downward to a depth varying from 5 to 7 inches. Beneath this, the upper part of the subsoil is friable heavy sandy clay or clay loam of which the color may be bright yellow, reddish yellow, brownish yellow, or light reddish brown. This layer varies in depth from 24 to 36 inches and grades to material of similar texture but of more uniform brownish-yellow or reddish-yellow color. In many places it is mottled with brown and red in the lower part. Below a depth varying from 40 to 48 inches is imperfectly weathered, highly mottled light-gray, yellow, brown, and purplish-red clay. Under cultivation the surface layer, to a depth varying from 4 to 6 inches, is yellowish or brownish-gray pebbly loamy sand or sandy loam. Small rounded, brown or almost black iron oxide concretions and accretions are rather numerous over the surface and throughout the topsoil and are present in smaller numbers in the subsoil. The percentage of pebbles varies from 15 to 40 per cent of the soil mass.

The areas of this soil mapped on crests of broad ridges near Moye and west of Manry School conform to the typical as to the depth of the parent material, but areas occurring on slopes are, for the

most part, rather shallow, and the depth to the unweathered parent material is variable. This variation is very noticeable along the road leading south from Moye where the parent material in many places comes within 3 feet of the surface and causes considerable variation in the thickness of the subsoil. A few areas of this soil are southeast of Edison, around Kemps Store, and in the northwestern part of the county. Rather large areas are west of Pachitla Creek and north of Little Pachitla Creek. The largest and most typical areas are near Moye.

The relief of Carnegie sandy loam is in general rather mild but is sufficiently undulating to insure excellent drainage. Most of the soil occupies broad ridges or very gentle slopes. It occurs at the highest elevations in the county.

Carnegie sandy loam was originally forested with a heavy growth of long-leaf pine and hardwoods, but with the exception of a very few small areas the timber has been removed. More than 90 per cent of the soil is now devoted to the production of the common crops, principally cotton.

Carnegie sandy loam is one of the most desirable soils of the county, as it is in general productive and responds well to good cultural methods. As it occurs at the highest elevations in the county, it offers healthful living conditions. Probably fewer limestone sinks occur in this soil than in any other soil in the county. The character of the soil is such that it is retentive of moisture, and yet the movement of air and water throughout is good. This is one of the earliest soils of the county.

Carnegie sandy loam is adapted to many crops, being in this, as well as in many other respects, similar to Tifton sandy loam. These two soils are probably the two most desirable soils in the county. Carnegie sandy loam is doubtless one of the very best cotton soils in southern Georgia, and Tifton sandy loam is a close second. The highest cotton yields reported in the county came from this soil. It is an excellent corn soil, although it probably has no advantage over Tifton sandy loam as a corn producer. It is one of the two soils best suited to the production of pecans. Velvet beans and other legumes do well, and the practice of growing legumes and leaving organic matter in the soil proves very beneficial. Commercial fertilizers give good results.

The present selling price of this soil varies considerably, but typical Carnegie sandy loam always commands a good price, as high as $75 an acre where the land is favorably located and well improved.

GREENVILLE SANDY LOAM

In virgin areas the topsoil of Greenville sandy loam consists of a rather thin veneer of brownish-gray loamy sand, dark with organic matter, underlain by yellowish-brown sandy loam which continues to a depth of about 8 inches. The subsoil is deep-red heavy sandy clay, which is rather sticky when wet but is very hard and brittle when dry. The thickness of the subsoil is rather variable. On many slopes this layer extends to a depth of only about 3 feet but in most places it continues to a depth of 7 or 8 feet. The average depth is probably about 6½ feet. In some places the 12 inches of the subsoil just above

the substratum is somewhat mottled, but from the examinations made in this county this appears to be little more than a transition from the subsoil to the underlying brownish-red, highly mottled, unweathered clayey substratum.

When plowed the surface soil, to a depth of 6 inches, is brownish sandy loam. Greenville sandy loam is very closely associated with Orangeburg sandy loam and the other members of the Greenville series. Some difficulty was experienced in the attempt to accurately separate these soils in places. Southwest of Edison the surface soil varies in thickness from 3 to 8 inches in such short distances as to render an accurate separation of the sandy loam and clay loam members a physical impossibility, and small areas of both soils were included in mapped areas of each. Throughout the greater part of the western half of the county, the color of the surface soil caused a similar difficulty in the separation of this soil from Orangeburg sandy loam. In the vicinity of and north of Leary and in many places on the plains extending back from the Ichawaynochaway Creek and Pachitla Creek swamps, notably near Bermuda, the texture of the subsoil is intermediate between that of the sandy loam and loamy sand soils. Even though this textural difference materially affects the moisture-holding capacity and thus the productivity of the soil, it was nevertheless questionable in many places which soil would best represent the typical.

Greenville sandy loam is very important when it is considered as to area and productive possibilities. With the exception of the region surrounding Cordrays Mill and an area of about 15 square miles between Arlington and Williamsburg, it occurs extensively throughout the county. The largest and most typical areas are mapped in the vicinities of Leary and Edison and on the plains along the larger stream swamps. The drainage of these plains is favorably affected by the cut-out channels of the streams.

The surface features of Greenville sandy loam are somewhat variable. The land ranges from an almost level plain, as southeast and north of Williamsburg along Ichawaynochaway and Pachitla Creeks, to rather strongly rolling, as along the slopes overlooking Little Pachitla and Pachitla Creeks near Edison and farther east. Surface drainage on the greater part of the smooth areas is good, and the rather open, porous sandy clay subsoil everywhere allows good internal drainage.

Greenville sandy loam is naturally fertile. The principal problem in its management is its physical condition. Commercial fertilizers give good returns with all the common crops, unless it be peanuts, but this treatment alone will not restore the former productiveness. The most successful farmers do not cultivate this soil when it is too wet, they rotate the crops grown on it, growing legumes when possible, and they incorporate an abundance of organic matter in the soil.

Much of the Greenville sandy loam, especially in the western part of the county, contains varying percentages of iron oxide concretions and accretions. Where the content of concretions becomes considerable, their presence is indicated on the map by gravel symbols. The pebbles are in no place sufficiently abundant to interfere with cul-

tivation. In fact, their presence in many places facilitates cultivation and is desirable as they scour the plows and make the soil more porous without reducing the moisture retentiveness.

The original forest on this soil consisted principally of hardwoods, including hickory, the various oaks common to this region, and dogwood. Long-leaf yellow pine was rather abundant in some localities. Except for a few small areas of fine hickory and a few oaks, the forest has been removed, and practically all this soil has been cleared and cultivated. Probably from 15 to 20 per cent of it is now idle, however, and is growing up in sassafras, plum trees, young pine, and broom sedge. The greater percentage of the abandoned areas is rather intricately associated with limestone sinks and small swampy drainage ways.

Greenville sandy loam has a high agricultural value and when it is properly managed produces good yields of all the crops common to this region. In its present condition, however, it is not giving the yields which it should. Cotton yields from one-fourth to nearly one-half bale to the acre, corn from 10 to 20 bushels, oats from 30 to 65 bushels, and peanuts about one-third ton, depending largely on the condition of the soil, the applications of fertilizer, and the treatment. The commercial fertilizers which apparently give the best results are: For cotton a 10–3–2 mixture; for corn or oats a 10–3–0 mixture and a top-dressing of nitrate of soda; and for peanuts, lime and phosphate. This is an excellent soil for pecans and peaches.

Much of this land is now for sale and can be purchased for prices ranging from $12 to $40 an acre, depending on the condition, location, and improvements.

