

U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF SOILS
IN COOPERATION WITH THE GEORGIA STATE COLLEGE OF AGRICULTURE

SOIL SURVEY OF JENKINS COUNTY GEORGIA

BY

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[Advance Sheets—Field Operations of the Bureau of Soils, 1923]



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[PUBLIC RESOLUTION—No. 9.]

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

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

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

Approved, March 14, 1904.

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

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MAP

Soil map, Jenkins County sheet, Georgia

SOIL SURVEY OF JENKINS COUNTY, GEORGIA

By EARL D. FOWLER, in Charge, and J. M. SNYDER

DESCRIPTION OF THE AREA

Jenkins County is situated in the east-central part of the State of Georgia, 20 miles west of the South Carolina State line and 70 miles northwest of Savannah. It is an irregular-shaped area, formed from parts of Burke, Screven, Bulloch, and Emanuel Counties, which in general bound it on the north, east, south, and west, respectively. The total area is 352 square miles, or 225,280 acres.

The surface of the county is essentially a uniform plain dissected by the Ogeechee River and its tributaries. There are four distinct types of topography, distinguished by their difference in elevation, degree of dissection, and other surface features. The rolling uplands or "piny woods" section, the comparatively level plain broken by sink holes and shallow depressions, the terraces or second bottoms of the streams, and the flood plains comprise the four separate topographic divisions.

The rolling uplands constitute the highest part of the county. All of the county lying south of the river terraces and east of Little Buckhead Creek is made up of these uplands. This region is dissected by small creeks and numerous intermittent streams. The slopes are generally gradual and slightly concave, except for the saucerlike slopes at the heads of many small branches. The greatest relative relief is a rise of 150¹ feet from the river bed to the crest of Paramore Hill, 3 miles southeast of Millen. The average depth of the valleys is 30 to 50 feet.

West of Little Buckhead Creek and north of the river is a comparatively level plain several feet lower than the rolling upland region. It is broken by scattering sink holes, shallow winding depressions, and the valleys of the two main streams, Buckhead and Springhead Creeks. Most of the sinks and depressions range from 5 to 10 feet in depth and vary in area from a few square yards to more than 2 square miles. The slopes of this region are in general very gentle except near the larger streams.

The terraces or second bottoms are comparatively level lands lying from 2 to 10 feet above high-water level. They are most extensive along the southern side of the Ogeechee River and range from one-fourth mile to 3½ miles in width. Slight depressions and very poorly defined drainage ways are common. A few conspicuous small mounds

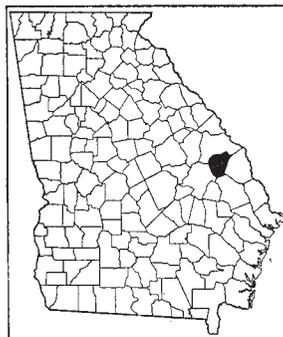


FIG. 4.—Sketch map showing location of the Jenkins County area, Georgia.

¹ U. S. Geol. Survey topographic map.

and low sandy ridges occur on the terrace along the south side of the river south and southeast of Herndon. Three miles southeast of Herndon an isolated hill of upland rises 40 or 50 feet above the terrace.

The first bottom or flood plain of the Ogeechee River is almost level, except for low hummocks and secondary channels. The average width is about 1 mile. Similar areas of comparatively level overflow land occur along all the main streams to a very limited extent, but in their entirety they represent a considerable acreage.

The highest points in the county are between 350² feet and 370 feet above sea level; one is 3½ miles and the other 5½ miles northeast of Millen. The lowest elevation is about 112 feet above sea level and is in the extreme southeastern corner of the county.

The drainage system of the county is formed by the Ogeechee River and its tributaries. The larger tributaries are Buckhead, Springhead, Little Buckhead, Beaverdam, and Horse Creeks on the north, and Bay Branch and Sculls Creek on the south. The river traverses the central part of the county in a general southeasterly direction. All parts of the upland regions are reached by this drainage system and are well drained, except in the lime-sink region of the northwest, and in that part the interdepressional areas are well drained owing to the character of the soils and substrata.

Along all the drainage ways are belts of poorly drained land frequently broadening out into ponds or swampy areas known as "bays" and "sloughs." Many of the smaller streams are dry during the late summer. Excepting the Ogeechee River, whose waters are muddy, the streams are clear-water streams.

Good flowing wells are obtainable at depths ranging from 200 to 275 feet along the lower lands or second bottoms of the river and at about 600 feet in the upland areas.

The large acreage of poorly drained land along most of the streams and small branches is gradually being decreased in extent through clearing of the lower slopes and deepening of the channels. Considerable expense would be necessary to drain the broad lowlands along the river and its larger tributaries.

