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Soil Survey
of
Jefferson County, Georgia

By
R. T. AVON BURKE, in Charge, S. W. PHILLIPS
J. W. MOON, R. WILDERMUTH
and A. L. GRAY

Bureau of Chemistry and Soils
In cooperation with the
Georgia State College of Agriculture

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SOIL SURVEY OF JEFFERSON COUNTY, GEORGIA

By R. T. AVON BURKE, in Charge, S. W. PHILLIPS, J. W. MOON, R. WILDERMUTH, and A. L. GRAY

COUNTY SURVEYED

Jefferson County is in the eastern part of Georgia (fig. 1). Louisville, the county seat, is 48 miles by highway from Augusta, 180 miles from Atlanta, and 120 miles from Savannah. The county is irregular in outline, with its greatest length north and south. It comprises an area of 532 square miles, or 340,480 acres.

The general physiography is that of a broad flat or undulating plain which has been dissected in many places by streams. The plain in general appears to have an even skyline, and the slope of 4 or 5 feet to the mile is not apparent. This plain is not continuous but is broken by the ramifications of a well-developed drainage system.

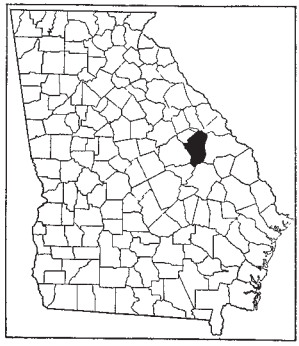

FIGURE 1.—Sketch map showing location of Jefferson County, Ga.

The surface features of the smoother parts of the county, which represent the remnants of the old plain, range from almost level to gently rolling, and the land lies favorably for farming operations. Some of the more level and smoother areas are west of Wrens, between Wrens and Louisville, and south of Ogeechee River. The southern part of the county lies at a lower elevation than the northern part, and the streams have not cut such deep channels. In many places small saucerlike depressions, or sinks, lie a few feet below the general surface level of the surrounding upland. They are conspicuous features in the surface relief, and all of them are poorly drained, water standing in some of them the greater part of the year. In many places the approach to the valleys, which range from a few feet to 100 feet below the general level of the uplands, is gradual. The steeper slopes are along Rocky Comfort, Big, and Reedy Creeks, but they are not so abrupt as the slopes along Ogeechee River.

The greater part of the county is naturally well drained, only the sinks, some of the flatter upland areas, the soils on the first bottoms, and those on the flatter parts of the terraces requiring artificial drainage. The drainage pattern may be described as dendritic, and small streams reach practically every farm.

The land has a general eastern and southern slope. It attains a maximum elevation of 495 feet in the northwestern corner and gradually slopes down to 234 feet at Wadley in the southern part.

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Jefferson County was originally forested with longleaf pine, rosemary (shortleaf) pine, and some hardwoods. Most of the original timber was removed long ago, and the present forest consists of second-growth pine and scrub oak, with some red oak, white oak, live oak, hickory, dogwood, beech, elm, and maple. The remaining original growth is largely confined to the larger stream valleys and consists largely of sweetgum, water oak, black gum, sycamore, magnolia, and bay. In the upland depressions, sweetgum seems to predominate, although in a few of the wetter places cypress is the main growth. In the southern part of the county, wire grass is conspicuous.

Jefferson County was organized in 1796 and named for Thomas Jefferson. Settlements in this part of the country were made as early as 1752, when the area was included in St. George's Parish. The early settlers were Scotch-Irish, and these were followed by Irish coming directly or indirectly from the north of Ireland. It is estimated that 200 families located in the vicinity of the present site of Louisville. In 1810 the population of the county included 3,775 free persons and 2,336 slaves.

According to the 1930 Federal census, the population of the county is 20,727, all of which is classed as rural, 15,208 being classed as rural-farm, and 5,519 as rural-nonfarm. Of the total population, 12,042 are Negroes. The density of the population is 32.1 persons a square mile. Most of the present population are descendants of the early pioneers and slaves. The principal towns and local markets are Louisville, Wadley, Wrens, Stapleton, Avera, and Matthews. Louisville, the county seat, is connected by the Louisville and Wadley branch with the Central of Georgia Railway at Wadley. The Georgia & Florida Railway and the Savannah & Atlantic Railway pass through Wrens, and the Georgia & Florida through Stapleton and Avera. Cotton bought by local buyers is shipped to Augusta and Savannah compresses and distributed from these points. Practically all the corn grown is consumed on the farms, though a small quantity is shipped out, but probably more is shipped into the county in the form of corn meal, poultry feed, and commercial livestock feed. All the hay and roughage are consumed on the farms where produced. Hogs and poultry are collected in car lots and shipped to Georgia markets or to northern and eastern cities, wherever the best prices can be obtained. A large quantity of milk and cream goes to Augusta and Savannah, and eggs are shipped to Atlanta, Savannah, and Macon, Ga., and to towns in Florida.

Jefferson County has an excellent system of public roads, most of which are of sand-clay construction, extending to all sections. A State and National concrete highway crosses the county from north to south and facilitates trucking of heavy produce to more remote markets. A paved road extends from Louisville westward.

The public schools are consolidated, 6 being classed as accredited high schools and 4 as junior high schools. All have school bus service. Churches are conveniently located. Most farms are reached by rural free delivery of mail, and all sections have adequate telephone service.

Lumber manufacturing at present is restricted to a planing mill and sawmill at Louisville, a veneer plant and planing mill at Wadley, and a number of portable sawmills throughout the county.

The water supply is obtained from surface, deep, and artesian wells. The surface water supply is reached at a depth of only a few feet. The deep wells range from 40 to 165 feet in depth and the artesian wells from 160 to 300 feet. Wrens and Stapleton have deep wells of excellent water, and deep wells are on many of the farms. Louisville, Wadley, Bartow, and many farms in the vicinity of Rocky Comfort Creek and Ogeechee River have flowing wells. The well at Louisville is about 165 feet deep. No difficulty is experienced in obtaining plenty of good water for the homes and for livestock.

CLIMATE

The climate of Jefferson County is mild. The county is situated in a latitude where the winters are mild, though characterized by recurrent cold snaps frequently preceded by rain and followed by fair and pleasant weather, and the summers are long and hot. Farm work can be performed throughout the entire year, being interrupted only by heavy rains.

The annual mean precipitation of 45.65 inches is ample and fairly well distributed throughout the year. The most rainfall occurs during the summer and the least during the fall. During the winter and early spring much of the rain is accompanied by northeast or southeast winds.

The climatic conditions are about the same in all parts of the county, as differences in surface relief are not great enough to cause differences of climate. March 25 is given as the average date of the last killing frost, and November 6 is the average date of the first, giving an average frost-free period of 226 days, which makes possible the production of a wide range of crops. Frost has been recorded as late as April 26 and as early as October 11.

Most of the small grains, such as oats, wheat, and rye, are usually sown in the fall and make some growth during the winter. Sometimes a combination of crops, more especially oats or rye with hairy vetch and Austrian peas, is grown as a cover crop for protection of the soil during the winter and for soil improvement. In addition to the field crops grown, the more frost-resistant vegetables, such as collards, turnips, cabbage, lettuce, onions, radishes, and other garden crops, are produced.

Table 1, compiled from the records of the United States Weather Bureau station at Louisville, gives the more important climatic data for Jefferson County.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Louisville, Jefferson County, Ga.*

[Elevation, 259 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1931)	Total amount for the wettest year (1912)	Snow, average depth
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
December	47.9	79	7	3.24	5.18	3.99	0.2
January	47.3	80	11	3.44	2.68	5.66	.2
February	49.0	85	−2	4.49	2.57	4.92	1.0
Winter	48.1	85	−2	11.17	10.43	14.57	1.4
March	57.0	92	19	4.32	2.38	7.65	.0
April	63.9	93	29	3.16	1.03	7.22	.0
May	72.8	99	40	3.46	4.27	3.93	.0
Spring	64.6	99	19	10.94	7.68	18.80	.0
June	78.9	103	47	4.43	.62	8.40	.0
July	81.0	104	57	5.72	3.18	4.18	.0
August	80.0	101	58	4.93	7.86	4.01	.0
Summer	80.0	104	47	15.08	11.66	16.59	.0
September	75.6	99	42	3.31	.66	6.25	.0
October	63.0	92	28	2.66	.34	2.87	.0
November	56.2	84	18	2.49	.06	2.10	.1
Fall	64.8	99	18	8.46	1.06	11.22	.1
Year	64.3	104	−2	45.65	30.83	61.18	1.5

AGRICULTURAL HISTORY AND STATISTICS

The agricultural history of Jefferson County began as early as 1752, when land grants were made for the purpose of facilitating settlement of the country then known as "St. George's Parish."

The early pioneers subsisted largely on the wild life that was then so abundant. Later, poultry, hogs, cattle, and work animals were brought in, lands were cleared, and such crops as corn, wheat, oats, potatoes, and garden vegetables were produced. This early farming might be termed a subsistence type of agriculture. In time, as the country became more generally settled, cotton was added to the crops grown and ultimately became the dominant crop. When the early farmer, or planter, as he was then known, sold his cotton crop he usually bought more slaves and cleared more land, and the individual holdings became very large farms or plantations. This condition existed up to the time of the Civil War, which brought about a radical change in economic conditions. The slaves were freed, and farming operations began again with hired labor. The lack of capital resulted in the adoption of the tenant system of farming, and this has prevailed to the present time.

Cotton and corn are now the principal crops. These are supplemented to some extent by leguminous forage crops (commonly cowpeas) and to much less extent by oats, wheat, peanuts, and tobacco. Nearly every farm owner has a small garden in addition to a few

nut and fruit trees, but very few of the tenant farmers have either. Cotton, peanuts, and tobacco are the chief cash crops.

According to the 1880 census report, corn was grown on 42,335 acres in 1879 and cotton on 41,367 acres. In 1889 the acreage in cotton was increased to 46,624 and that in corn was reduced to 39,482. In 1899 cotton was grown on 41,014 acres and corn on 44,282 acres. In 1909 cotton reached its maximum acreage, being grown on 63,256 acres, and corn was grown on 51,039 acres. In 1919 corn attained its maximum acreage of 53,324 acres, and the cotton acreage was reduced to 62,745 acres. The 1930 census reports corn grown for grain on 47,789 acres and cotton on 50,675 acres in 1929. The total production of corn was 456,303 bushels and of cotton was 20,483 bales. The reduction in acreage may in part be attributed to the cotton bollweevil. Cotton was and still is the chief income crop of the county. It was formerly grown to the disadvantage of crops other than corn. Since the advent of the cotton bollweevil some crop readjustment has taken place for the purpose of maintaining or increasing the productive capacity of the soils through the use of legumes and to some extent by cover crops.

Until 1919 oats were the dominant small-grain crop, but the 1920 census report shows that wheat was grown on a larger acreage in 1919, 3,455 acres being reported. The flour mill located at Wrens may have stimulated production, as it obviated the long haul to Augusta. The 1930 census reported oats threshed from 391 acres in 1929 and cut and fed unthreshed from 3,345 acres. Wheat was threshed from 1,565 acres. Practically all the wheat is ground for flour, and most of the oats are threshed for grain or cut and fed unthreshed, although oats from a small acreage are used as cover crops and turned under in the spring. A considerable quantity of oats is shipped into the county each year, as not enough are produced to supply the local demand.

Peanuts were grown on 3,385 acres in 1929 and yielded 69,130 bushels. Peanuts are harvested for the nuts which are shipped to shellers in Savannah and other points in Georgia. White Spanish is the favorite variety. Peanuts are drilled in corn rows or are planted alone in fields, and they are either harvested or "hogged off", the tops being used largely for forage.

Hay was cut from 4,009 acres in 1929 and yielded 1,798 tons. Annual legumes constitute most of the hay crop and consist principally of cowpeas, supplemented by soybeans and velvetbeans, as summer legumes, and hairy vetch and Austrian winter peas, as winter legumes.

Sweetpotatoes grown on 658 acres yielded 84,379 bushels, and 52 acres of potatoes yielded 3,312 bushels.

Tobacco was grown on 207 acres in 1929 and yielded 167,754 pounds. Considerable interest has developed in the production of White burley tobacco in the last few years. It was formerly shipped to warehouses in Valdosta, Vidalia, Metter, and other Georgia points for sale, but, as selling associations are now being formed in this section, future crops will probably be sold by producers from their own warehouses. At the present time (1930) cooperative marketing associations are being organized in this district.

According to the 1930 census report, sugarcane was grown for sirup on 307 acres in 1929 and yielded 36,975 gallons. This represents a considerable acreage reduction as compared with 1909, when 817 acres yielded 59,345 gallons.

The 1930 census reports 10,756 peach trees, 1,787 apple trees, 1,470 pear trees, 213 plum and prune trees, and 9,873 pecan trees in the county.