GREENVILLE CLAY LOAM

In wooded areas Greenville clay loam, to a depth of 1 or 1½ inches, consists of dark brownish-gray heavy loamy sand or sandy loam. This grades to reddish-brown sandy loam which continues to a depth or 4 or 6 inches, where it is underlain by the subsoil. The upper part of the subsoil, to a depth of about 40 inches, is deep-red heavy sandy clay or clay which grades to red or dark-red, rather heavy sandy clay or clay slightly mottled, blotched, or streaked with black, yellow, or brown. Varying quantities of iron oxide concretions and accretions are present in many places in the lower part of the subsoil, in most places immediately above the heavy, brittle, blocky, unweathered sandy clay material of the substratum. The parent material is everywhere very highly mottled with yellow, purple, brown, gray, and some pink.

To a depth varying from 4 to 6 inches, Greenville clay loam in cultivated fields is reddish-brown heavy material varying from sandy loam to clay loam. In eroded areas there are small outcrops of heavy, red sandy clay. In small areas on eroded slopes, the subsoil may not extend to a depth of more than 3 feet, but in other places where the relief is milder it may extend to a depth of 6 or 8 feet. It appears, from the examinations made, that where the subsoil extends to a depth greater than 4 feet, variations in color, texture, or consistence below this depth are not uncommon. In a few

places, however, the deep-red sandy clay or clay extends to a considerable depth and is separated from the parent material by a comparatively sharp line of demarcation.

Over the western part of the county this soil is characterized by the presence of pebbles scattered throughout the topsoil and subsoil. Where these pebbles were present in sufficient numbers, the soil was mapped as Greenville clay loam, pebbly phase. A smooth phase and a shallow phase of this soil were also mapped.

With the exception of a few areas near Holt, the greater part of the Greenville clay loam occurs in the western and northwestern parts of the county, notably north of Edison on rather rolling slopes overlooking Little Pachitla Creek and its tributaries. Scattered areas, some of which are rather extensive, occur throughout the greater part of the western half of the county.

Areas of Greenville clay loam, as mapped in this county, are characterized by rather steep slopes, although the relief of probably 30 per cent of the area of this soil ranges from gently rolling to rolling. Drainage is everywhere thorough. Surface drainage in many places is excessive, and the effects of erosion are apparent.

Areas of this soil were orginally covered with various species of oak, hickory, dogwood, and other hardwoods, supplemented by a very few long-leaf pine. Practically all the merchantable timber has been removed, leaving only a very few small patches of hickory and some oak. Probably 90 per cent of this soil has been cleared and put into cultivation at some time, although about 30 per cent of it is now in young scrubby timber, poor pastures, or abandoned fields.

In its present condition Greenville clay loam is best adapted to the common field crops. It is not successfully used for the production of tobacco or truck crops and is a poor soil for pecans or peaches. Successful management of Greenville clay loam requires close attention to its physical condition. To a great extent, the treatment determines the yields. On well-managed and well-fertilized soil, cotton yields from one-fifth to one-fourth bale to the acre, corn from 8 to 15 bushels, and oats from 12 to 25 bushels. Under proper management over a period of years these yields may easily be doubled; the best farmers are proving this. As a rule this soil requires less potassium and more phosphorus than do the gray soils. Fertilizers mixed in about the same proportions as for Greenville sandy loam seem to give the best returns.

There is no soil in the county more injured by being plowed or winter grazed when too wet than is Greenville clay loam, and no soil is in greater need of a proper rotation including the growing of legumes as a manure crop. With proper management its present selling value, which varies from $8 to $15 an acre, may be increased 100 per cent. Such practices followed persistently for a number of years will improve its physical condition and increase the productivity sufficiently to produce peaches and pecans as well as the common crops.

Greenville clay loam, pebbly phase.—In wooded areas the 1-inch surface layer of pebbly Greenville clay loam, locally known as "red pebbly land" or "hard land," is dark-brown heavy sandy loam or loam containing a high percentage of organic matter and pebbles. The subsurface layer varies in color from yellowish red to brownish red and in texture from sandy loam to clay loam. It contains a high

percentage of iron oxide concretions and accretions and extends to a depth of about 5 inches, where it is underlain by the subsoil. The subsoil consists of red or rather dark red heavy material ranging in texture from sandy clay to clay. It contains varying proportions of red, brown, and, in places, yellow concretions and accretions, many of which are imperfectly indurated. The subsoil extends downward to a depth varying from 5 to 7 feet and is underlain by the substratum, similar to that underlying other members of the Greenville series. In cultivated fields the surface soil, to a depth of 4 or 5 inches, varies in color from reddish brown to brownish red and in texture from heavy sandy loam to clay loam.

The outstanding characteristic of this soil is the presence of numerous small rounded and smooth dark-brown or red iron oxide concretions and accretions scattered throughout the soil. In places in road cuts these pebbles are much more numerous in horizontal layers, usually from 4 to 6 inches thick and varying in depth from the surface. Many of the pebbles are yellow or brownish yellow and imperfectly developed and give the subsoil a rather yellowish-red or brown color.

In the west-central part of the county a few small areas of very pebbly Greenville sandy loam are included in mapped areas of this soil. In such places the surface layer is only 6 or 7 inches deep, and the soil is very intricately associated with the pebbly clay loam. The variations as to the depth from the surface at which the unweathered material occurs seem to be very much the same as in typical Greenville sandy loam and Greenville clay loam.

Greenville clay loam, pebbly phase, occurs very extensively in the west-central part of the county south of Little Pachitla Creek and extending to within a very few miles of Arlington. The size of the areas of this soil ranges from 3 to 700 acres.

Areas of this soil are not so rolling as areas of typical Greenville clay loam. The land ranges from rather smooth to rolling, but the greater part is undulating. Aside from this surface difference and the abundance of pebbles in the Greenville clay loam, pebbly phase, this soil is very similar to the typical clay loam. The differences, however, seem to make the pebbly soil somewhat more productive, especially for cotton. The same crops thrive on both the typical and the pebbly soils, although there may be a small margin of difference in yield favoring the latter.

The same general needs in soil management and improvement as are recommended for Greenville clay loam might well be recommended for the pebbly soil.

Greenville clay loam, shallow phase. The topsoil of Greenville clay loam, shallow phase, consists of reddish-brown clay loam 4 or 5 inches deep. The subsoil varies in color from brownish red to reddish brown. It is somewhat imperfectly weathered very compact sandy clay to a depth varying from 18 to 30 inches and in many places is streaked or mottled with gray and yellow in the lower part. The substratum is highly mottled, red, purple, gray, yellow, and brown, compact unweathered sandy clay. In many places, some iron oxide concretions and accretions are scattered throughout the topsoil and subsoil. This soil, as mapped in Calhoun County, is rather variable and is not in every place truly typical of the Green-

ville soils. It is comparatively unimportant in the county, both in extent and agricultural value. The largest areas are north of Edison.

The surface of this soil ranges from rolling to broken. Surface drainage is good or excessive, and the tight subsoil materially retards aeration and percolation. In many places erosion has been active to such an extent as to remove the topsoil and even, in some places, the upper part of the subsoil.

Practically none of this soil is now in cultivation. The rolling relief and the compact subsoil make it an undesirable and unproductive soil. It now supports a light growth of scrubby pine, blackberries, dewberries, and broom sedge. Some of it is used for pasture. It can best be used for forestry.

Greenville clay loam, smooth phase.—In the virgin condition the 1-inch surface layer of smooth Greenville clay loam is dark brownish-gray sandy loam or loam rich in organic matter and in most places contains some pebbles. This is underlain by yellowish-red heavy material varying in texture from sandy loam to clay loam and containing some pebbles. This material continues to a depth of about 5 inches and rests on the subsoil. The subsoil in places is well-divided into two layers but in many places it is uniform and extends downward to the unweathered parent material, which is very similar to that under typical Greenville clay loam. In cultivated fields the surface layer of this soil, to a depth of 6 or 8 inches, is reddish-brown heavy material varying from sandy loam to clay loam.

As in the other Greenville soils, smooth Greenville clay loam is variable as to the depth to which the subsoil extends and as to the nature of the lower part of the subsoil. Owing largely to the smoother surface, the depth of the subsoil of this soil is not so variable as that of typical Greenville clay loam nor even as that of Greenville sandy loam. In the western part of the county smooth Greenville clay loam in many places contains appreciable numbers of pebbles, most numerous in the lower part of the subsoil.

This soil is very closely associated with Greenville clay loam, pebbly phase, and occurs in the same parts of the county. Its distinguishing characteristic is its smooth surface. The drainage is nowhere excessive and in some places is not adequate. As to proportion of cleared land, proportion now in cultivation, physical condition, and methods of improvement, the two phases of Greenville clay loam are similar, but as regards yields of the common crops and market value the pebbly soil has a slight advantage over the smooth soil.

The following table gives the results of mechanical analyses of samples of the surface soil, subsurface soil, and different layers of the subsoil of Greenville clay loam, smooth phase:

Mechanical analysis of Greenville clay loam, smooth phase

No.	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
258011	Surface soil, 0 to 1 inch	1.8	9.5	8.9	49.6	10.8	11.9	7.0
258012	Subsurface soil, 1 to 4 inches	3.2	12.9	9.5	46.9	9.1	9.8	8.5
258013	Subsoil, 4 to 20 inches	2.0	10.9	7.9	40.1	6.9	10.2	21.9
258014	Subsoil, 20 to 65 inches	1.2	7.4	5.9	34.6	8.8	7.2	35.1
258015	Subsoil, 65 inches, +	6.5	11.4	6.6	36.6	10.6	8.6	19.8

GREENVILLE LOAMY SAND

In the virgin condition Greenville loamy sand has a 1-inch surface layer of dark-brown loamy sand, rather rich in organic matter, underlain by comparatively incoherent reddish-brown loamy sand which, at a depth of about 12 inches, grades to the red loamy sand subsoil. The subsoil extends downward to a depth varying from 5 to 7 feet, and is in general underlain by a layer, from 1 to 3 feet thick, of comparatively firm, partly cemented, pinkish-gray or yellowish-brown loamy sand which is hard and brittle when dry and shows more or less evidence of imperfect weathering. Immediately beneath this layer is the substratum of very compact, brittle, blocky, heavy unweathered fine sandy clay material characterized by the presence of coarse mottles of variegated bright colors. In plowed fields the surface layer, to a depth of 6 or 7 inches, varies somewhat in color although typically it is brown or reddish brown and is everywhere loamy sand or very light sandy loam. Immediately above the parent material, iron pebbles in various stages of induration are present in considerable quantities. Many of these are yellow or yellowish brown.

The principal variations occurring in this soil are in color. Just west of Spring Creek and north of Leary the topsoil has a lighter color, similar to that of Orangeburg loamy sand. Some difficulty was experenced in mapping this soil south and north of Leary, near Cordrays Mill, south of St. Lukes Church, and immediately east of Ichawaynochaway Creek near the Central of Georgia Railway, where the texture of the subsoil is slightly heavy, similar to that of Greenville sandy loam. Also, north of Cordrays Mill in a few small areas the texture is somewhat coarse. None of these variatons were considered of sufficient importance to justify separate mapping.

Greenville loamy sand is rather extensive in the county but is not of great agricultural importance. Most of the areas in the eastern part and along the plains adjacent to the larger stream swamps have a smooth surface, but those areas scattered throughout the western part, especially in the vicinity of Edison at the foot of slopes along Pachitla and Little Pachitla Creeks, are characterized by rather rolling surfaces. Near the Terrell County line just east of Ichawaynochaway Creek, a small area of Amite loamy sand occurring on a rather distinct terrace position was mapped with this soil, as this is the only area of the Amite soil in the county and as it is very similar in many respects to Greenville loamy sand.

The original forest cover on this soil, composed of hardwoods and pine with pine predominating, was not so heavy as that on Greenville sandy loam. The greater part of the soil has been cleared and put into cultivation, although probably 20 per cent of it is now either growing up to weeds and brush or is in pasture or idle fields. On most of the larger uniform areas, especially where the texture of the subsoil tends to be slightly heavy, cotton is grown with fair success, yielding from one-fifth to one-third bale to the acre when it is properly fertilized and the boll weevil is properly controlled. Velvet beans, peanuts, and peas give satisfactory yields, but the yield of corn is low because of the inability of the soil to retain moisture. Greenville loamy sand is rather loose and open for general farming,

but if heavy crops of velvet beans and cowpeas are turned under every other year this weakness can be materially decreased. One of its undesirable characteristics is the vast amount of water the soil absorbs during prolonged wet periods, especially where the surface is smooth, as much of it is. Wet periods during the growing season are very injurious. The structure of this soil is such that it is especially adapted to growing early watermelons, cantaloupes, and many of the truck crops adapted to this section. With proper treatment these crops can be grown with considerable success when climatic conditions are not abnormal during spring and early summer. Pecan trees may be grown with some degree of success, although the trees will not grow so rapidly, nor will they put on and mature as many nuts as will trees growing on more rolling or better-drained heavier soils.

Greenville loamy sand can be cultivated with ease under a wide range of moisture conditions. Hogs and cattle can graze on this soil during the winter wet season with much less injury to the soil than results to the sandy loams and clay loams.

The present selling price of this soil varies from $10 to $20 an acre, depending on the condition of the soil, the location, and improvements.

ORANGEBURG SANDY LOAM

In wooded areas Orangeburg sandy loam, to a depth of 2 or 3 inches, consists of gray or grayish-brown loamy sand, the dark color being caused by the organic matter present. The subsurface layer varies in color from grayish yellow to brownish yellow and in texture from loamy sand to light sandy loam. At a depth varying from 10 to 15 inches this is underlain by the subsoil, the upper part of which, to a depth of about 20 inches, varies from rather heavy yellowish-red or brownish-red sandy loam to light sandy clay. Just beneath this is bright-red rather heavy but crumbly and friable sandy clay which continues to a depth of 4 or 5 feet and grades to the parent material, predominately brown and yellow compact, brittle, blocky unweathered clay, mottled and streaked with gray and purple. Under cultivation Orangeburg sandy loam, to a depth of 6 inches, consists of gray or yellowish-gray material varying from loamy sand to light sandy loam. Small areas, having a brown surface caused either by deep plowing or erosion, are included.

In the western part of the county, Orangeburg sandy loam, as is true of nearly all other upland soils of this part of the county, contains some iron oxide concretions and accretions. In areas where the pebbles occur in considerable numbers their presence is indicated on the map by gravel symbols.

Orangeburg sandy loam is very closely associated with Greenville sandy loam. The association becomes so intricate in some localities, notably southwest of Edison, that the inclusion of small areas of both soils in mapped areas of each could not be avoided. In the extreme northwestern part of the county the texture approaches fine sandy loam, but this variation was not of sufficient extent to justify separate mapping.

Orangeburg sandy loam is one of the most extensive soils of the county and is one of the best agriculturally. With the exception of

a small section east of Cordrays Mill it occurs throughout all parts of the county. The areas range in extent from a few acres to 800 acres.

The relief of this soil is rather variable. With the exception of areas mapped near Holt, practically all areas east of Ichawaynochaway Creek, as well as near and south of Williamsburg are characterized by a comparatively low elevation and smooth or undulating surface. Drainage is adequate owing to the near-by channels of the larger streams. The areas in the western part of the county are, with few exceptions, more elevated, have a rolling relief, and are excellently drained.

Originally Orangeburg sandy loam supported a comparatively heavy forest of a rather evenly divided stand of long-leaf pine and hardwoods such as post oak, red oak, white oak, blackjack oak, hickory, dogwood, and some shortleaf pine. Practically all the timber has been removed, and nearly all the soil has been put into cultivation. Probably less than 10 per cent has been abandoned.