The same census reports 203 horses, 3,801 mules, 3,222 cattle, and 10,367 swine.

Most of the cattle are of the dairy breeds, mainly Jersey grades, although a few beef cattle are fed. One or more dairy cows are kept on every well-established farm to meet the home demand for milk and butter. When the herds are large enough the excess milk and cream is sold on nearby markets. The value of butter, cream, and whole milk sold in 1929 was $32,591.

The raising of hogs for a home supply of meat has always been a necessary part in the agriculture of this section, but in recent years much interest has developed in raising an additional supply for market, and several carloads of hogs are shipped to more or less remote points each year. The total income from cooperative hog sales from 1927 to 1930 amounted to $45,919.14.

The 1930 census reports 158,344 chickens raised in 1929, with a value of $110,841. The interest in poultry has increased greatly within the last 5 years, and, in addition to the great number shipped in car lots, more have probably left the county by express and truck. The county agent reports the value of car-lot shipments from 1925 to June 1, 1930, as $119,048.97.

According to the 1930 census report, the total expenditure for fertilizers in 1929 was $387,461 on 2,364 farms. Most of the fertilizers used are ready mixed, although some farmers mix their own, particularly when they exchange cottonseed for meal and when the spread in prices of ingredients is wide. Most of the fertilizer used is a 4–8–4 [1] mixture, although considerable 2–9–3 is used. Acre applications range from 200 to 800 pounds. A rather large quantity of superphosphate (16-percent acid phosphate), a much smaller quantity of sodium nitrate, and little or almost no crushed limestone are used.

Nearly all the laborers employed on the farms are colored. They are usually paid $20 a month, and day labor can be procured in most localities for $1 or $1.25. The total expenditure for labor in 1929 is given as $101,830 on 663 farms.

The farms range in size from 10 to 3,000 acres, but most of them are between 20 and 175 acres. The 1930 census reported 2,580 farms with an average size of 90.8 acres. The number of farms reported by the 1880 census was 1,299. The number increased to 3,258 in 1920 but decreased in 1930. This reduction is attributed to the influence of the cotton bollweevil whose ravages became apparent in 1920.

The 1930 census reports 561 farms operated by owners, 2,006 by tenants, and 13 by managers. Of the 2,006 tenants, 196 are cash tenants and 1,810 are share tenants. Under the share-rental system the most common plan is for the landlord to supply the land, imple-

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

ments, work animals, feed, and one-half the cost of the fertilizer, the tenant supplying all the labor and paying for half the fertilizer, and each receives half the crops produced.

Most of the farms have a farm dwelling, tenant houses, barns, cribs, and sheds. Some of the farmers have tractors and binders, and nearly all have disk and turning plows, sweeps, cultivators, and harrows. Threshing outfits and hullers are usually hauled from place to place, and grain, peas, beans, and other crops are threshed for a toll of one-eighth of the crop. Many farms or plantations throughout the county are equipped with tenant houses as the only dwellings, the owners living in nearby towns.

Land values have declined in recent years, owing to the general economic depression.

SOILS AND CROPS

Jefferson County contains a large number of soils which differ in texture, color, and structure. Most of the soils are dominantly sandy in the surface soil and have sandy clay subsoils. Locally some areas of sand soils occur, particularly in the northern part of the county, which approaches the well-known sand-hill region. The differences in the soils are caused by a number of factors, and in many places the character of the surface soil and subsoil is influenced to a large extent by the underlying material—whether it be sandy, clayey, or marly. It is true, however, that several different soils may have the same parent material but differ in color, texture, and structure, owing to differences in the degree of oxidation, aeration, and drainage. The soils which have red or brown surface soils and comparatively heavy subsoils, classed as the Magnolia and Greenville soils, are derived from beds of rather heavy clays or some impure marls or soft limestones, whereas the soils with the more sandy subsoils have been derived from beds of unconsolidated sands and sandy clays.

A large part of Jefferson County has an undulating or gently rolling surface relief and lies favorably for general-farming purposes. About two-thirds of the land is open and clear, and the remainder is covered with trees and brush. With the exception of the sinks, a few flat areas, and some of the low-lying land in the stream valleys, all the soils are naturally well drained. In recent years a rather large acreage of the once cultivated land has been abandoned, and on such areas broomsedge, briers, and bushes grow. In most places these areas represent soils of low productivity, but in other places good soils have been "turned out" as a result of adverse economic conditions.

Jefferson County includes a large acreage of as good soils as any in the coastal-plain area of Georgia, and the range of their adaptabilities is wide, making possible a diversified agriculture. The light sandy soils with yellow sandy clay subsoils are adapted to the production of bright-leaf tobacco and peanuts.

Cotton has been grown in Jefferson County since the days of early settlement and has always been the chief cash crop, as both climatic conditions and soils favor the production of this crop, its culture is well understood, and the farmers have been very success-

ful in its production. It has been a profitable crop, it can be stored or marketed at any time, and it will probably continue to be the dominant cash crop until some other product is introduced that will better meet all conditions.

Peanuts are considered a cheap feed for hogs, and increasing interest is being taken in their production. They are considered a profitable crop and suited to much of the land in the county.

The tobacco grown is said to be of excellent quality, and much land in Jefferson County is suitable for its production.

Crops consisting generally of combinations, such as vetch, oats, and rye, are used as cover crops and are turned under in the spring or cut green for hay. Some land is also devoted to Austrian winter peas.

As the agriculture of Jefferson County is largely dependent on cotton and as this crop is grown to greater or less extent on all the well-drained soils, no agricultural grouping of soils based on crops can be made. A grouping of the soils, however, can be made on their characteristics as regards color, texture, structure, drainage conditions, and relation to crops. The soils of the county may be divided into two main divisions, based on drainage: (1) Well-drained soils and (2) poorly drained soils.

The well-drained soils occupy approximately three-fourths of the total land area and, with the exception of a few small steeply sloping areas, have favorable surface relief, that is, are undulating or gently rolling. They are naturally well drained in both the surface soils and subsoils. The open texture of the surface soils allows ready absorption of the rainfall, and the subsoils are of such character as to allow fairly free movement of water and at the same time retain an abundant supply of moisture for the growth of crops under normal rainfall. No soils in the State are more easily tilled than the greater part of the soils in this county. Improved farm machinery can be operated advantageously and all the lighter textured soils can be efficiently worked with light farm implements.

The gray or light color of the sandy soils indicates the lack of organic matter, especially in those areas where clean cultivation of cotton has been carried on for a number of years. In the forested areas the surface soils have a slight veneer of leaf mold or enough organic matter in the first 2 or 3 inches to produce a dark color, but this soon disappears with cultivation. All the soils are more or less acid.

In the following pages the soils of Jefferson County are described in detail, and their agricultural relationships are discussed; their location and distribution are shown on the accompanying soil map; and their acreage and proportionate extent are given in table 2.

TABLE 2.—*Acreage and proportionate extent of soils mapped in Jefferson County, Ga.*

Type of soil	Acres	Per-cent	Type of soil	Acres	Per-cent
Norfolk sandy loam	26,304	7.7	Ruston loamy sand	5,312	1.5
Norfolk sandy loam, deep phase	17,664	5.2	Ruston sand	9,920	2.9
Norfolk coarse sandy loam	4,224	1.2	Cuthbert sandy loam	2,368	.7
Norfolk loamy sand	4,992	1.5	Cuthbert sandy loam, mixed phase	2,112	.6
Norfolk sand	20,352	6.0	Cuthbert coarse sandy loam	960	.3
Marlboro sandy loam	7,936	2.3	Cahaba loamy sand	1,856	.6
Tifton sandy loam	16,000	4.7	Greenville sandy loam	23,168	6.8
Tifton sandy loam, shallow phase	2,560	.8	Greenville sandy loam, hilly phase	1,216	.4
Kalmia coarse sandy loam	1,216	.4	Greenville clay loam	6,208	1.8
Kalmia sandy loam	2,176	.6	Greenville loamy sand	10,240	3.0
Kalmia sand	4,352	1.3	Blakely loam	3,776	1.1
Magnolia sandy loam	29,696	8.7	Grady sandy loam	14,592	4.3
Magnolia sandy loam, deep phase	6,464	1.9	Plummer sandy loam	4,352	1.3
Magnolia sandy loam, mixed phase	17,344	5.1	Myatt sandy loam	832	.2
Orangeburg loamy sand	4,224	1.2	Meadow	10,496	3.1
Ruston sandy loam	28,608	8.4	Swamp	34,944	10.3
Ruston sandy loam, deep phase	4,224	1.2			
Ruston sandy loam, shallow phase	9,792	2.9	Total	340,480	

WELL-DRAINED SOILS

The group of well-drained soils may be divided into three subgroups. The first includes soils with gray surface soils and yellow subsoils, the second includes soils having gray or light-brown surface soils with reddish-yellow or bright-red subsoils, and the third includes soils having red or reddish-brown surface soils and red or dark-red subsoils.

SOILS WITH GRAY SURFACE SOILS AND YELLOW SUBSOILS

These soils comprise the Norfolk group and include all the Norfolk, Marlboro, Tifton, and Kalmia soils in the county. They are well distributed over all parts of the county. They do not occur in large broad areas but are interrupted by members of other soil groups.

Most of these soils have light-colored and light-textured surface soils, and the subsoils are more friable than those of the soils of the other upland groups. As all these soils warm up early in the spring, they are the first on which tillage operations can be begun, and they are also the first to be cultivated after heavy rains. Although these soils are generally deficient in organic matter and most of the plant nutrients, they possess such good physical properties that they readily respond to commercial fertilizers and produce the most profitable crops of any soils in the county. These soils also show increased yields for several years after a green-manure crop has been turned under.

The crops grown on the soils of this group consist mainly of cotton and corn, together with small acreages of forage crops, grain, peanuts, and tobacco. The Tifton and Marlboro soils are the premier soils of the county and also of the State. They are especially well adapted to cotton and produce the heaviest yields consistently for a longer period of time than any other soils. Norfolk sandy loam and its deep phase are recognized as being especially well suited to the production of bright tobacco and peanuts, not only in Georgia but in Alabama and the Carolinas, and, if tobacco growing

develops extensively in Jefferson County, it may be expected to develop on these soils. These are also good trucking soils, but their remoteness from markets precludes such utilization at present.

Norfolk sandy loam.—The surface soil of Norfolk sandy loam consists of a 3- to 8-inch layer of light-gray sand or loamy sand, which grades into grayish-yellow sand or loamy sand. This is underlain, at a depth ranging from 15 to 20 inches, by sandy clay which is friable and crumbly, of uniform yellow color, and in most places extends to a depth ranging from 30 to 40 inches, where it passes into sandy clay mottled with yellowish brown, reddish brown, yellow, and light gray.

This soil occurs in all parts of the county but is more extensively developed in the eastern and southern parts, particularly in the vicinity of Dry Creek School, near Moxley, and south of Williamson Swamp Creek. Other areas are near Oak Grove Church, near Avera, and northwest, east, and southeast of Wrens.

This soil occupies the tops of ridges and the lower slopes around the heads of streams. It is estimated that three-fourths of the total area is cleared, and the rest of the land supports second-growth pine and some scrub oak. Only about one-half of the cleared land is used for crops, and the remainder is turned out or abandoned. About 50 percent of the cultivated land is used for cotton, about 30 percent for corn, about 5 percent for forage crops, and the rest is in oats, peanuts, tobacco, sweetpotatoes, sugarcane, and garden crops. Tenant farmers rarely plant any crop other than cotton and corn, and they devote about the same acreage to each. Acre yields of cotton range from one-third to one-half bale; corn, from 12 to 40 bushels; peanuts, from one-third to one-half ton; cowpeas for hay, from 1 to 1½ tons; tobacco, from 800 to 1,000 pounds; and sugarcane, from 100 to 250 gallons of sirup. Yields in excess of these are reported under more efficient individual management and where heavy applications of commercial fertilizer are made.

Norfolk sandy loam has a wide range of usefulness. It can be used for general farm crops but is particularly well adapted to such special crops as cotton, peanuts, tobacco, pecans, fruits, and vegetables. Although most of this soil, especially where used for the production of cotton over a long period, is leached of both organic matter and mineral plant nutrients, it can be brought to a state of good productivity by turning under green-manure crops or by the addition of barnyard manure.

Included with Norfolk sandy loam, as mapped in the southern part of the county, are a few areas of Norfolk gravelly sandy loam. Such areas have white and stained small rounded quartz gravel scattered over the surface. These spots have about the same agricultural value as the typical soil and are shown on the map by gravel symbols.

Norfolk sandy loam, deep phase.—Norfolk sandy loam, deep phase, differs from the typical soil in having a greater thickness of surface sand or loamy sand over the underlying sandy clay subsoil. The true subsoil is reached at a depth ranging from 20 to 40 inches below the surface. The subsurface layer is the same in color and texture as in typical Norfolk sandy loam. In the extreme southern part of the county the subsoil is heavier.

In the northern part of the county, Norfolk sandy loam, deep phase, is generally associated with the typical soil, occurring near the heads of streams and in the flatter areas. In the southern part most of it occurs on the low ridges. This deeper soil has an agricultural value for general farm crops between that of typical Norfolk sandy loam and Norfolk loamy sand, being less productive than the typical sandy loam and more productive than the loamy sand.

Soil of this phase is most extensive in the southern part of the county around Wadley and in the northern part around Wrens.

Norfolk coarse sandy loam.—The surface soil of Norfolk coarse sandy loam consists of whitish- or ash-gray coarse sand or loamy coarse sand, from 2 to 4 inches thick. It is underlain by yellow gritty loamy coarse sand which in most places extends to a depth ranging from 12 to 15 inches, where it rests rather abruptly on yellow light coarse sandy clay. This subsoil layer is uniformly colored, is very shallow, and in few places exceeds 5 inches in thickness. It grades into a dominantly yellow compact and light coarse sandy clay containing mottlings of brown, pink, red, and light yellow.

Norfolk coarse sandy loam occurs only in the extreme southern part of the county, along the Johnson County line. It has a gently rolling or undulating surface relief and occupies the crests of the drainage divides.

Norfolk coarse sandy loam in this county is not so typical or so productive as in many other localities. Here, it has a value for general farm crops intermediate between that of Norfolk sandy loam, deep phase, and Norfolk loamy sand. The surface soil is loose and open and in most places severely leached of organic matter and mineral plant food.

About 75 percent of the land is cleared, and the rest supports a growth of longleaf and second-growth pine. About one-half of the cleared land is used for crops, and the rest is turned out or abandoned. All this soil occurs in the so-called "wire-grass section" of the county. Where cultivated, the land is used principally for the production of cotton and corn, supplemented occasionally with crops of cowpeas and oats. Sometimes velvetbeans and peanuts are planted between the corn rows. Cotton occupies about 40 percent of the cultivated acreage, corn about 50 percent, and hay and forage crops the remainder.

Norfolk loamy sand.—The surface soil of Norfolk loamy sand consists of a layer of gray or brownish-gray loamy sand from 3 to 8 inches thick, grading into grayish-yellow loamy sand which extends to a depth ranging from 10 to 15 inches, where it passes into yellow loamy sand becoming slightly sticky and decidedly loamy at a depth ranging from 30 to 36 inches.

This soil is very inextensive and is restricted largely to the southern part of the county south of Louisville, particularly east and northeast of Wadley, in the vicinity of Bartow, and near Moxley. A few small isolated areas lie north of Louisville. The soil occurs in flat or undulating areas, most of which lie near the smaller watercourses or depressions.

Norfolk loamy sand is slightly more productive than Norfolk sand but not quite so productive as Norfolk sandy loam, deep phase. It has a higher content of organic matter, and crops do not suffer to the same degree during dry spells as on Norfolk sand. Only about

50 percent of this soil is under cultivation, and the rest supports second-growth pine and some oak. Where cultivated, cotton occupies about 40 percent of the land, corn about 50 percent, and the remainder is in forage crops and grain, particularly oats. Acre yields of cotton range from one-third to one-half bale, corn from 12 to 35 bushels, and forage crops from three-fourths to 1 ton, depending on the amount of fertilizer applied. This is an excellent soil for the production of early truck crops, but its remoteness from markets precludes such use at present.

Norfolk sand.—Norfolk sand consists of a 2- to 8-inch layer of gray or yellowish-gray sand resting on yellow or pale-yellow medium sand which in most places extends to a depth of more than 3 feet. The surface soil and subsoil are in general loose, open, and incoherent. Where covered with forest the surface soil is darker in the first 1 to 3 inches, and it is also darker in local depressions and in some places near the watercourses.

Included with this soil as mapped are some areas of Norfolk coarse sand which has an ash-gray or gray surface soil and a pale-yellow subsurface soil having a coarse sand texture. This included soil is restricted to the extreme southern part of the county where it occupies the ridges, low knobs, and slopes.

Norfolk sand occurs in all parts of the county, being typically developed near Postoak School, Anderson School, Springfield Church, Bethlehem Church, near Stapleton, and at other places.

Not more than 20 percent of the land is under cultivation, and the rest supports second-growth pine or scrub oak or consists of abandoned land. Much of this land should be reforested.

Where cultivated this soil is used in the production of general farm crops, cotton occupying about 50 percent of the cultivated area and corn about 30 percent, with the remainder being devoted to tobacco, peanuts, and forage crops. The yields produced are slightly less than those on Norfolk loamy sand, and, like that soil, Norfolk sand is especially well adapted to the production of early truck crops. Tobacco yields are usually small, but the bright color of the leaf is desirable.

Marlboro sandy loam.—Marlboro sandy loam is gray or brownish-gray fine or medium sandy loam to a depth of about 4 inches. It passes into grayish-yellow or yellow sandy loam which, at a depth ranging from 6 to 10 inches, grades into sticky heavy sandy clay of deep-yellow or faintly reddish yellow color. This material extends to a depth ranging from about 24 to 30 inches where it passes into rather heavy sandy clay containing reddish-brown mottlings. As depth increases, red, brown, purple, yellow, and gray mottlings occur. The surface soil is much heavier, shallower, and more brown than that of the Norfolk soils, and in many places plowing turns up the underlying yellow or reddish-yellow sandy clay. Included with this soil as mapped are a few spots of Marlboro fine sandy loam which differs from the sandy loam in being finer in texture, but it has about the same agricultural value.

Marlboro sandy loam is one of the important soils of the county, and most of the land is under cultivation. It is developed principally northwest of Wrens, north of Bartow, south of Wadley, east of Eden Church, and east of Clarks Grove Church. It occupies

flat or slightly undulating areas and can be handled economically with all kinds of labor-saving machinery.

Probably 95 percent of the land is under cultivation, and the remainder supports a stand of second-growth pine. Where cultivated the soil is used principally for cotton which occupies about 60 percent of the cultivated acreage. Corn is grown on about 25 percent of the cultivated land, forage crops on 10 percent, and oats on about 5 percent. Acre yields of cotton range from one-half to 1 bale, corn from 25 to 60 bushels, forage crops from 1 to 1½ tons, oats from 30 to 60 bushels, and wheat from 15 to 35 bushels, depending on farm management and the amount of fertilizer applied. This is one of the strongest soils in the county for general farm crops, and its productivity can be easily maintained or increased by turning under green-manure crops.

Tifton sandy loam.—The surface soil of Tifton sandy loam, locally known as "pebbly land", consists of gray or brown loamy sand to a depth of about 6 inches, grading into brownish-yellow loamy sand or sandy loam, which extends to a depth of about 12 inches. The subsoil is rather heavy deep-yellow sandy clay which, at a depth ranging from 24 to 30 inches, passes into slightly compact and in places stratified yellow sandy clay containing mottlings of red and brown. In most places this layer is very thin, in few places being more than 10 inches thick. It represents a transitional layer between the subsoil proper and the underlying parent material which is variegated in color, consisting of yellow, red, brown, and gray intermingled throughout the layer. The lower layers are not so sticky but are harder and more brittle. Over the surface of this soil and mixed with the surface soil and to less extent with the subsoil are conspicuous quantities of small rounded iron concretions or accretions, together with some angular iron-incrusted fragments. Included with this soil as mapped are a few acres of Tifton sandy loam, deep phase. The only difference between this soil and the typical material is the thickness and lighter texture of the surface soil which in places extends to a depth of more than 20 inches before the sandy clay subsoil is reached.

Tifton sandy loam is an extensive soil, and most of it is under cultivation. Little or none of it is forested. The principal areas are in the vicinities of Stapleton and Atwell, east of Wrens, northwest of Wadley, around Moxley, and near Walton Grove Church, and the soil also occurs in other places throughout the county. It occupies the higher broad gently sloping ridge crests and is everywhere well drained.

Tifton sandy loam is considered one of the strongest soils in the county for the production of cotton, although it is also well adapted to general farm crops. In places, particularly in the vicinity of Stapleton, cotton is the exclusive crop. In other sections it is used for more general farming which consists of the production of cotton and corn, principally, supplemented by forage crops, grain, and peanuts. Cotton occupies about 60 percent of the cultivated acreage, corn 25 percent, and forage crops, grain, and peanuts the rest. Cotton yields range from one-half to 1 bale an acre, corn from 30 to 50 bushels, forage crops from 1 to 1½ tons, and peanuts from one-third to one-half ton. According to reports of farmers on this soil, very

consistent yields of crops are obtained in either extreme wet or dry seasons. In some places the presence of a large quantity of iron concretions and iron crust in the surface soil is said to be wearing on farming implements, but over the greater part of the soil the small rounded pebbles are not objectionable.

Tifton sandy loam, shallow phase.—Tifton sandy loam, shallow phase, differs essentially from typical Tifton sandy loam in having a more shallow surface soil and a less uniform subsoil. The surface material is variable in color, ranging from light gray to brown, and it ranges in texture from sandy loam to clay loam. The subsoil ranges from deep-yellow sticky sandy clay to reddish-yellow or light-red hard but brittle sandy clay. Soil of this phase represents Tifton sandy loam that has been subjected to wash or sheet erosion, and in many places on slopes the underlying variegated sandy clay is exposed. Most areas of this soil occur on slopes or knobs associated with the smaller streams or intermittent drainageways. A conspicuous amount of iron concretions or accretions and angular ironlike incrustations occur over the surface.

Tifton sandy loam, shallow phase, is of very small extent, and most of it is associated with typical Tifton sandy loam. It is not nearly so productive as the typical soil and is more difficult to work because of the presence of the hard material in places near the surface. Greater effort should be made to protect the slopes from excessive wash.

Kalmia coarse sandy loam.—The surface soil of Kalmia coarse sandy loam consists of a 4-inch layer of gray or dark-gray coarse or medium loamy sand grading into grayish-yellow coarse loamy sand which extends to a depth ranging from 12 to 20 inches. The subsoil is yellow friable coarse sandy clay which becomes compact and heavier with depth and between depths of 36 and 50 inches is mottled with brown and reddish brown. Over the surface and throughout the soil mass is a noticeable quantity of small quartz gravel.

This is one of the inextensive soils of the county. Nearly all the land is cleared, but not all the cleared land is under cultivation. Where forested, the tree growth consists of second-growth pine, together with some white, red, and water oak, sweetgum, and maple. This soil occurs only on the terraces or second bottoms of Ogeechee River. About 60 percent of the land is under cultivation, and the rest is in pasture, abandoned fields, or forest. Where cultivated it is used principally for the production of cotton which occupies about 40 percent of the land. Corn is grown on about 50 percent and forage crops and oats on about 10 percent. Cotton yields from one-third to one-half bale an acre, corn from 12 to 30 bushels, oats from 15 to 25 bushels, and forage crops from one-half to 1 ton. This soil should have a productive value similar to that of Norfolk sandy loam, and under efficient management it could be developed into a productive soil.

Kalmia sandy loam.—The surface soil of Kalmia sandy loam consists of a layer of gray or brownish-gray loamy sand about 5 inches thick, grading into grayish-yellow or pale-yellow loamy sand which extends to a depth ranging from 8 to 15 inches. The subsoil is yellow friable sandy clay of uniform color, which extends to a

depth ranging from 24 to 36 inchess, where it is underlain by a splotched or variegated layer of brown, yellow, and gray sandy clay.

This soil occurs on the terraces or second bottoms of Ogeechee River, Rocky Comfort Creek, and other creeks. The greater part of the land is under cultivation, and the rest supports a forest growth similar to that on Kalmia coarse sandy loam. The soil is used for similar crops as those grown on the coarse sandy loam, but yields are slightly higher on the sandy loam.

Included with this soil on account of their small extent, are a few spots of Kalmia fine sandy loam, Augusta sandy loam, and Augusta fine sandy loam. Kalmia fine sandy loam is developed on the terraces of Ogeechee River, whereas the Augusta soils are developed not only on the terraces of Ogeechee River but along Brier and Reedy Creeks.

Kalmia sand.—Kalmia sand consists of gray or slightly brownish gray loamy sand to a depth of about 4 inches. This material grades into grayish-yellow loamy sand or sand and, at a depth of 10 or 12 inches, passes into pale-yellow medium sand which in most places extends to a depth of more than 3 feet. This is the most extensive second-bottom or terrace soil in the county. It is developed on terraces of Ogeechee River and the larger streams. Included with mapped areas of this soil, on account of their small extent, are a few spots of Kalmia fine sand.