Orangeburg sandy loam is an excellent agricultural soil. It is easily cultivated within a wide range of moisture conditions; it can be grazed in winter while wet without very serious injury; and it is rather retentive of moisture and has a wide crop adaptation. These qualities make up a rare combination of desirable soil characteristics. The yields at present are not so high as might be obtained. About one-third bale of cotton, from 12 to 20 bushels of corn, from 25 to 30 bushels of peanuts, and 30 bushels of oats to the acre represent present yields. The soil is also well adapted to the production of watermelons, cantaloupes, and the more common truck crops of this region and is one of the very best for pecans and peaches.

Commercial fertilizers give excellent returns on Orangeburg sandy loam but are not sufficient, in themselves, to restore or maintain the productivity. Rotation of crops, the growing of legumes, and the incorporation of an abundance of organic matter materially improve the condition and fertility of this soil.

The current market prices of Orangeburg sandy loam range from $15 to $35 an acre, depending on location, condition, and improvements.

The following table gives the results of mechanical analyses of samples of the surface soil, subsurface soil, and different layers of the subsoil of Orangeburg sandy loam:

Mechanical analysis of Orangeburg sandy loam

No.	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
258016	Surface soil, 0 to 2 inches	1.2	10.2	7.6	51.0	8.2	15.6	5.8
258017	Subsurface soil, 2 to 8 inches	2.2	10.2	7.6	46.6	13.0	13.7	6.4
258018	Subsoil, 8 to 20 inches	1.2	7.2	5.6	37.9	11.8	13.0	23.7
258019	Subsoil, 20 to 54 inches	.6	6.7	5.0	29.0	9.6	13.2	36.3
258020	Subsoil, 54 inches, +	.7	5.7	4.6	30.1	12.8	11.7	34.1

RUSTON SANDY LOAM

In wooded areas Ruston sandy loam has a rather dark gray loamy surface layer about 3 inches deep, in which the dark color is caused

by the presence of organic matter. This is underlain by a subsurface layer of brownish-yellow sandy loam which extends to a depth varying from 6 to 10 inches and rests on the subsoil. The upper part of the subsoil, to a depth of about 40 inches, is yellowish-brown or reddish-yellow friable sandy clay. This grades to a lower layer of reddish-brown, somewhat tighter sandy clay which in places is mottled with red, yellow, or gray at a depth below 45 inches. The weathered part of this material in most places extends downward to a depth ranging from 40 to 60 inches and is underlain by the highly mottled, unweathered, sandy clay parent material. In cultivated fields the surface layer, to a depth of 4 or 6 inches, varies from yellowish-gray to brownish-gray loamy sand or light sandy loam.

In a few areas of this soil, the largest of which is about 1 mile north of Dickey, the comparatively shallow topsoil is underlain by a rather firm, though friable sandy clay subsoil of a uniform reddish-brown color. Such areas occur on the tops of broad ridges, usually of high elevation and slight relief. This variation is really superior agriculturally to typical Ruston sandy loam. That part of the soil mapped in the northwestern and western parts of the county contains varying quantities of rounded ironstone pebbles scattered throughout the topsoil and subsoil. Where the proportion of pebbles is considerable, their presence is indicated on the map by gravel symbols. Near and north of Arlington small patches of either yellow or red soils are included in mapped areas of this soil, since it was impractical and in many places impossible to indicate these variations on the map. There is also considerable variation in the depth to which the soil is weathered, the parent material in most places coming much nearer the surface on the more rolling areas.

Ruston sandy loam is rather inextensive, occurring mainly in the belt of gray soils which crosses the central part of the county. The larger areas are along the Central of Georgia Railway between Williamsburg and Arlington, although several areas are north of Holt and north and west of Dickey.

The relief of this soil is somewhat variable. The more typical and larger areas are mostly rather smooth, and many of the smaller areas, especially those occurring on the bluffs bordering the larger stream swamps, are in many places gently rolling.

Drainage is well established. Excessive surface drainage, causing erosion, has materially injured many of the smaller areas on bluffs or steep slopes, leaving them fitted only for the growing of timber.

Ruston sandy loam formerly supported a rather heavy growth of yellow pine and hardwoods such as oak, hickory, and some tulip poplar and dogwood. Most of the timber, both pine and hardwood, has been removed, and about 75 per cent of the soil is now in cultivation.

Ruston sandy loam, when in good condition, is a productive soil. It is easily cultivated, is rather retentive of moisture, and can be plowed under a rather wide range of moisture conditions. Winter grazng is not so injurious to this as to the heavier red soils. Ruston sandy loam compares well with the sandy loams of the Carnegie, Tifton, and Norfolk series in this respect.

This soil is an excellent producer of all the common farm crops. Under similar conditions, Ruston sandy loam and Norfolk sandy loam produce about the same yields of cotton, corn, oats, peanuts, beans, and other farm crops Ruston sandy loam is adapted to the production of nearly all truck crops grown in this region and produces good orchards of both pecans and peaches. Tobacco grown and sirup manufactured from cane grown on this soil are not of so good quality as these crops grown on Norfolk sandy loam.

Ruston sandy loam, like most of the upland soils of this county, is very much in need of a proper rotation of crops, including the growing of velvet beans and cowpeas for manure crops. This soil is not only retentive of moisture but also of applied commercial fertilizers, which give good returns. Special crops require liberal applications of manure and fertilizers in order to realize best results.

Ruston sandy loam can be bought at present for prices ranging from $15 to $25 an acre, depending on improvements, condition of the soil, and location.

The following table gives the results of mechanical analyses of samples of the surface soil, subsurface soil, and different layers of the subsoil of Ruston sandy loam:

Mechanical analysis of Ruston sandy loam

No.	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
258001	Surface soil, 0 to 3 inches	2.0	13.4	10.8	42.4	9.8	11.8	9.6
258002	Subsurface soil, 3 to 9 inches	3.8	15.9	10.2	42.7	8.5	10.6	8.6
258003	Subsoil, 9 to 40 inches	2.5	11.1	8.0	34.4	7.3	9.8	27.0
258004	Subsoil, 40 to 54 inches	2.4	9.6	6.8	29.7	7.9	7.9	35.9
258005	Subsoil, 54 inches, +	1.9	6.2	3.2	19.7	11.5	15.8	41.7

RUSTON LOAMY SAND

In the virgin condition Ruston loamy sand has a thin surface covering of dark-gray sand, the dark color being caused by the organic matter present. This is underlain by a subsurface layer of yellow or brownish-yellow light loamy sand which continues to a depth of about 12 inches and grades to loose and friable reddish-brown loamy sand, which extends to a depth varying from 48 to 60 inches and is underlain by highly mottled, imperfectly weathered, hard, and brittle sandy clay material. In cultivated fields the surface layer of loamy sand 6 inches deep varies from yellowish gray to brownish gray, the difference from the virgin soil being the result of the loss of organic matter and the disturbance by cultivation.

This soil occurs throughout the county, although more than 90 per cent is along and east of Ichawaynochaway Creek, and very little is in the northwestern and central-western parts.

The subsoil of Ruston loamy sand, as mapped in the county, is somewhat variable both as to the character of the subsoil beneath a depth of 3 feet and as to the depth at which the parent material occurs. In places the lower part of the subsoil may be of a somewhat heavier texture and in places it is mottled. The depth to the parent

material ranges from 3 feet on the slopes to 7 feet on the areas of slighter relief.

Ruston loamy sand is intermediate in texture between the sands and sandy loams and in color between the gray soils and the red soils, so that it necessarily includes several variations. Many of the areas, especially those west of Ichawaynochaway Creek, occur near the foot of rather steep slopes and were formed largely from material washed from higher areas. Two or three areas just east of Pachitla Creek near the Randolph County line approach loamy coarse sand in texture, but the variation is not of sufficient significance to warrant separation on the soil map.