Nearly all the Kalmia sand is cleared, but only about one-fifth of the land is utilized for agriculture. This soil has about the same agricultural value as Norfolk sand. The water table is closer to the surface in this soil than in Norfolk sand, which is advantageous. Reforestation is suggested for all areas not in cultivation.

SOILS WITH GRAY OR GRAYISH-BROWN SURFACE SOILS AND REDDISH-YELLOW OR RED SUBSOILS

This subgroup includes all the soils of the Magnolia, Orangeburg, Ruston, Cuthbert, and Cahaba series mapped in Jefferson County. The surface soils are dominantly gray or grayish brown, and they range in texture from loamy sand to light sandy loam. The subsoils of the Orangeburg, Ruston, and Cahaba soils are friable sandy clays, whereas the subsoils of the Magnolia soils are heavy sandy clay or friable clay. The subsoil of the Cuthbert soils differs from the subsoils of other members of this group in that it is yellowish-red or reddish-yellow heavy tough compact clay.

The soils of this group occur to greater or less extent in all parts of the county, but the largest areas are developed in the northeastern, southeastern, and western parts. These soils are readily distinguished from the soils of the Norfolk group, previously described, by the browner surface soils and the prevailing red subsoils. Under present agricultural practices the agriculture on these soils differs very little from that on soils of the Norfolk group, except that no tobacco is grown on these soils. Bright-leaf tobacco can be grown on the soils with red subsoils, but the leaf does not cure to a bright-yellow color. For the production of grains and grasses, these soils are probably superior to the soils which have yellow sandy clay subsoils.

Magnolia sandy loam.—Magnolia sandy loam is one of the normally developed soils of the county. The surface soil consists of gray

or light-brown fine sand or medium loamy sand, 3 or 4 inches thick, grading into brownish-yellow loamy sand which extends to a depth ranging from 10 to 15 inches. This material passes into reddish-yellow light sandy clay which grades, at a depth ranging from 16 to 20 inches, into red sandy clay that is rather heavy and stiff but brittle and crushes down to a friable mass. The depth to which this layer extends is variable, but in most places the clay continues to a depth ranging from 4 to 10 feet. This material rests on more compact and indurated red sandy clay containing mottlings of yellow, brown, and gray.

Magnolia sandy loam is one of the extensive and important agricultural soils and is widely scattered over the county. It occurs principally in the vicinities of Louisville, Grange, Ebenezer Church, Corinth Church, Zebina, and Clarks Grove Church.

About 60 percent of the land is under cultivation, and the rest supports a tree growth, principally of second-growth pine, or represents lands abandoned or turned out, although scattered scrub, white, and red oaks, and some hickory grow on this soil.

Where cultivated, the soil is used principally for cotton and corn, supplemented by forage crops, peanuts, and grain. Cotton occupies about 40 percent, corn about 50 percent, and forage crops and grain about 10 percent of the cultivated land. Acre yields of cotton range from one-half to 1 bale, corn from 20 to 40 bushels, oats from 20 to 40 bushels, wheat from 10 to 25 bushels, hay crops from three-fourths to 1½ tons, and peanuts from one-half to 1 ton. All crops are fertilized. The vines of peanuts aggregate about the same weight as the nuts. Heavier yields of peanuts are obtained on this soil than on Norfolk sandy loam, but the hulls are more stained. Bright tobacco is rarely grown, as the leaf when cured is dark. Magnolia sandy loam is one of the most productive soils in the county and can be brought to a high state of productivity.

Magnolia sandy loam, deep phase.—Magnolia sandy loam, deep phase, differs from the typical soil in having a thicker layer of sandy material over the underlying red sandy clay, the depth ranging from 20 to 36 inches, but in other respects no difference in the character of the material is noted. Soil of the deep phase is not considered so productive as the typical soil, but it is better adapted to light farming and the production of early truck crops. It is a good soil for the production of pecans.

About 50 percent of this deep soil is under cultivation, and the rest is turned out, or abandoned, or supports a forest principally of second-growth pine with a few hardwoods. The principal areas occur northwest of Clarks Mill, in the vicinity of Magnolia, and near Clarks Grove Church, Almira, and Corinth Church. Other areas occur throughout the county.

Magnolia sandy loam, mixed phase.—The surface soil of Magnolia sandy loam, mixed phase, presents a wide variation in color, texture, and depth. This mixed soil represents small areas and mere spots of Magnolia sandy loam and Greenville sandy loam, from which the surface soil has been wholly or partly removed by sheet erosion. Soil of this phase occupies slopes. In places a few inches of sand are on the surface, and in others the underlying red clay is exposed, giving the surface soil a mixed appearance as regards

color and wide differences in texture. This soil is closely associated with the Magnolia and Greenville soils. At one time this mixed soil had a good sandy loam surface soil.

The principal areas are northeast of Louisville, near Clarks Mill, Ebenezer Church, and Stapleton Crossroads, and south of Grange. Other areas are scattered throughout the county.

The greater part of this mixed soil is abandoned land, but where cultivated it is used for the same crops as Magnolia sandy loam. The essential improvement for soil of this phase is to prevent the excessive soil wash and then to keep the land in grass or forest.

Orangeburg loamy sand.—The 4-inch surface layer of Orangeburg loamy sand consists of gray or grayish-brown loamy sand. It is underlain by brownish-yellow loamy sand or sand which extends to a depth ranging from 12 to 15 inches. This material passes into reddish-yellow loamy sand or sand, which grades, at a depth ranging from 15 to 36 inches, into red sticky sandy loam which may extend to a depth of 4 or 5 feet and be underlain by the typical subsoil of Orangeburg sandy loam, or it may rest directly on a bed of sand.

Orangeburg loamy sand occupies benchlike positions on slopes, and the surface relief in most places is flat or undulating. It occurs most extensively north of Clarks Mill along Duhart Creek, in the vicinity of Smiths Grove Church, and north of Clarks Grove Church.

About one-half of this soil is cleared, and the rest supports a stand of second-growth pine and some scrub oak. Only about three-fourths of the cleared land is used for crops, and the remainder is turned out or abandoned. The cultivated land is used for the same crops as is Magnolia sandy loam, although it does not return such good yields of cotton, corn, and forage crops. Acre yields of cotton range from one-third to one-half bale, corn from 10 to 20 bushels, and hay crops from one-half to 1½ tons. Cotton occupies about 60 percent, corn 30 percent, and forage crops 10 percent of the cultivated land.

This is an excellent soil for early truck crops, but the distance from markets precludes its use at present. Fruit and nuts do well. Under efficient methods this could be made a productive soil.

Ruston sandy loam.—Ruston sandy loam is one of the normally developed soils and one of the dominant agricultural soils of the county. It occurs in all parts, the more extensive areas lying southwest of Keysville, near Ebenezer Church, south of Wrens, northeast of Louisville, northeast of Avera, east of Magnolia, west and south of Grange, and in the vicinities of Wadley and Bartow.

The surface soil consists of a 2- to 4-inch layer of gray or brownish-gray loamy sand grading into brownish-yellow loamy sand which extends to a depth ranging from 12 to 15 inches. The subsoil is reddish-yellow, yellowish-red, or brownish-yellow friable and crumbly sandy clay extending to a depth ranging from 25 to 40 inches. It is underlain by sandy clay material mottled or splotched with red, brown, and gray. Ruston sandy loam occurs dominantly on broad ridge tops and slopes, and all of it is naturally well drained. It is considered an excellent soil for the production of cotton, corn, forage crops, and grain. About 30 percent of the total area is used for cultivated crops, and the rest is in pasture, abandoned fields, or supports a stand of second-growth pine, and in places a mixture of scrub, red, white, and water oaks, pine, and hickory. Cotton occupies about 40

percent of the cultivated land, corn 45 percent, forage crops 10 percent, and grain 5 percent. Cotton yields from one-third to 1 bale an acre, corn from 12 to 40 bushels, hay crops from three-fourths to 1½ tons, oats from 15 to 40 bushels, and wheat from 12 to 30 bushels. On some of the farms, efficient methods and the turning under of green-manure crops have materially increased the yields.

Included with Ruston sandy loam in mapping is a variation which occurs northeast of Louisville. Here the surface soil and upper subsoil layer are similar to typical Ruston material but, at a depth ranging from 20 to 40 inches, the subsoil rests directly on the subsoil material of the Greenville and Orangeburg soils.

Ruston sandy loam, deep phase.—Ruston sandy loam, deep phase, differs essentially from the typical soil in the thickness of the sandy layer over the sandy clay subsoil, this layer ranging in thickness from 20 to 40 inches. The surface soil is in general lighter in color and texture, but the subsurface material is practically the same as that in typical Ruston sandy loam. Soil of this deep phase is of little agricultural importance. About the same proportion is under cultivation and crops occupy about the same percentage of the cultivated land as of typical Ruston sandy loam. It is not so productive of general farm crops as the typical soil but is better adapted to light farming and to the production of truck crops and fruit. This soil occurs near Grance and Magnolia, southwest and north of Rhodes Store, northwest of Bartow, and at other places in the county.

Ruston, sandy loam, shallow phase.—The surface soil of Ruston sandy loam, shallow phase, presents considerable variation in color and texture, and this shallow soil represents slopes that have been subjected to wash, or erosion, which has exposed the underlying subsoil in places, giving the surface a very spotted or mixed appearance. It is a more difficult soil to work and is not so productive as the typical soil. Soil of the shallow phase occurs in the vicinities of Stapleton and Wrens, near Oak Grove Church, in the vicinity of Noah in the northeastern part of the county, and in a few other places.

Some areas mapped with the shallow phase of Ruston sandy loam consist of a pebbly soil which has a rather large quantity of iron concretions or accretions scattered over the surface. The slopes of these areas are more gentle and the surface is not quite so spotted, although the sandy covering is very shallow, in few places extending to a depth of more than 6 inches. The subsoil is more red in color and the varicolored sandy clay material lies close to the surface. Areas of this pebbly soil occur southeast of Wrens, west and northwest of Rockydale School, west and southwest of Stapleton, northeast of Avera, south of Blunts Chapel, south of Farmers Grove School, and in other parts of the county.

Ruston loamy sand.—The surface soil of Ruston loamy sand consists of gray or brownish-gray sand extending to a depth of about 5 inches, where it passes into yellowish-brown or brownish-yellow loamy sand which becomes slightly sticky within a depth of 3 feet. In many places the lower part of the subsoil is reddish-yellow sandy loam or light sandy clay.

Ruston loamy sand occurs in widely scattered small areas in all parts of the county, being most extensively developed in the central

part around Louisville and in the northwestern part around Magnolia.

Only about one-third of the land is under cultivation, and the rest supports a mixed growth of scrub oak and second-growth pine or represents land turned out or abandoned. Where cultivated this soil is used for the production of cotton, corn, and forage crops. Cotton occupies about 60 percent, corn 30 percent, and forage crops 10 percent of the cultivated land. This soil has about the same agricultural value as Norfolk loamy sand, and it is slightly more productive than Ruston sand.

Ruston sand.—The surface soil of Ruston sand consists of gray or brownish-gray sand or loamy sand, to a depth of about 5 inches, where it grades into yellow or brownish-yellow sand. This material, at a depth between 12 and 15 inches, grades into reddish-yellow, yellowish-red, brownish-red, or brown sand which extends to a depth of more than 3 feet. Included with this soil, as mapped in the northern part of the county, are some areas of Ruston coarse sand. In places, along the upper slopes of Brier Creek near the McDuffie County line, a few small areas of a steep phase of this soil are also included.

Ruston sand is developed in large areas in the northern part of the county in the vicinity of Luckie Pond, Postoak School, and Anderson School, along Ogeechee River east of Moxley, and in the vicinities of Bethlehem Church and Magnolia. Probably not more than 30 percent of the land is under cultivation, and the rest supports a growth of scrub oak and some second-growth pine or represents land turned out or abandoned. The cultivated land is used for the production of cotton, corn, and forage crops. Cotton occupies about 55 percent, corn 40 percent, and forage crops 5 percent of the cultivated land. Acre yields of cotton range from one-third to one-half bale, corn from 8 to 25 bushels, and forage crops from one-third to 1 ton. This is an excellent soil for the production of early truck crops, but its remoteness from markets precludes such use. It is a soil that requires heavy fertilization to produce good yields. Most of it should be reforested.

Cuthbert sandy loam.—In cultivated fields the surface soil of Cuthbert sandy loam ranges from light-gray to light-brown sandy loam from 6 to 10 inches thick. The surface soil is not uniform in either depth or color. On some of the knolls and ridges the underlying clay comes to the surface, but in other places a deep covering of loamy sand or sandy loam has accumulated. A few iron concretions or accretions and white quartz pebbles are conspicuous on the surface of washed or eroded areas. The subsoil is yellowish-red or reddish-yellow heavy tough clay which extends to a depth of about 20 inches. This material passes rather abruptly into yellow clay mottled with light gray and purplish red, and in some places into blotched purplish-red, yellow, and white material of heavy texture and tough consistence.

The surface relief is characterized by low ridges and knobs with gentle slopes. Surface drainage is good, but internal drainage is poor on account of the almost impervious underlying clay.

Practically all this soil occurs in the extreme southern part of the county south of Williamson Swamp Creek. About 75 percent

of the land is cleared, and the remainder supports a growth of scrub oak and second-growth longleaf pine. The common grass growing on this soil is wire grass. Only about two-thirds of the cleared land is used for crops, and most of the remainder is turned out or abandoned. The cultivated land is used for the production of cotton, corn, forage crops, and grain. Cotton occupies about 40 percent of the cultivated land, corn about 45 percent, forage crops 10 percent, and grain 5 percent. Acre yields of cotton range from one-third to three-fourths bale, corn from 8 to 20 bushels, forage crops produce about one-half ton, and oats yield from 10 to 20 bushels. The best yields are obtained from areas in which the surface sand is deep, but where the surface soil is shallow, yields are low and the soil is difficult to till. This soil should be reforested where erosion has been active.

Cuthbert sandy loam, mixed phase.—The surface soil of Cuthbert sandy loam, mixed phase, is similar to that of the typical soil in that it is variable in depth and color. The essential difference between the two soils is in the subsoil. That of the mixed phase is thicker, redder, and is heavy and plastic.

Soil of the mixed phase occurs near the east county line north of Atwell, in some places between Atwell and Wrens, and southwest of Atwell. Included with mapped areas of this mixed soil are a few very small bodies of Susquehanna sandy loam which occur in the same section. Such areas have a mottled red, gray, and yellow plastic clay subsoil. Neither of these soils is very productive, and both are very difficult to handle. Most of this mixed soil should be used for pasture or forestry. A few spots having a uniform surface soil are suitable for growing cotton and corn.

Cuthbert coarse sandy loam.—The surface soil of Cuthbert coarse sandy loam is gray or dark-gray coarse loamy sand to a depth of about 3 inches, where it grades into brownish-yellow coarse loamy sand which extends to a depth ranging from 6 to 24 inches. Below this depth the material passes into yellowish-red coarse sandy clay which is compact and tough and contains faint streaks of yellow and brown. In most places this layer is either very shallow or entirely absent, and it is underlain by a layer of reddish-yellow very compact sandy clay splotched with red, yellow, and brown. Some very coarse sand and small quartz gravel are present in some areas of this soil.

Practically all this soil occurs in the extreme southern part of the county south of Williamson Swamp Creek. The surface relief is similar to that of Cuthbert sandy loam, and the land is used for the same crops and has about the same agricultural value as the sandy loam.

Cahaba loamy sand.—The 5- to 8-inch surface soil of Cahaba loamy sand ranges from gray to brown loamy sand. This material grades into brown or reddish-brown loamy sand which extends to a depth ranging from 3 to 5 feet. In places the lower part of the subsoil becomes more red and slightly sticky.

Included with this soil as mapped are some bodies of Cahaba sand which differs from the loamy sand in that it lacks the loamy texture in the subsurface material. Two small areas of this included soil lie southwest of Wadley on the south side of Williamson Swamp Creek.

Cahaba loamy sand is one of the less extensive soils in the county. It occurs on the second bottoms or terraces of Ogeechee River and the larger streams. It occupies slight ridges or hummocks, which lie slightly higher than the contiguous terrace soils.

About 85 percent of the land is cleared, and the rest supports a stand of second-growth pine and mixed hardwoods. It has a little higher agricultural value than Ruston loamy sand, as the water table, in most places, is nearer the surface, affording better moisture conditions. Where cultivated, this soil is used for the production of cotton, corn, and forage crops, cotton occupying about 40 percent, corn 45 percent, and forage crops or pasture the rest of the land. The yields vary with the farming practices, and the soil requires heavy fertilization and a good supply of organic matter to produce even fair yields. It would produce truck crops if it were heavily fertilized.

SOILS WITH RED OR REDDISH-BROWN SURFACE SOILS AND RED SUBSOILS

This group may be called the Greenville group, and the soils are locally known as the "red lands" of the county. The group includes all the soils of the Greenville and Blakely series mapped. The surface soils of the members of the Greenville series are prevailingly light red, and those of the Blakely series are dark reddish brown. The subsoils are heavy sandy clays which are red in the Greenville soils and dark red in the Blakely soils. Soils of the Greenville group are in general restricted to the central part of the county, associated with the major drainage system.

The surface soil of Greenville sandy loam is shallower than that of most of the sandy loams of the county, and the surface soils of Greenville clay loam and Blakely loam are decidedly heavier in texture and are, in fact, the heaviest surface soils in the county. As these soils are so heavy, they require stronger work animals and heavier farm implements for preparation and cultivation of the land, in order to obtain the best results. More tractors are used on these soils than on any other soil.

Like the soils previously described, these "red lands" are deficient in organic matter, with the exception of the Blakely soils which contain more organic matter than any of the upland soils. The Greenville soils do not warm up so early in spring nor can farming operations be started so soon as on the Norfolk and Orangeburg soils, and more time must be allowed for these soils to dry out after heavy rains before cultivation can be carried on.

Cotton is the principal crop on these soils, but under bollweevil conditions it is more difficult to mature a crop than on the more sandy soils. Cotton is produced because of the necessity of a cash crop and not because the heavy red lands are especially suited to it. These soils are better suited to the production of corn, small grains, forage crops, and grass than the other soils of the county. Members of this group occur in all sections, except the southern part and the extreme northern end, and they attain their greatest development in the central part.

Greenville sandy loam.—The surface soil of Greenville sandy loam consists of light-brown, light-red, or reddish-brown sandy loam of medium texture, ranging in thickness from 4 to 12 inches. This is the

most shallow of the sandy loam soils, and it is the more variable both in color and texture. In places plowing brings the underlying subsoil to the surface, and this modifies the texture and color. The subsoil is deep-red rather sticky heavy sandy clay which has an open structure. In many places the clay extends to a depth of more than 7 feet, usually becoming heavier in the lower part of the layer. In most places the clay is underlain by a variegated or mottled layer, somewhat lighter in color but splotched with yellow, red, gray, and brown.

Included with this soil as mapped are a few small areas of a pebbly phase of Greenville sandy loam. One such body occurs on the Glascock County line about 2 miles north of Stapleton.

Greenville sandy loam is most extensively developed in the central part of the county north of Ogeechee River. Only a few small bodies lie south of the river. The soil occupies the tops and crests of low divides, and sheet erosion is active in many places.

About 85 percent of the land is cleared, and the rest is forested with second-growth pine and various oaks. About three-fourths of the cleared land is used for crops, and the remainder is turned out or abandoned. The cultivated land is used for the production of cotton and corn, supplemented by forage crops, peanuts, and small grains. Cotton occupies about 35 percent of the cultivated land, corn 40 percent, forage crops 10 percent, oats 10 percent, and wheat 5 percent. Acre yields of cotton range from one-fourth to 1 bale, corn from 20 to 45 bushels, oats from 20 to 45 bushels, wheat from 12 to 25 bushels, and forage crops from 1 to 2 tons. Greenville sandy loam is an excellent soil for general farm crops and fruits, especially peaches. The hulls of the peanuts grown on this soil are apt to be stained, but heavy yields, ranging from one-half to 1½ tons, are obtained.

Greenville sandy loam, hilly phase.—The surface soil of Greenville sandy loam, hilly phase, is variable in color, texture, and depth, the color ranging from gray to red, the texture from sand to clay, and the thickness of the sandy surface layer from less than 1 inch to 15 inches. The underlying material is dark-red or red sandy clay which in most places extends to a depth of more than 3 feet. In places at the bottoms of the slopes the underlying mottled layer comes to the surface. The slopes are too steep or broken for agricultural purposes, and practically none of the land is under cultivation, but it supports a mixed growth of pine and oak and affords protection and some scanty pasture for cattle and work animals. This hilly soil occurs along Rocky Comfort Creek, Blackjack Branch, Ogeechee River, and in other places. It should all remain in forest.

Greenville clay loam.—The 5- to 10-inch surface layer of Greenville clay loam consists of reddish-brown or red sandy clay loam. It is underlain by dark-red or red heavy sandy clay or clay which is slightly sticky, but which breaks into irregular-shaped lumps that are fairly easily crushed into a friable mass. In most places, this material extends to a depth of more than 3 feet, where it is underlain by light-colored heavy sandy clay splotched with yellow and purplish red. In some of the more eroded places this layer is exposed.

Nearly all of Greenville clay loam occupies slopes along drainageways, but some areas have a smooth surface relief. This soil

is widely distributed throughout the county, being associated with the drainage systems and occurring in all parts, except the extreme southern end. The largest bodies are around Louisville, around Aldred Chapel, north of Ebenezer Church, in the vicinity of Grange, and north of Avera.

About 75 percent of the land is cleared, and the rest is forested with second-growth pine and oak. Only about two-thirds of the cleared land is used for crops, and the rest is turned out or abandoned. The cultivated land is used for the production of cotton, corn, forage crops, and grain. The acreage occupied by cotton is about 30 percent of the cultivated land, by corn 35 percent, by hay crops 10 percent, by grain 10 percent, and by pasture 15 percent. On the smoother areas, crop yields are a little heavier than on Greenville sandy loam. The slopes do not produce so well, as they are subjected to surface wash and are more difficult to work. Peaches do unusually well on this soil, and it would seem that the acreage in this crop could be profitably extended.

Greenville clay loam is the heaviest soil in the county. It requires heavy machinery and strong work animals for the most efficient tillage. Lime and organic matter would improve its physical character. By turning under green-manure crops, larger yields of corn and grains can be obtained. This is naturally one of the strongest soils.

Greenville loamy sand.—The surface soil of Greenville loamy sand is reddish-brown or brownish-red sand or loamy sand from 8 to 12 inches thick. This grades into a red or dark-red sticky sand or loamy sand subsoil which in most places extends to a depth of more than 3 feet and in some places to a depth of 7 or 8 feet. The material in the lower part of this layer in places is rather compact and where exposed is indurated. Included with this soil as mapped are spots of Blakely loamy sand, which have much darker surface and subsurface material.

Most of Greenville loamy sand occupies gentle slopes near the watercourses, but in some places the slope is rather steep. This is not an extensive soil. The largest bodies occur along Big Creek north of Louisville, and a fair-sized area lies along Brushy Creek near the Burke County line.

Not more than one-third of this soil is cleared, and probably not more than one-half of the cleared land is in cultivation. The forested lands comprise second-growth pine and oak. Cotton is grown on about 40 percent of the cultivated land, corn on 50 percent, and forage crops on 10 percent. Acre yields of cotton range from one-third to three-fourths bale, corn from 15 to 35 bushels, and forage crops from one-half to 1 ton.

Peaches do unusually well in this soil, but the steeper slopes should be reforested. Although more generally productive than the other loamy sands, the land requires heavy applications of fertilizer to produce and maintain good yields.

Blakely loam.—The surface soil of Blakely loam ranges in texture from loam to clay loam and in color from deep chocolate brown to reddish brown. Under virgin conditions this soil has a shallow covering of sand overlying red sandy clay, but when cultivated the sand is mixed with the clay and the result is differences in texture. The difference in color is caused by different amounts of organic

matter in the surface soil. The subsoil is dark-red or maroon heavy sandy clay which is rather stiff but smooth and brittle. In most places this material extends to a depth ranging from 4 to 5 feet and is underlain by variegated or mottled sandy clay of brown, gray, purplish-red, and yellow colors.

Included with this soil as mapped are a few small areas of sandy loam, which were too small to warrant separate mapping.

Blakely loam is not an extensive soil. It occurs in numerous small areas in a belt across the central part of the county from Grange eastward. It occupies flat areas and slight depressions. Most of it is well drained, although a few spots occur, in which drainage is not well established.

Practically all the land is cleared and is used for cotton, corn, forage crops, oats, wheat, and pasture.

Cotton occupies 35 percent, corn 40 percent, forage crops 10 percent, oats 5 percent, wheat 5 percent, and pasture 5 percent of the cultivated land. Acre yields of cotton range from one-third to 1 bale, corn from 30 to 50 bushels, forage crops from 1 to 2 tons, oats from 25 to 60 bushels, and wheat from 15 to 30 bushels. This is one of the best soils for the production of forage crops and grains.