Areas of this soil are rather smooth or undulating in the eastern half of the county, except those mapped in the vicinity of Cordrays Mill where the relief, like that of the scattered areas throughout the western half of the county, is rather rolling.

This is not an important soil, either in extent or productivity. It is rather droughty, especially in the areas on the slopes. The smooth areas are unable to withstand continued wet weather during the growing season.

With favorable seasons and proper management, Ruston loamy sand is a fair soil for the growing of early truck crops, but marketing facilities for such produce are at this time not very favorable. Peanuts and velvet beans do well. In general, yields are considerably lower than those obtained on Ruston sandy loam and are about equal to those on Norfolk loamy sand. This soil can be purchased for amounts ranging from $6 to $12.50 an acre.

Even though commercial fertilizers, as they are now used, give good returns, the greatest needs of this soil are increased quantities of nitrogen and organic matter. The best farmers supply the greater part of these needs by growing velvet beans and other legumes and continually growing and leaving on the fields an abundance of organic matter. Much of the land should be devoted to forestry.

NORFOLK SANDY LOAM

In wooded areas the topsoil of Norfolk sandy loam consists of a 2-inch or 3-inch surface layer of dark brownish-gray loamy sand which grades to pale-yellow or grayish-yellow loamy sand or light sandy loam which continues to a depth varying from 12 to 16 inches. The subsoil is yellow friable and crumbly sandy clay to a depth of 3 or 4 feet, where it becomes somewhat brownish yellow and is in most places slightly mottled with rust brown and red. This quickly grades to yellow, imperfectly weathered sandy clay material mottled with light gray, brown, and red. Under cultivation the surface layer of Norfolk sandy loam, to a depth varying from 5 to 8 inches, is light gray or gray, depending on the quantity and character of the organic matter present.

The areas of this soil which occur in the north-central part of the county are much higher in elevation and the surface relief affords much better surface drainage than in other parts of the county. A few small areas of Marlboro sandy loam along the Randolph County line, were included with Norfolk sandy loam in mapping. Except in comparatively dry growing seasons, the better-

drained areas produce much larger yields than the others. In the south-central part of the county Norfolk sandy loam is in most places very closely associated with limestone sinks, and much of it is only a very few feet above them. These areas are somewhat inferior to the typical soil. Much of the Norfolk sandy loam in the southern part of the county is mottled at a depth of 30 or 40 inches, whereas that in the northern part is perfectly weathered and of uniform color to a depth of about 5 feet. Near and northeast of Arlington some areas of this soil are underlain, at a depth ranging from 3 to 5 feet, by tight, rather impervious sandy clay which seriously interferes with the downward movement of water.

Norfolk sandy loam is fairly extensive, and small areas are mapped in nearly all parts of the county. Most of this soil occurs in a belt extending in a northeast-southwest direction across the central part of the county. The areas range in size from a few acres to 600 acres.

The original forest cover of Norfolk sandy loam consisted of pine, principally long-leaf, and of scattered oak, hickory, and dogwood. In a few places, especially along ridges where the surface soil is somewhat deeper than typical, blackjack and other scrub oaks were numerous. The commercial timber has been removed, and probably 70 per cent of the soil is now being cultivated. The remainder is either producing timber or is used for pasture.

Where Norfolk sandy loam is well drained, its productiveness is largely a matter of management. It is easily cultivated. The growing of legumes in a suitable rotation of crops and the plowing under of organic matter are probably the greatest needs of this soil. Applications of commercial fertilizers or manure give quick and marked results. When seasons are not abnormal, nitrate of soda used as a top-dressing for either cotton, corn, or small grain proves profitable. Norfolk sandy loam can be cultivated under a wide range of moisture conditions. Winter grazing is not very injurious to it; and it is not very susceptible to erosion. It retains moisture rather well, and when surface drainage is well established wet periods do not prove nearly so injurious to crops as on Norfolk loamy sand.

Norfolk sandy loam is adapted to practically all the crops commonly grown in this region, both common and special crops. The yields of the common crops depend largely on management. On well-drained, well-fertilized, and properly cultivated soil, good farmers obtain yields of about one-third bale of cotton, from 18 to 25 bushels of corn, from 20 to 40 bushels of peanuts, and from 25 to 45 bushels of oats to the acre. Yields on the average tenant farm, however, are from 40 to 50 per cent less. Where adequately drained, this is one of the best trucking soils in the county. In other parts of the State it produces tobacco, pecans, peaches, watermelons, plums, and pears. Sugar cane grown on this soil produces a fine-flavored, light-colored sirup. The current value of this soil varies from $12 to $30 an acre, depending on location, condition, and improvements.

Norfolk sandy loam, deep phase.—The deep phase of Norfolk sandy loam differs from typical in that the yellow friable sandy clay of the deep phase occurs at a depth ranging from 20 to 28 inches below the surface, and the surface soil, owing to its greater content of sand and lower content of organic matter, is somewhat lighter,

both in color and texture, than in the typical soil. The difference in color and texture is more noticeable in cultivated fields.

The scattered areas of this soil mapped in the central and southern parts of the county are very closely associated with typical Norfolk sandy loam, and difficulty was experienced in determining which soil could best be considered typical. This close association necessitated the drawing of arbitrary boundary lines between the deep phase and the typical sandy loam in a few places.

The surface of this soil, as it occurs in this county, is in general more even and smooth than is that of typical Norfolk sandy loam. Most of the deep soil is rather closely associated with Plummer sand and the Grady soils. Drainage in most places is not good, and mottles of gray, brown, or red occur in many places in the lower part of the subsoil.

The greater part of the merchantable timber has been removed from this soil, but several hundred acres east of Cordrays Mill are being turpentined.

Probably 25 or 30 per cent of this soil has been cleared and put into cultivation. About a third of this area has since been abandoned and allowed to grow up to scattered pine, scrub oak, and an undergrowth of wild grasses and broom sedge.

This soil seems to be unable to withstand either too much or too little rainfall during the growing season. To a depth of 2 feet it is not retentive of moisture or of fertility, and it seems difficult to maintain a sufficient supply of organic matter. If better drained, the soil might be used with some degree of success in the production of peanuts and some of the earlier truck crops.

NORFOLK LOAMY SAND

In wooded areas of Norfolk loamy sand a 1-inch surface layer of gray sand, dark with organic matter, is underlain by a subsurface layer varying in color from yellow to grayish yellow and in texture from sand to loamy sand. This, at a depth varying from 10 to 14 inches, is underlain by yellow or pale-yellow loamy sand, which in many places becomes slightly heavier with depth and in some places grades to yellow, friable light sandy loam at a depth of 30 or 40 inches. In cultivated areas, the soil, to a depth varying from 5 to 7 inches, has a rather light gray color, owing to the absence of organic matter.

Norfolk loamy sand occurs in the same belt crossing the central part of the county in which the other members of this series are most extensive. Norfolk loamy sand is very closely associated with the deep phase of the sandy loam, small areas of both soils are included in mapped areas of each, and boundary lines in many places are somewhat arbitrary. In the south-central part of the county a few small areas of Norfolk sand are included in mapped areas of the loamy sand. A few small areas of loamy sand occurring on terraces along Ichawaynochaway and Pachitla Creeks are mapped with Norfolk loamy sand on account of their small extent and similarity from an agricultural viewpoint. Variations in the texture of the deeper part of the subsoil are common. In areas near and immediately northeast of Arlington tough, rather impervious sandy clay is in most places present at a depth varying from 3 to 5 feet.

The relief of this soil is in general rather mild. Although a small part of it occurs on slopes and ridges, the greater part has a smooth surface. Areas occur in close association with Plummer sand, Grady sandy loam or with the deep phase of Norfolk sandy loam. In many places surface drainage is inadequate and, although percolation to certain depths is rapid, either long continued wet or dry periods during the growing season prove harmful.

Norfolk loamy sand originally supported a good cover of longleaf and other pines with a very few scrubby hardwood trees. Practically all commercial timber has been removed, although east of Cordrays Mill some pines are being boxed for turpentine. Probably not more than 20 or 25 per cent of the soil is under cultivation; much of it once cultivated has been abandoned. Considerable areas are in pine for lumber or turpentine, and some of the land is used for pasture.

Except in a few areas, Norfolk loamy sand is the lowest producer of the three soils of the Norfolk series mapped in the county. It apparently suffers more than the other members of the series as a result of either continued wet or dry periods, but when seasons are favorable most of the common crops are grown with more or less success. Reports from the best farmers on this soil show yields ranging from one-fourth to one-third bale of cotton, from 10 to 15 bushels of corn, from 15 to 20 bushels of oats, and from 15 to 25 bushels of peanuts to the acre, but the average tenant farmer gets little more than half these yields. Peanuts do better than either cotton or corn. This soil is rather well adapted to the growing of early truck crops and is used very successfully for this purpose when seasons are favorable and the organic-matter content of the soil is maintained.

Norfolk loamy sand can be purchased at prices ranging from $5 to $12 an acre depending on location, condition, and improvements.

The growing of legumes and the incorporaton of organic matter are the greatest needs for improvement of this soil. The land should be used mainly for forestry.

BLAKELY CLAY LOAM

In the virgin condition the surface layer of Blakely clay loam consists of dark-brown heavy sandy loam, 1½ or 2 inches deep. The subsurface layer, to a depth of 5 or 6 inches, consists of dark reddish-brown clay loam containing much less organic matter than the surface layer. The upper part of the subsoil is dark reddish-brown or maroon-red very heavy clay loam or clay which is rather brittle and friable when dry but is sticky when wet. At a depth of 20 or 24 inches this material grades to more sticky and tight very heavy rather stiff sandy clay similar in color but in many places containing numerous brown and yellow pebbles in various stages of induration. In many places the heaviest concentration of pebbles is immediately above the parent material, at a depth of 4 or 5 feet below the surface. The parent material is purple, red, lavender, and gray, slightly weathered clay. In cultivated fields, to a depth varying from 3 to 5 inches, Blakely clay loam is somewhat heavier in texture and slightly lighter in color than in the virgin condition.

There are a few widely scattered areas of this soil in all parts of the county where red soils predominate, but with the exception of the several patches along and west of Chickasawhatchee Creek, practically all the Blakely clay loam is in the southwestern part. This soil is very closely associated with the Greenville soils, the color being the principal visible basis for separation. The imperceptible change from this soil to Greenville clay loam necessarily makes the drawing of lines to separate the two soils more or less arbitrary in many places.

Blakely clay loam was derived from unconsolidated marine deposits. The chocolate, dark-red, or maroon-red color characteristic of this soil visibly separates or distinguishes it from the Greenville soils. This color probably results from the large percentage of manganese oxide (Mn_2O_3) present rather than from the quantity or character of the organic matter. It is probable, however, that Blakely clay loam in some places contains more organic matter than Greenville clay loam. Strong effervescence is shown with a 15 per cent solution of hydrogen peroxide.

Characteristic areas of Blakely clay loam are smooth, giving way to other soils on slopes. Most of this soil occurs on level areas adjacent to the larger stream swamps and is interrupted in places by lower areas of the Grady soils. It gives way to the Greenville soils on the adjacent slopes and higher elevations.

Although the relief of this soil is very slight, surface drainage is good. The subsoil is retentive of moisture, and percolation of water is comparatively slow in the typical subsoil. The soil seems unable to withstand either continued rain or long periods of dry weather during the growing season. This may be partly the result of inadequate preparation, as the soil is such that deep plowing is very difficult. It does not scour well from the moldboard of the plow and is locally known as "push soil."

Blakely clay loam originally supported a growth of large oak, hickory, and other hardwood trees, with some long-leaf and other pines. Probably 80 per cent of the soil has been cleared and put into cultivation, but at this time about 50 per cent of it is either idle, in forest, or is used as pasture. The boll weevil seems to have reduced the yield of cotton on this soil more than on some of the lighter soils occurring at higher elevations. The usual yield under good management is about one-fourth bale to the acre. This is probably a heavier soil than is best for peanut production, although some peanuts are grown, and yields of 15 or 20 bushels to the acre are common. Blakely clay loam is better adapted to growing corn and small grain and to stock raising. It is very injurious to plow this soil when it is too wet or to pasture it during the rainy season of winter and spring. Good management may produce yields of 20 or 30 bushels of corn with velvet beans and of 30 bushels of oats. Good yields of hay, forage crops, legumes, and grasses are obtained.

The present value of this soil varies from $15 to $25 an acre. The application of lime to legumes and the incorporation of coarse organic matter seem to give good results. This is an excellent soil for growing peaches and pecans.

The following table shows the results of mechanical analyses of samples of the surface soil, subsurface soil, and different layers of the subsoil of Blakely clay loam:

Mechanical analysis of Blakely clay loam

No.	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
258069	Surface soil, 0 to 3 inches	1.7	8.1	6.2	29.2	12.8	27.8	14.7
258070	Subsurface soil, 3 to 10 inches	.8	5.3	5.4	29.1	12.3	25.8	21.8
258071	Subsoil, 10 to 22 inches	.4	4.4	4.5	22.0	9.9	19.6	39.6
258072	Subsoil, 22 to 45 inches	.7	3.6	3.4	18.0	7.9	15.7	51.0
258073	Subsoil, 45 to 70 inches	.8	2.8	2.0	12.6	5.1	11.1	65.8

HENDERSON STONY SANDY LOAM

To a depth of about 2 inches, Henderson stony sandy loam, in wooded areas, consists of rather dark gray loamy sand containing some organic matter and considerable angular cherty fragments. The subsurface layer, to a depth varying from 8 to 12 inches, is in most places yellowish-gray light sandy loam, also containing cherty fragments. The subsoil, to a depth varying from 24 to 30 inches, is sandy clay variable in color, although as mapped in this county, most of it is yellow, yellowish brown, or reddish brown. It is compact, hard, brittle (when dry), and contains cherty fragments. It is not thoroughly weathered and breaks into cubes on drying. It grades downward to compact, brittle, slightly gritty, unweathered clay material of various colors, highly mottled with brown, gray, purple, and yellow and containing an abundance of broken angular chert. In cultivated fields, Henderson stony sandy loam, to a depth of 4 or 6 inches, is gray or slightly yellowish gray loamy sand or light sandy loam, with stones strewn over the surface.

The largest areas of this soil are north of Edison. It is inextensive and unimportant in the county. The surface varies from undulating to rolling. In places, the soil occurs on the crest of ridges or on the top of small moundlike hills, but most of it occupies rather steep slopes near the head of V-shaped valleys north of Edison. Surface drainage is everywhere excellent. Numerous stones over the surface prevent excessive erosion.

Henderson stony sandy loam, as mapped in the county, is uniformly very stony, and much of it is now in original forest for this reason. The stones vary in size from small cherty fragments to bowlders of more than a foot in diameter, which interfere seriously with cultivation. This soil should be used only for forestry or pasture.

LEAF SANDY LOAM

In wooded areas, Leaf sandy loam, to a depth of about 2 inches, is dark-gray sandy loam containing considerable organic matter. The subsurface layer, to a depth of 6 or 8 inches, is gray or yellowish-gray sandy loam. The subsoil consists of brownish or brownish-yellow heavy, tough silty clay or clay somewhat mottled with gray and red. At a depth of 30 or 36 inches, this grades to highly mot-

tled, rather tight, somewhat impervious, unweathered clay. Under cultivation the surface soil to a depth of 4 or 5 inches is in most places yellowish-gray or gray heavy sandy loam or loam.

This soil occurs on the second bottoms of the larger streams and is inextensive. It is flooded only during times of very high water. Only a small area southwest of Morgan on Pachitla Creek is in cultivation.