POORLY DRAINED SOILS

The group of poorly drained soils includes the Grady, Plummer, and Myatt soils and the land classified as meadow and swamp. With the exception of a few spots of the Grady soils, which are better drained than typical, none of the soils in this group is cultivated at present. These soils support a mixed growth of water-loving trees and an undergrowth of bushes, weeds, and briers. Among the trees are sweetgum, cypress, magnolia, bay, sycamore, maple, white oak, hickory, and pine. Most of the merchantable timber has been removed. The Grady, Plummer, and Myatt soils have gray or dark-gray surface layers and contain more organic matter than the well-drained soils. The subsoils are mottled and in most places are sticky sands or heavy sandy clays. These are the most acid soils in the county. They are all poorly drained, and it is doubtful whether they would have any value, other than for pasture, if they were reclaimed, and this would hardly justify the expense of draining, particularly at this time when good upland soils can be purchased at low prices.

Grady sandy loam.—The surface soil of Grady sandy loam is variable as regards color, texture, and depth. The surface soil is dominantly gray or dark gray, but in some places it is almost black, and bordering the upland soils there is considerable filled-in material which is brown or reddish brown. The subsoil is lighter in color than the surface soil, in most places being gray or ash gray, and it ranges in texture from sticky sandy loam to sandy clay, which, at a depth ranging from 15 to 20 inches below the surface, passes into gray clay mottled with yellow and rust brown and in places with purplish red. In some places the underlying layer is lighter in texture than the subsoil.

Grady sandy loam occurs in many small areas scattered throughout the county, the larger bodies being between Louisville and Wrens.

Included with this soil as mapped are a few spots of Grady clay loam, which are restricted to the northern part of the county. They

occur in the deeper ponds, and most of them support a heavier growth of cypress. A fairly large body lies about 4 miles north of Louisville and another is about 1½ miles southeast of Zebina. The clay loam has a dark-gray or almost black clay loam surface soil and a subsoil similar to that of Grady sandy loam. Included also are areas of material that has a slight resemblance to the Dunbar soils but which represents a transitional soil between Grady sandy loam and the upland soils. About 50 percent of this better drained soil is under cultivation, but most of the land is imperfectly drained and crop yields are light, except of corn which does well. This soil is in most places associated with Grady sandy loam and is restricted generally to the section southeast of Wrens. In addition to the soils described, there are included with Grady sandy loam a number of very small depressions which occur within the normally developed areas and which are nearly all cleared and represent imperfectly drained conditions. The surface soil ranges in texture from sandy loam to loam and in color from gray to almost black, and the subsoil ranges from dark yellow to reddish yellow in color but has a rather uniform sandy clay texture. Most of the depressions are cultivated with the adjoining soils. They are not so deep as the depressions in which typical Grady sandy loam occurs.

Grady sandy loam occupies depressions or sinklike areas which are usually covered with water during winter and early spring, but most of them dry up during the summer. These areas have no agricultural value, except to afford protection and scant pasture for work animals and cattle.

Plummer sandy loam.—The surface soil of Plummer sandy loam consists of gray or dark-gray sandy loam from 4 to 8 inches thick. It is underlain by gray or ash-gray sandy loam or loamy sand, which, at a depth ranging from 20 to 24 inches, passes into sandy clay or in places dense clay of various colors, extending to a depth of more than 3 feet. Included with this soil as mapped are spots of Plummer loamy sand which has a loamy sand surface soil and a sticky loamy sand or sandy loam subsoil within a depth of 3 feet, underlain by dense clay at a greater depth.

Plummer sandy loam is wet and poorly drained. It occurs on slopes, on flat areas, and in poorly developed drainageways. It has little agricultural value except for pasture. Second-growth and longleaf pine trees are common to this soil, and the undergrowth consists of wire grass, gall-berry bushes, pitcherplants, and sedges. The land can be seeded and used for summer pasture, and it is a good soil for growing pine trees.

Myatt sandy loam.—The 6-inch surface soil of Myatt sandy loam consists of gray or dark-gray fine sandy loam or medium sandy loam. The subsoil is ash-gray or gray slightly sticky sandy loam or light sandy clay splotched with yellow and brown. This material is much like quicksand in character and structure, but it becomes slightly heavier and more compact with depth. In most places it is saturated at a depth of about 5 feet from the surface.

Included with this soil as mapped are some small areas of soil which have a mottled light-gray, yellow, and red heavy plastic clay subsoil. These areas occur southwest of Louisville on the Ogeechee River terrace.

Little or practically none of the Myatt sandy loam is under cultivation, except along the edges of the higher lying soils. Drainage is very poor, and water stands on the surface the greater part of the year. In most places the land supports a mixed growth of swamp vegetation, second-growth pine, gum, water oak, and other oaks. In some places in Georgia this soil is used advantageously for growing pasture grasses.

Meadow.—Meadow is a term given to the first-bottom soils of the smaller streams and represents a condition rather than a soil type. It is so variable in texture that no definite type separation could be made of it. It is wet and poorly drained most of the time and is covered with brush, trees, and water-loving plants and grasses. The surface material in most places is dark from the decay of vegetable matter. This land affords protection and pasture for work animals, cattle, and hogs during the summer and to a considerable extent during the winter.

Swamp.—Swamp represents a soil condition rather than a soil type. It occurs only in the first bottoms of the river and larger streams, and it is wet or saturated practically all the time. The soil material is variable and difficult to classify as definite soil types. The surface soil ranges from sand to silty clay in texture and from gray to dark brown in color, and the subsoil from sand to clay in texture and from white or ash gray to brown in color. The underlying sands vary little in color, but the underlying clays are much mottled. Most of the merchantable timber has been removed, but considerable swamp pine, gum, oak, elm, birch, and some cypress remain. In its present condition, the only use of this land is for forestry.

AGRICULTURAL METHODS AND MANAGEMENT

Agricultural methods and management are characteristic of those prevailing in the Cotton Belt and particularly in that section where the tenant system of farming is so predominant. With almost 80 percent of the farms in the county operated by tenants, the character of farm management would naturally be determined by the efficiency of the tenants. The tenant on most farms is required to produce cotton and corn—cotton for revenue and corn for feed—and because this is necessary he usually plants those crops on the land that he thinks will produce the heaviest yields and can be worked most easily. Land that is known to be unproductive is not sought by tenants, and this accounts in some measure for the fact that about one-half of the farm land is practically abandoned. Many of the landlords live in town, and this usually results in a proportionally greater cut in the acreage used.

There is little marginal land other than the poorly drained areas and some areas of the deeper and looser sands, and there seems to be no good reason for the removal of such a high percentage of arable land from cultivation. Little or no new land can be brought in, as formerly, to maintain production, and continuous exploitation has resulted in decreased land values and poor returns. No better land occurs in the coastal-plain section of Georgia than in Jefferson County. The soils could hardly have a better surface relief or provide a greater range in soil and soil conditions in this

region. These advantages, under efficient management afford the opportunity for a wide and diversified production. The soils are run down in places and leached of organic matter and the mineral plant nutrients, but they respond to intelligent treatment rapidly; in fact, few sections are blessed with climatic conditions that allow the growth of so many soil-improvement crops.

It is not to be inferred that no effort is made to maintain or increase the production of the land, because the landlords do all that they are able, but they are greatly hampered by lack of capital. The plantations are large, and much cash and labor are necessary to build up the soils. The great necessity of green-manure crops is apparent to all, and the acreage in legumes is increasing from year to year. Crop rotations are generally not adhered to, as the periods of tenancy are so short that adequate systems cannot be devised or carried out. The main dependence for soil improvement at present is in the use of commercial fertilizers.

The State, State College of Agriculture, and county agent are contributing valuable service to the farmers of this section, and some of their suggestions are incorporated here.

The State College of Agriculture recommends an acre application ranging from 200 to 400 pounds of superphosphate (acid phosphate) in the fall and from 100 to 150 pounds of nitrate of soda or from 75 to 110 pounds of sulphate of ammonia in the spring for small grains. The recommendation for corn is from 200 to 400 pounds of superphosphate, from 100 to 150 pounds of nitrate of soda or from 75 to 110 pounds of sulphate of ammonia, or a mixture ranging from 400 to 800 pounds of 8 percent phosphoric acid and 4 percent ammonia, or 10 percent phosphoric acid and 4 percent ammonia. The recommendations for cotton differ somewhat with the different soils. For soils having gray surface soils and yellow subsoils—the Norfolk and Marlboro soils—from 400 to 600 pounds of a 5–10–3 or 4–10–4 mixture is suggested, with a side application of 50 pounds of nitrate of soda or 40 pounds of sulphate of ammonia. For gray pebbly soils with yellow subsoils—Tifton soils—from 600 to 800 pounds of a 3–8–5 mixture is suggested, but if a less amount is applied, a side application of nitrogen is advisable. For the soils having gray or red surface soils and red subsoils—Greenville and Blakely soils—from 400 to 800 pounds of a 4–12–4 or 4–10–4 mixture is suggested. Improvement of the soils by good tillage, crop rotation, lime, and the building up of the supply of organic matter, will enable farmers to use larger applications of fertilizers with profit. The increase in yields from this practice will make a lower production cost and result in greater efficiency in farm operations.

The general methods of production, experience with special fertilizers, lime, and use of soil-improvement crops and their value is given herewith by W. H. Hosch, county agricultural agent.

Corn and cotton are the principal crops. These crops are supplemented by small grain, hay crops, peanuts, tobacco, truck, and horticultural crops.

The most general crop program is for cotton to follow cotton on about 50 percent of the acreage in crops, and the other 50 percent of the acreage is rotated with corn, small grain, hay crops, peanuts, tobacco, and truck crops, although many farmers follow corn with corn on certain fields year after year. A number of farmers are

trying to follow a crop-rotation program, and they are very successful in making good crops on their land in addition to improving the soil each year. This practice is spreading.

Hay or forage crops consist of cowpeas, soybeans, velvetbeans, peanuts, sorghum, and millet grown in the summer, in addition to a small acreage of the small grain cut as a hay crop. In recent years a number of farmers have used a mixture of oats and hairy vetch as a hay crop. The small-grain hay crop and oat-and-hairy-vetch hay crop are grown in winter and cut in early spring.

About 50 percent of the summer hay crop acreage follows after a winter small-grain crop has been harvested, as this practice gives two crops on the same land within 1 year. Some farmers follow small grains with velvetbeans or cowpeas as a green-manure crop, and this practice should be more generally followed.

A few farmers follow an oat-and-hairy-vetch hay crop with a summer-grown hay crop of either soybeans or cowpeas, as by this practice they harvest two crops of hay within a year from the same acreage. During 1930, one farmer harvested 2 tons of oat-and-hairy-vetch hay, cut when the oats were in the dough stage, and followed this crop with Otootan soybeans which produced 2 tons of soybean hay, making a total tonnage on the same land of approximately 4 tons of hay an acre within 1 year, and most of this was leguminous hay. This is heavy cropping of the soil, but by using leguminous crops, with the organic matter from stubble, this land was left in a more productive state after the two hay crops were cut than it was before they were planted. By taking advantage of both the winter and summer seasons for growing hay crops, mainly legumes, and grain crops, and with the increase of livestock on the farms it is reasonable to assume that within a few years the soil will become much more productive.

No indigenous grasses will prove profitable as hay crops, but a number are profitable for pastures, including Bermuda grass, carpet grass, crabgrass, broomsedge, and several swamp grasses. Most of the hay is produced from legumes, and the use of leguminous crops for hay has done much to increase the productive capacity of the soils.

Approximately 50 percent of the corn acreage is planted to velvetbeans in rows between the corn hills. The average production of corn is between 12 and 18 bushels an acre. When velvetbeans are planted between hills of corn the land will produce practically as much corn as it does without the legume crop and in addition produces from one-third to two-thirds ton of velvetbeans in the pod, besides the vines. The practice is to harvest the velvetbean pods by hand, leaving the vines on the land for soil improvement, or by grazing them with livestock. The velvetbean pods, if left on the land, would add much more plant nutrients, but the pods are of more value as feed for cattle and hogs than for plant nutrients. Even when velvetbean vines alone are left on the land the soil is improved, but when velvetbean pods are harvested by grazing with livestock most of the plant nutrients from the bean pods are returned to the soil in the form of manure. The practice of grazing this crop with livestock is increasing, because of the saving in labor expense of harvesting the pods. It has been estimated by leading farmers that

the increase in the crop of corn following corn with velvetbeans planted in rows is from 1 to 5 bushels an acre. One farmer states that after velvetbeans have been planted in corn 3 years in succession, the fourth-year corn crop will be more than double that of the first year.

It is also common practice to use cowpeas or soybeans planted with corn instead of velvetbeans, but velvetbeans are more generally planted because of their continued growth until frost, and, in addition, the well-matured velvetbean pod will withstand weather until harvested.

It has been the practice of many farmers during the last few years to use hairy vetch or Austrian winter peas as soil-improvement crops. These crops are seeded in the early fall, usually on cotton or corn land, and the following spring they are plowed under as green manure. Field demonstrations have proved that this practice has practically doubled the yield of corn the first year and increased production for several years thereafter. Demonstrations have also proved that a much larger tonnage of green manure is produced when vetch or Austrian winter peas are planted on the same land for 2, 3, or more years, mainly because the soil becomes well inoculated with the proper bacteria. Because the main cash crops are grown in the summer season, hairy vetch and Austrian winter peas that grow during the winter are becoming very popular among the leading farmers. This makes possible the use of leguminous crops grown during the winter season for soil improvement, followed by a cash crop on the same land in the summer within 1 year.