In places a surface covering of sand from 12 to 18 inches thick has been deposited by the stream, but in other small areas rather heavy clay loam comes to the surface. This soil is everywhere wholly or nearly surrounded by swamp, and the line separating it from the swamp is not always sharp. Consequently, minor variations near the border of some of the areas of Leaf sandy loam are not uncommon. The surface is smooth, and drainage is inadequate. The small area in cultivation seems to indicate that Leaf sandy loam is best adapted to the production of corn, velvet beans, oats, and hay.

From 90 to 95 per cent of this soil now supports a growth of pine, oak, hickory, beech, gum, and tulip poplar. Most of the commercial timber has been removed.

PLUMMER SAND

In the virgin condition the topsoil of Plummer sand consists of a thin surface layer of gray sand containing some organic matter and a subsurface layer of yellowish-gray or dull-gray sand which continues to a depth of 8 or 10 inches. The subsoil, to a depth varying from 18 to 24 inches, is yellowish-gray or light-gray sand grading to light-gray sand faintly mottled with yellow or rust brown. In general this extends downward to a depth varying from 36 to 48 inches and rests on unweathered, rather firm sandy loam or sandy clay which is coarsely mottled with rust-brown and yellow. In places the sand subsoil has some of the characteristics of quicksand. In cultivated areas the surface layer, to a depth of 6 inches, is light-colored sand or light loamy sand.

Practically all of this soil was mapped east of Cordrays Mill, although a few small areas occur throughout the gray soil belt crossing the central part of the county. Here it is closely associated with swamp or Grady sandy loam, which occur in lower situations than Plummer sand, and with the deep phase of Norfolk sandy loam which occurs at a higher elevation and is better drained.

Areas of Plummer sand are flat or very gently sloping. Drainage is everywhere very poor. In many places this soil occurs in seepage areas in the surrounding land. The run-off in many places is removed by very slow percolation or evaporation.

In its present condition, this soil is not suited for cultivation. A very small part of the land is used for pasture, most of which affords very poor grazing. The native vegetation, which consists chiefly of slash and other scattered pines and a few water-loving hardwoods such as cypress, water oak, and black gum and an undergrowth of wire grass, broom sedge, and gall berry bushes should be allowed to remain. The pine is usually turpentined. The selling price of Plummer sand ranges from $3 to $6 an acre.

GRADY SANDY LOAM

To a depth varying from 2 to 4 inches, Grady sandy loam, in the virgin condition, is dark-gray loamy sand or sandy loam rich in organic matter. The subsurface layer, to a depth of 10 or 12 inches, is somewhat bluish gray or light-gray sandy loam. The upper part of the subsoil is drab-gray or bluish-gray sticky sandy clay slightly mottled in the lower part. It grades, at a depth of about 24 inches, to heavier, somewhat impervious sandy clay or clay loam material highly mottled with rust brown, brownish red, gray, and yellow. Under cultivation, Grady sandy loam is ash-gray or drab-gray sandy loam to the depth to which it is stirred by the plow.

This soil varies considerably in different areas and to some extent even in the same small area. The surface layer in the virgin soil may be lighter in color than typical, and in a few places a thin veneer of muck may cover it. The subsoil varies slightly in color, texture, and thickness.

Grady sandy loam, though not of much agricultural importance, occurs rather widely throughout the county, except on the divide near Holt and in a strip along the Randolph County line in the western part. It occupies limestone-sink depressions or lies along winding drainage ways which were formed by the joining of a series of these depressions. Many of these depressions are circular, although in places they narrow or broaden into a sinuous course forming sluggish drainage ways. They result from the solution of the underground rock. They range in depth from a very few feet to 20 feet, but the greater number are from 2 to 4 feet below the surrounding land. Many are continuously wet throughout the growing season and the greater part of the year. Grady sandy loam is characterized by poor surface drainage. In many places drainage is wholly subterranean or artificial.

Very little of this soil is cultivated. Artificial drainage is almost everywhere necessary, and although, in general, it can be accomplished, in many places it is difficult. A few of the larger areas are too deep to be drained. This soil, where sufficiently drained, produces fair crops of sugar cane and grows good pasture in favorable seasons if it is seeded to carpet grass, dallis grass, and Lespedeza. Corn, oats, and velvet beans can be grown under favorable conditions with some degree of success.

In its present condition more than 90 per cent of this soil in the county is grown up to oak, cypress, gum, May haw, and some slash pine, with an undergrowth of gall berry and sedges. Swamp maple, ash, elm, tulip poplar, beech, and other water-loving trees and plants thrive in areas along drainage ways. Grady sandy loam supports more gall berries, Christmas oak, and loblolly pine than does Grady clay loam. The land affords some grazing but by no means good pasturage unless it is drained and seeded.

It is very important that as much of the depressed areas as possible be drained, not only for the agricultural worth of this soil but more for the sanitary condition of the surrounding community.

GRADY CLAY LOAM

In the virgin condition the surface soil of Grady clay loam, to a depth varying from 2 to 4 inches, is dark-gray or almost black loam or silt loam rich in organic matter. This is underlain, to a depth of 6 or 8 inches, by a subsurface layer of drab-gray material varying in texture from silt loam to clay loam. The subsoil is light-gray, heavy, plastic, impervious clay mottled with red, yellow, and brown below a depth of 18 or 20 inches.

There are a number of minor variations of both the surface soil and subsoil. The surface soil in places may appear lighter in color than typical, and some small areas may have a surface veneer of muck. Similar variations occur in the subsoil. This soil is very intimately associated with Grady sandy loam, and the boundary lines separating the two soils at many places are arbitrarily drawn.

Grady clay loam occurs principally in the western part of the county and in the southern half of the eastern part. Some of the largest areas are near Leary and Turman. This soil occurs in situations similar to those covered by Grady sandy loam. Grady clay loam occupies the larger depressions, and most of it is partly or wholly surrounded by Greenville clay loam or Blakely clay loam.

This soil, like Grady sandy loam, is poorly drained on account of its position. Most of the areas serve as collection basins for the run-off from the surrounding lands. It is very similar in other drainage characteristics to Grady sandy loam, although the clay loam has a more impervious subsoil and remains wet the greater part of the year.

The native and present vegetation of this soil differ from those on Grady sandy loam only in that on the clay loam there is usually a greater proportion of cypress and gum and less pine and gall berries. Practically none of the Grady clay loam is now cultivated, but if drained it could be used for the production of corn, velvet beans, sugar cane, rice, and oats. It would be somewhat more difficult to drain than areas of the sandy loam because most of the clay loam occurs in deeper depressions and has a more tenacious and impervious subsoil. Even when drained, the heavy, sticky soil would be difficult to cultivate, and this soil could not be cultivated under so wide a range of moisture conditions as Grady sandy loam. Grady clay loam should remain in forest or should be drained and seeded to carpet grass for pasture.

SWAMP

Swamp, as mapped in this county, is not a definite type of soil but is land classed according to a soil condition. In swamp areas there are many variations in the soil, both in color and texture. In some places, a thin veneer of mucky material is present on the surface. Another rather common variation is the nearness of the plastic, mottled subsoil to the surface. The upper part of the subsoil may be entirely absent. Deposits of sand 2 feet thick are not uncommon, especially in Little Pachitla Creek swamp where the stream has considerable fall. In places the subsoil is rather bluish very plastic clay. As a result of deposits from adjacent uplands and from the smaller tributary streams, many minor variations occur near the borders of the

larger stream swamps. Small areas of somewhat higher islandlike elevations occur throughout the broader swamps along the larger streams, but their extent was not sufficient to justify their separation on the map.