Since the advent of the bollweevil it has been necessary in the production of cotton to use fertilizer in which the plant nutrients are derived mainly from quickly available sources, so as to hasten the growth and maturity of the crop. Field demonstrations by leading farmers in different parts of the county have shown that a rather liberal use of fertilizers containing quickly available nitrogen and potash have proved economical for cotton. During the last few years farmers have increased the content of nitrogen and potash in their cotton fertilizers over the amount used a number of years ago, and this procedure has increased the yield economically. This practice has proved helpful on the Greenville, Marlboro, Norfolk, and Blakely soils, although these soils contain a large amount of combined potash.

Lime, although not generally used, has given excellent results on soils with or without an appreciable organic content. The form of lime used is ground limestone or marble. Where lime has been used it has been mainly on peanuts and winter legumes and to some extent on tobacco. Recently a few tests have been made on cotton. The most noticeable results were on peanuts and other legume crops. It would be an economical practice for farmers to make an acre application of approximately 1,000 pounds of limestone broadcast, at intervals ranging from 3 to 5 years, on most of the soils, as all the soils are acid and lime is needed to correct this condition. Although some crops cannot be successfully grown without lime, particularly peanuts and to some extent cowpeas, hairy vetch, and clovers, the lime makes available more of the plant nutrients com-

bined in the soil, especially in those soils having an appreciable iron content.

The soils in general are deficient in organic matter, which is the principal natural source of nitrogen, and nitrogen is usually supplied in such fertilizers as sodium nitrate, sulphate of ammonia, or other mineral or organic sources. Nitrogen supplied from commercial sources gives very little benefit beyond one growing season, whereas that supplied from legume crops and livestock manures is much more lasting and, from observation, seemingly much more beneficial than the same amount of plant nutrients added through the use of commercial fertilizer materials. Organic matter increases the water-holding capacity of soils, prevents erosion and wash to some degree, stimulates biological and chemical activities, and increases available plant nutrients.

For the purposes of simplifying the relationship between the soils and the methods for their improvement, the soils are grouped into four divisions, the first of which includes the sands and loamy sands; the second, the sandy loams, which differ from the first in having sandy clay subsoils; the third, the heavy soils which include the loams and clay loams with heavy sandy clay subsoils; and the fourth, the poorly drained soils.

The loamy sands of the first group contain a small quantity of fine material, and the sands little or none. There is little difference in the productiveness of the sands of the different series, but the loamy sands seem to be more productive as they have become more thoroughly oxidized, and the fine material seems to have increased, which is an indication of the increase in natural plant nutrients. As this is largely absent in the sands and less so in the loamy sands, these soils should be fertilized throughout the growing season. On account of their open character, these soils retain moisture and plant nutrients poorly, and the organic content is quickly oxidized and lost. The first essential for these soils is the incorporation of organic matter which can be applied by the use of manure or such soil-improvement crops as hairy vetch and Austrian winter peas in winter and cowpeas, soybeans, or velvetbeans in summer.

The soils of the second group, those having sandy clay subsoils, are much more productive than those of the first group. Most of them are deficient in nitrogen and phosphoric acid but contain more potash. These soils have good water-holding capacity on account of their heavy subsoils, and fertilizers are better retained than in the lighter soils. Some of these soils are called "run down", but they can be brought to a fair state of productiveness by the incorporation of organic matter and the use of such legumes as hairy vetch and Austrian winter peas in winter and cowpeas, soybeans, and velvetbeans in summer.

The soils of the third group, that is, the heavy soils or "red lands" cannot all be handled economically, as part of them occupy positions where they are exposed to sheet erosion. They are more difficult soils to work and require heavier tools and equipment for satisfactory results. An effort should be made to lessen the wash on these exposed slopes by the more general use of cover crops as protection against the heavy rains, to increase the organic content,

and to improve production. Other members of the group have good surface relief, and all kinds of farm machinery can be used. The soils of this group represent some of the strongest land in the county and probably have more combined plant nutrients than any others. The Blakely soils, in addition, have a good supply of organic matter. All these soils can be improved by the practice of proper crop rotations that provide for more organic matter to be left in the soil and longer intervals between clean-cultivated crops. The practice of using legume crops in the rotation, and good tillage are recommended for these soils. Many of the soils of this group include fields that are badly in need of terracing for better protection from soil erosion.

The last group includes the poorly drained soils. It is suggested that ditching would be beneficial on the Myatt soils, but little can be done in this respect for the Plummer soils, particularly the parts wet from seepage, unless the seepage water could be cut off above. Some of the Grady soils could be drained, especially the shallow depressions, and the deeper depressions might be improved by vertical drainage to the underlying substratum. Straightening the stream channels in places would make more land available.

It is questionable whether at this time, when so much good upland soil could be improved so easily, it would be advisable or profitable to drain this wet land. This group of soils includes those that are best suited for permanent pastures when properly drained, and demonstrations in different parts of the county in recent years have shown that much of this poorly drained land could be profitably drained and seeded for permanent pasture with carpet grass, Dallis grass, and lespedeza, especially where farmers are increasing the livestock production. On a few pastures on these soils that have been properly drained and now have a good sod, an acre of land will provide pasture for 1 cow for approximately 9 or 10 months during the year. However, for other crops than pasture these soils have not proved very productive.

SOILS AND THEIR INTERPRETATION

Jefferson County lies in the gray-soil region of the higher part of the coastal plain, and the soils are dominantly gray, with the exception of the " red land " in the central part of the county. Practically all the land is well drained and has an undulating or gently rolling surface relief. It ranges in elevation from about 254 feet in the south-central part to 495 feet in the northwestern corner.

The soils have developed under a forest cover, mainly of rosemary and longleaf pines, although a few scattered hardwoods, such as oak and hickory, grew in places. No opportunity has been afforded for the accumulation of organic matter in the soils as in the grass-covered region of the United States. In the wooded areas a thin covering of leaf mold and forest litter is present on the surface, and a small amount of this material is mixed with the topmost 2 or 3 inches of soil, but the organic matter has not really become a part of the soil and disappears after a few years' cultivation. In a few of the poorly drained areas, especially in meadow and swamp land, sufficient organic matter has accumulated to give the soils a dark or almost black color.

All the soils are acid, some of the poorly drained soils being more acid than some of the better drained soils. Table 3 gives the pH values of four soils as determined by the hydrogen-electrode method.

TABLE 3.—*pH determinations of 4 soils from Jefferson County, Ga.*

Soil type and sample number	Depth	pH	Soil type and sample number	Depth	pH
Ruston sandy loam:	*Inches*		Kalmia coarse sandy loam:	*Inches*	
259206	0– 1	4.62	259236	½– 4	6.07
259208	1– 7	5.27	259237	4– 8	5.22
259209	7–15	5.47	259238	8–24	5.22
259210	15–27	4.93	259239	24–50	5.22
259211	27–39	4.93	Tifton sandy loam:		
259212	39–60	4.77	259254	0– 6	5.22
Greenville sandy loam:			259255	6–10	4.90
259213	0– ½	5.02	259256	10–30	4.90
259215	½– 4	5.72	259257	30–60	4.90
259216	4– 8	5.57	259258	60–72	4.79
259217	8–12	5.82			
259218	12–18	5.10			
259219	18–28	4.59			
259220	28–60	4.63			

In this warm climate the comparatively heavy rainfall has leached most of the soluble plant nutrients from the surface soils, and this leaching process is practically continuous, as the soils are not subjected to long freezes as in colder sections of the country. The streams have cut channels ranging from a few feet to more than 50 feet below the general level of the upland. In some places fairly steep slopes have developed, and through erosion on these slopes, gullies have formed. In addition, much sheet erosion has taken place, which in many places has removed the sandy covering and exposed the sandy clay B horizon, with the result that the texture and depth of the surface soils have been materially changed.

All the soils, with the exception of the alluvial soils developed along the streams, have been derived from the underlying formations consisting mainly of beds of unconsolidated sands, sandy clays, clays, and marly material.[2] According to the information supplied by the report referred to, the greater part of Jefferson County is underlain by the McBean formation of the Claiborne group. This formation consists mainly of clays of the character of fuller's earth, shell marls, sandy limestones, and calcareous glauconitic sands. The thickness of the Claiborne group near Louisville is about 350 feet. The upper 68 feet may belong to the Barnwell sand. Along the extreme northern border of the county the Arcosic sand is developed. This consists of deep beds of red or yellow sand and sandy materials. In places the sands are indurated, compact, and hardened. These beds of sand are weathered to considerable depth, and as a result a layer of light-colored sand, ranging from 5 to more than 10 feet in thickness, overlies the unweathered part of the formation.

In the southwestern corner of the county the soils are underlain by and derived from the Altamaha formation. This formation consists of extensive deposits of irregular-bedded sands, clays, and gravels. Throughout it are small rounded pebbles, mainly quartz and quartzite.

[2] VEATCH, J. O., and STEPHENSON, L. W. PRELIMINARY REPORT ON THE GEOLOGY OF THE COASTAL PLAIN OF GEORGIA. Ga. Geol. Survey Bull. 26, 466 pp., illus. 1911.

The "red lands", particularly the heavier soil types, have been derived from or influenced by deposits of calcareous material or from beds of fairly heavy clays. This is particularly true of the Greenville and Magnolia soils, and these formations have influenced to some extent the B horizon of the Marlboro soils. Most of the Norfolk, Ruston, and Tifton soils have probably been derived from the beds of unconsolidated sands, sandy clays, and clays of the Barnwell formation. The Kalmia, Cahaba, and Myatt soils have been formed from materials brought down and deposited by the streams.

In all the well-drained soils considerable eluviation has taken place in the A horizon, and a large proportion of the original fine material has been carried down to the B horizon or removed by lateral movement of water. This action has produced soils which are prevailingly of medium texture and predominantly sandy. In the normally developed soils, illuviation has occurred in the B horizon which is much heavier in texture than the horizon above. This is the horizon in which plants obtain most of their nourishment and their principal water supply. In the more typically developed profiles, the B horizon in many places is very thick and is generally uniform in color and composition. In places a conspicuous quantity of small rounded brown accretions or concretions are on the surface, and a few are within the soil profile. In places iron-incrusted angular fragments are associated with the smaller and more rounded concretions, and they occur also below the B horizon. In the extreme southern end of the county are small areas of coarse sandy material intermixed with some gravel. In the soils in the central part, some white or gray granular chert occurs between the B and C horizons, which would seem to indicate that some limestone existed in this section at one time. It is in this particular section that the B and C horizons are best developed, that is, the section in which practically all the Greenville soils occur. The fuller's earth deposits in the north-central part and the shell beds in the central and eastern parts are not related to the above-mentioned chert, although they show the same lack of carbonates. In the southern end of the county near the Johnson County line the parent material is heavier than that underlying the rest of the county. It comes nearer to the surface, and the B horizon is much shallower and more heavy than in most of the soils. In the west-central and extreme northern and northeastern parts the C horizon, or the mottled layer, is not so apparent and may have been more or less completely oxidized, and the B horizon rests directly on the underlying sand.

Along the river and some of the larger streams, comparatively large areas are subject to frequent overflow during periods of high water. Bordering these first bottoms are small areas of terraces, or second bottoms. The terrace land lies above normal overflow, and some of the material is well drained and occupies a position favorable to the development of a normal profile, but all the poorly drained terraces and the first bottoms are comparatively young and more nearly represent alluvium or geological material that has not developed a definite soil profile.

Extensive areas of soils have mature or normally developed profiles. The sandy loams of the Norfolk, Tifton, Marlboro, Ruston, Magnolia, and Greenville series may be considered the normally developed soils of the county. All these soils have light-textured A horizons; much heavier textured B horizons which are uniform in color, texture, and structure; and C horizons that are variable in character, in places being lighter in texture with a variegated coloration such as mottling, streaking, and blotching. The lower part of the C horizon in places shows some evidence of stratification.

In addition to the soils having normal profiles, some occur that have a mutilated or immature development, but the total extent of these soils is rather small. On some of the steeper slopes, the removal of the surface material by erosion has changed the character of soils that formerly had a three-horizon arrangement to a B-C condition, and in some places erosion has been active enough to leave only the C horizon. In the poorly drained sections of the uplands, the soils have not developed normal profiles because the water table has been so near the surface that the soil-forming processes have not had an opportunity to act on the material, and this accounts for the streaked and mottled color of the subsoils of these poorly drained soils.

Following is a description of the normally developed profile of Norfolk sandy loam as observed 1 mile west of Greener Millpond:

A_1. 0 to 2 inches, leaf mold and forest debris on surface and mixed in soil.
A_2. 2 to 6 inches, gray loamy sand.
A_3. 6 to 12 inches, grayish-yellow or pale-yellow loamy sand.
B_1. 12 to 18 inches, yellow sticky sandy loam.
B_2. 18 to 30 inches, light sandy clay which is slightly sticky, of uniform color, brittle, and friable.
C_1. 30 to 60 inches, yellow brittle rather heavy sandy clay containing spots of red and dark brown.
C_2. 60 to 72 inches, slightly indurated sandy clay mottled with red, yellow, and gray, in which the red color is dominant.

The Tifton soils differ essentially from the Norfolk in that they contain a large quantity of small rounded brown or almost black concretions or accretions and some iron-incrusted angular fragments. The A horizon is darker, the B horizon is deep yellow or reddish yellow, and in general the profile contains a large quantity of fine material, is heavier, and more brown than the Norfolk soils.

The Marlboro soils are darker than the Norfolk soils in the A horizon and have a deep-yellow or reddish-yellow B horizon. The A and B horizons are much more shallow than the A and B horizons of the Norfolk soils, and the A horizon is much heavier in texture than the Norfolk and contains more fine material.

Following is a profile description of Ruston sandy loam as observed 6½ miles west of Louisville:

A_1. 0 to 2 inches, pine straw and forest debris on surface and mixed in soil.
A_2. 2 to 3 inches, dark-gray loamy sand.
A_3. 3 to 7 inches, yellow loamy sand.
A_4. 7 to 15 inches, brownish-yellow loamy sand.
B. 15 to 27 inches, brownish-yellow friable and crumbly light sandy clay.
C_1. 27 to 39 inches, yellowish-red heavy sandy clay which breaks into lumps, but these are easily crushed.
C_2. 39 to 60 inches, splotched gray, red, brown, and yellow hard but brittle sandy clay.

The Magnolia soils are characterized by a bright-red B horizon which in most places is much thicker than the same horizon in the Ruston soils, and the material of both the B and C layers is heavier than in those soils.

Following is a profile description of Cuthbert sandy loam as observed 2 miles southwest of Wadley:

A_1. 0 to 3 inches, grayish-brown loamy sand which contains a small quantity of organic matter and a few iron concretions.
A_2. 3 to 10 inches, yellow loamy sand.
B. 10 to 30 inches, yellowish-red clay which is tough and compact and cracks into small angular blocks in an exposed bank and becomes hard.
C. 30 to 40 inches, yellow, mottled with light-gray, brown, and purplish-red, heavy clay material.

Following is a profile description of Greenville sandy loam as observed 3½ miles southeast of Clarks Mill:

A_1. 0 to ½ inch, leaf and forest mold, the surface being covered with leaves and pine straw.
A_2. ½ to 4 inches, dark-brown loamy sand.
A_3. 4 to 8 inches, brown sandy loam.
B_1. 8 to 12 inches, reddish-brown mellow and friable sandy loam.
B_2. 12 to 18 inches, reddish-brown friable sandy clay.
B_3. 18 to 28 inches, red heavy sandy clay which is uniform in color and breaks into irregular-shaped lumps.
C_1. 28 to 60 inches, red heavy sandy clay which is hard but brittle and shows a few brown and yellow splotches in exposed banks.
C_2. 60 to 84 inches, mottled gray, red, and brown heavy clay having a somewhat stratified structure.

The Blakely soils are characterized by a brown A horizon and a dark-red or maroon-colored B horizon. They contain some manganese dioxide and this, together with organic matter, causes the dark color which distinguishes them from the Greenville soils, with which they are closely associated in many places.

In all the normally developed soils, variations in structure occur that seem to have some relation to the degree of oxidation. The B horizons of the Norfolk, Marlboro, and Tifton soils have a close structure; that is, the interstitial spaces are smaller than in the well-developed Ruston soils. The Orangeburg soils are more open in structure, especially in the C horizon, than the Magnolia soils, but are similar to the Ruston soils.

The Grady and Plummer soils represent the poorly drained land of the uplands. Both these soils have gray A and mottled B layers, but they do not have normally developed profiles. The Grady soils occur only in the upland sinks, or depressions, and the Plummer soils occupy the flats or lie contiguous to the heads of streams and near the bases of the lower slopes.

On the second bottoms, or terraces, of the river and larger streams, drainage conditions differ widely. All the soils in such positions have been derived from material brought down and deposited when the flood plains were much higher than at present. The differences in the soils are owing largely to differences in drainage, aeration, and oxidation of the material. The Cahaba and Kalmia soils are well drained and have profiles similar to those of the Ruston and Norfolk soils, respectively. The Myatt soils are poorly drained and in their characteristics bear a close resemblance to the Plummer and Grady soils of the uplands. Meadow and swamp represent the

alluvial material of the first bottoms. They are so variable in texture and structure that no soil types could be differentiated, and the material represents a soil condition rather than a soil type. Swamp is saturated and covered with water, whereas meadow is not permanently wet.

In table 4 are shown the results of mechanical analyses of several layers of four soils.

TABLE 4.—*Mechanical analyses of 4 soils in Jefferson County, Ga.*

Soil type and sample no.	Depth	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
Tifton sandy loam:	*Inches*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
259254	0- 6	5.8	15.3	15.7	29.8	12.8	12.8	7.7
259255	6-10	2.4	11.4	16.6	31.1	13.8	12.8	11.8
259256	10-30	3.4	8.4	9.9	18.5	8.4	8.2	43.2
259257	30-60	4.2	7.7	8.5	15.3	6.4	6.6	51.4
259258	60-72	5.6	11.9	9.5	14.9	6.3	5.6	46.3
259259	72-78	3.8	9.5	6.9	9.7	6.3	8.1	55.8
Kalmia coarse sandy loam:								
259236	½- 4	11.6	25.0	14.8	21.4	11.6	10.0	5.6
259237	4- 8	9.7	22.8	15.2	21.9	10.8	9.3	10.2
259238	8-24	11.5	19.3	12.3	19.3	9.4	8.0	20.1
259239	24-50	10.3	17.0	11.6	18.6	9.6	12.5	20.5
259240	50-70	15.5	20.7	11.8	15.1	7.3	6.9	22.6
Ruston sandy loam:								
259207	1- 3	3.7	16.8	16.6	31.5	10.8	13.8	6.6
259208	3- 7	4.0	16.3	16.3	28.2	14.4	12.8	7.9
259209	7-15	3.8	13.4	14.7	28.5	15.2	12.7	11.5
259210	15-27	3.6	9.8	9.8	16.9	8.6	7.6	43.6
259211	27-39	3.0	10.4	9.8	14.7	7.7	6.9	47.4
259212	39-60+	6.0	14.4	10.4	14.6	7.6	5.6	41.3
Greenville sandy loam:								
259213	0- ½	11.3	20.7	16.5	22.4	7.6	10.0	11.4
259214	½- 2	3.1	20.7	16.8	19.9	4.3	17.8	17.3
259215	2- 4	5.6	21.6	17.6	23.3	6.7	7.8	17.3
259216	4- 8	4.5	18.4	16.8	26.0	7.8	8.2	18.3
259217	8-12	4.0	17.1	16.6	25.7	7.6	7.0	22.1
259218	12-18	5.2	17.5	15.1	19.7	6.0	6.5	29.9
259219	18-28	4.9	15.7	12.7	14.2	3.8	3.5	45.3
259220	28-60	5.0	20.0	14.0	13.5	3.4	1.8	42.3
259221	60-84	1.8	5.0	3.4	3.0	1.2	7.6	78.0

SUMMARY

Jefferson County lies in the eastern part of Georgia, where it comprises an area of 532 square miles. Transportation facilities are fair, and the system of county roads is excellent. The surface relief ranges from almost level or undulating to gently rolling or sloping, and the land is for the most part well drained. Large areas lie favorably for farming operations.

The climate is mild, the summers being long and the winters comparatively short. Farm work can be performed throughout the year, except during winter rains. The length of the frost-free season is 226 days, and the average annual rainfall is 45.65 inches. Both climate and soils are favorable for the production of a wide range of staple crops and garden vegetables.

The present-day agriculture centers around the production of cotton and corn. These crops are supplemented by forage crops, small grains, tobacco, peanuts, garden truck, fruit, and nuts.

The soils are dominantly sandy in the surface soils, and they have sandy clay subsoils. They are easy to till, and they warm up quickly in the spring. They respond readily to fertilization and to

the turning under of green-manure crops, and they can be built up to fair state of productivity.

A large number of soil types and phases are mapped, and these have been divided into four groups. The first group is composed of soils having gray surface soils and yellow subsoils and includes the Marlboro, Tifton, Norfolk, and Kalmia soils. These soils are recognized throughout the coastal plain as the best soils in their respective localities for the production of cotton, peanuts, and bright tobacco. They are also generally accepted as being ideal trucking soils.

The second group includes the gray or light-brown soils having reddish-yellow or bright-red subsoils, such as the Ruston, Cuthbert, Orangeburg, and Cahaba soils. These soils are well suited to the production of cotton and truck crops, but they do not produce so good a quality of bright tobacco as do the soils of the first group.

The third group includes the soils having red surface soils and red subsoils. The Greenville, Blakely, and Magnolia soils comprise this group. These soils are known as the "red lands" of the county and are typical of the red soils in southwestern Georgia. They comprise some of the heaviest lands in the county and are well suited to the production of corn, forage crops, small grains, and cotton. In southwestern Georgia they are used for growing peaches and pecans. These soils are heavier in their subsoils than the soils of any group in the county and can, therefore, be built up to a high state of productivity.

In the fourth group are included the Grady, Plummer, and Myatt soils, also meadow and swamp. These are the poorly drained soils of the county, and only a small proportion of them has been drained, cleared, and used for the production of crops. These soils when reclaimed through ditching and when limed and fertilized will produce good pasture grasses, corn, and oats.

Considered as a whole, Jefferson County contains large acreages of good farming land which can be purchased very cheaply and which offers possibilities for future development. Both extensive and intensive farming operations can be successfully carried on.

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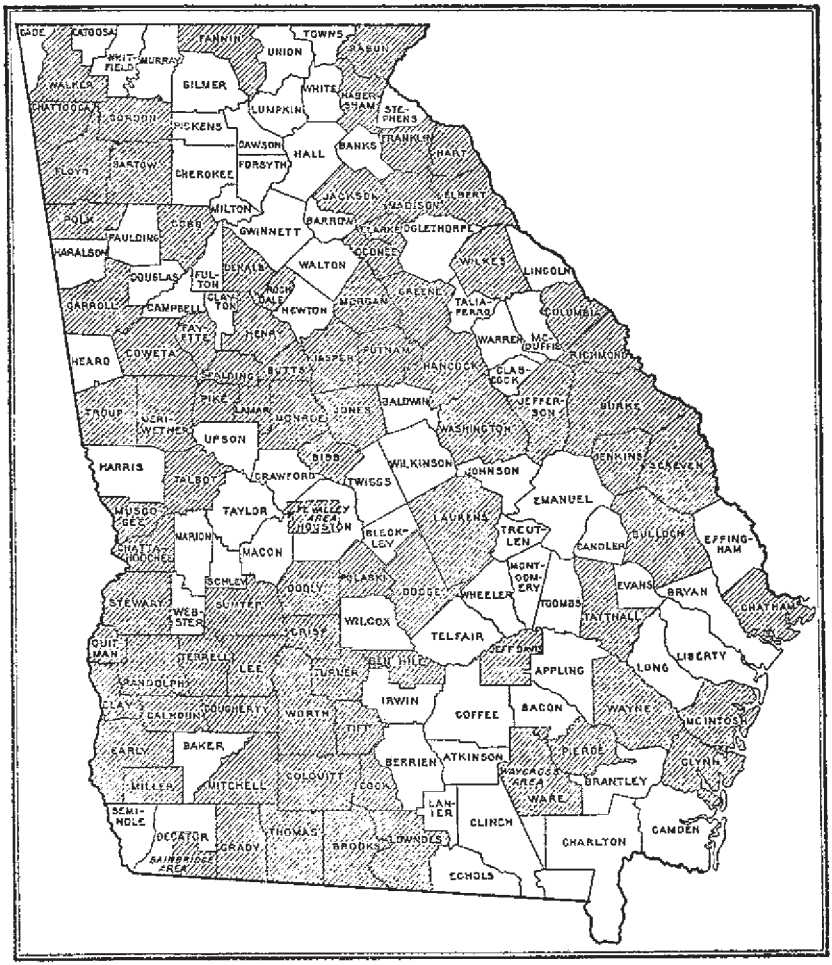

Areas surveyed in Georgia shown by shading. Detailed surveys shown by northeast-southwest hatching.

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