Swamp occurs along Pachitla, Spring, Ichawaynochaway, and Chickasawhatchee Creeks. The areas range from very narrow strips along the smaller streams to areas more than a mile wide along the larger streams. Swamp is bounded on both sides and on the upper end by higher lands. The borders of most areas are sharply defined by banks ranging in height from 3 to 12 feet.

The swampy areas are naturally flat and wet except during dry periods when the higher parts become camparatively dry on the surface. The larger stream swamps are practically level on a transverse section, but on a longitudinal section the surface slopes sufficiently to make drainage possible. The streams are very tortuous and are filled in many places with logs, brush, and trash. By straightening these streams, much of the surface water could be removed. Present low prices of well-drained soils in this county seem to indicate the impracticability of this undertaking, but complete drainage of the swamps would not only reclaim some of the most fertile soil in the county but would improve materially the sanitary conditions of the entire region.

On account of its permanently wet condition none of the swamp is cleared or cultivated. It supports the original forest cover of oak, gum, swamp maple, pine, beech, and some bay, cypress, and magnolia. In most places a heavy growth of cane, brambles, and various kinds of vines and water-loving grasses cover the ground. Some of the more desirable timber has been removed, or is now being removed, although the greater part of it remains. In its present condition swamp is fitted only for the growing of timber.

SUMMARY

Calhoun County is in the southwestern part of Georgia. It has an area of 287 square miles or 183,680 acres. Except for the rolling area in the northwestern part of the county, the physiographic features are those of a low plain marked with numerous limestone sinks. Throughout the greater part of the county drainage is good, although considerable swamp occurs along the larger streams. Pachitla, Chickasawhatchee, and Ichawaynochaway Creeks are the principal streams and receive most of the drainage waters. Spring and Little Pachitla are less important creeks. All the streams have rather shallow winding channels.

Calhoun County was formed from the northern part of Early County in 1854, 37 years after the removal of the Indians. Twenty-five years later the population was about 7,000. At present the population is given as 10,225, all classed as rural. Arlington, a town of about 1,300 population, is the present county seat and the largest town in the county. Edison is the next town in size and importance.

Transportation facilities are good, especially in the southern and western parts of the county. Two railroads cross the county, with their junction at Arlington. Improved roads extend to all parts, and most of them are maintained in excellent condition throughout the year.

Markets are good for the staple products of the farms, although there is little local demand for truck and dairy products. Some produce which might easily be supplied by local farms is now imported.

The climate is mild and equable. Winters are short and mild, and summers are long, though not excessively hot. Snow is rare, though rather heavy frosts are common during January and February. Rainfall is usually well distributed throughout the year.

Farming is the principal industry of the county, although considerable lumbering and some turpentining are carried on. Cotton, corn, peanuts, oats, and velvet beans are the staple crops. The growing of pecans is a new and promising industry. Cotton, corn, and grain have been leading crops since the founding of the county.

The general agricultural depression of 1920 and 1921 and the radical changes incident to and following the advent of the cotton boll weevil resulted in the loss of much farm labor and many farms were abandoned. The result was agricultural depression and a sudden slump in land values. Farmers are now beginning to overcome this period of depression through a more general use of labor-saving machinery and better farming methods. More diversification and crop rotation is practiced now than ever before. Land values have begun to increase, although productive, improved, and favorably located farm land can now (1925) be purchased at prices ranging from $15 to $25 an acre.

The farm labor is sufficient to cultivate only about 80 per cent of the improved farm land of the county. Most of the farms are operated by tenants. Since 1880 farms have gradually become smaller, but during this time the percentage of farms operated by tenants has steadily increased from 63.9 per cent to 86.4 per cent.

The soils of Calhoun County are of coastal plain origin. Most of them have light sandy loam topsoils and sandy clay subsoils. Eleven series of soils, exclusive of swamp, are mapped. These include 16 distinct soil types and 4 phases.

The Carnegie, Tifton, Greenville, Orangeburg, Ruston, Norfolk, and Blakely soils are the principal agricultural soils of the county. Henderson stony sandy loam and Leaf sandy loam are comparatively unimportant, both in extent and agricultural value. Leaf sandy loam is the only terrace soil mapped. Plummer sand, the Grady soils, and swamp represent the poorly drained soils. They are of minor agricultural importance.

Greenville sandy loam is one of the most fertile soils in the county and is one of the very best producers of pecans and peaches, as well as of the common farm crops.

Greenville clay loam, locally known as "red clay land" or if pebbly as "red pimply land," and Blakely clay loam are the heaviest textured upland soils. They are well adapted to the production of the common farm crops and to pecans.

The sandy loams of the Orangeburg, Ruston, and Norfolk series are spoken of locally as the "gray sandy soils." They are adapted to the production of both common and special crops.

The sandy loams of the Carnegie and Tifton series are known locally as "gray pimply soils," as both soils contain pebbles. These are the best soils of the county. They are well adapted to both common

and special crops and are the best producers of cotton and pecans in the county.

The loamy sand members of the Greenville, Ruston, and Norfolk series are the lightest textured soils mapped. They are too light to produce good yields of the common farm crops. If irrigated and properly managed they are well adapted to the production of early truck crops.

Swamp is not a definite soil type but a soil condition. It is permanently wet, except in long dry periods. None of it is cleared or cultivated.

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[PUBLIC RESOLUTION—No. 9]

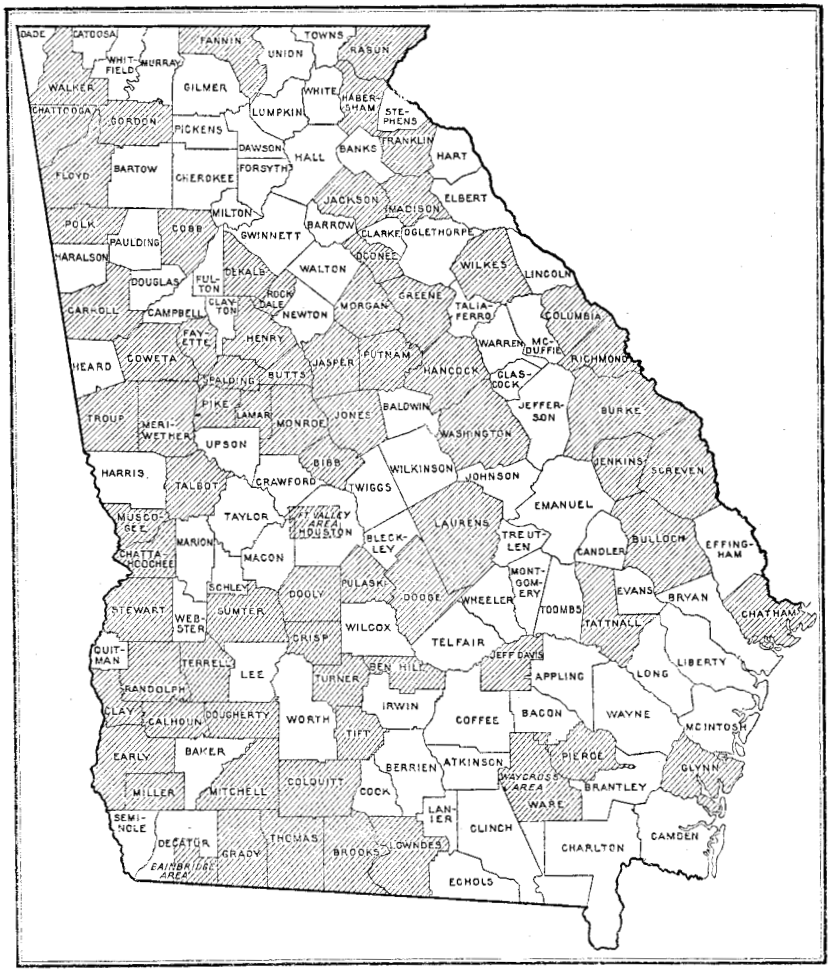
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

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, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]



Areas surveyed in Georgia, shown by shading

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