Jenkins County was organized in 1905. The very earliest settlers came up the Ogeechee River from points near Savannah and gradually extended their settlements back from the river. Some of the early settlements were made before Revolutionary times under charters granted directly by the English Sovereign. However, settlement to any great extent did not occur until after the Central of Georgia Railway was built through this section of the State, between 1830 and 1840. This later expansion came through the successful efforts of Virginia and North Carolina settlers in organizing the lumber, turpentine, and agricultural industries.

² Elevation taken from U. S. Geol. Surv. topographic map.

The entire population of 14,328 in 1920 was classed as rural and averaged 41.9 per square mile. It is fairly equally distributed over the county.

Millen, the county seat, is centrally located and is the largest town, having a population of 2,405 at the time of the 1920 census. It owes its growth largely to the Central of Georgia and the Georgia & Florida Railways, which form a junction at this point. Lumber mills, oil mills, a cotton mill manufacturing cloth for tire fabric, and markets for farm and garden products constitute the chief interests of the town.

Perkins, with a population of 230, the only other town of more than 150 inhabitants, is on the Central of Georgia Railway in the north-central part of the county.

A branch line of the Georgia & Florida Railway extends southwest from Millen to Moultrie (Colquitt County), passing through the settlements or villages of Emmalane, Butts, and Thrift. The main line of the Central of Georgia Railway from Savannah to Macon traverses the county from the southeast to the northwest passing through the villages of Scarboro, Paramore Hill, Rogers, and Herndon, and joins with the Savannah-Augusta branch at Millen. This radiating system of railroads supplies direct transportation facilities from the county seat to the larger markets at Savannah, Moultrie, Macon, Atlanta, and Augusta.

A system of well-improved sand-clay roads radiate from Millen to all parts of the county. The Augusta, Savannah, and Jacksonville branch of the Atlantic Highway traverses the county from north to south, passing through Millen. Rural delivery of mail is provided for all sections of the county.

CLIMATE

The climate of Jenkins County is characterized by long warm summers, mild open winters, and comparatively heavy annual rainfall which is well distributed.

The normal winter season is characterized by short periods of cool weather, occasional white frosts and freezing temperatures at night, followed by milder temperatures. The mean temperature for each of the three winter months is slightly more than 48° F., showing a very even temperature for that period. Snow is an exception and usually occurs as a light flurry, melting rapidly as it falls. The summers are long, with warm days, generally pleasant nights and only occasional short spells of extremely high temperatures. The highest temperature recorded is 106° F., in July, the lowest is 9° F., in February. The mean annual temperature of 65.2° F. varies less

than 1° from the average temperatures for the spring and fall months. Temperatures of over 100° F. have been recorded from May to September, inclusive.

The mean annual precipitation of 44.87 inches, fairly uniformly distributed during the year, warrants considerable diversification in agriculture. The heaviest precipitation, amounting to 61.37 inches, occurred in the year 1912. The fall precipitation in that same year was less than normal. The driest year on record (1910) had 32.04 inches of rainfall.

The ample rainfall, together with an average growing season of 224 days, affords a long grazing period, which can be extended during the remainder of the year by a careful choice of forage crops. The average date of the last killing frost in spring is March 26, and that of the first in the fall November 5. The latest recorded killing frost in spring occurred on April 26, and the earliest in the fall, on October 21.

The following table, compiled from the records of the Weather Bureau station at Millen, gives the maximum and minimum temperatures and precipitation, and the averages for each month, season, and the year, and is representative of climatic conditions throughout the county.

Normal monthly, seasonal, and annual temperature and precipitation at Millen
(Elevation, 158 feet)

Month	Temperature			Precipitation		
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1910)	Total amount for the wettest year (1912)
	° F.	° F.	° F.	Inches	Inches	Inches
December.....	48.5	83	10	3.30	1.70	2.85
January.....	48.3	82	12	2.94	2.19	7.50
February.....	48.9	85	9	4.24	4.32	5.21
Winter.....	48.6	85	9	10.48	8.21	15.56
March.....	58.0	89	20	3.90	1.33	7.45
April.....	64.6	97	30	2.74	.90	6.92
May.....	73.8	102	41	2.94	2.75	3.99
Spring.....	65.5	102	20	9.58	4.98	18.36
June.....	79.7	105	44	5.25	5.92	6.46
July.....	81.7	106	54	5.81	2.04	5.45
August.....	81.3	103	58	5.25	3.25	8.23
Summer.....	80.9	106	44	16.31	11.21	20.14
September.....	76.6	103	38	3.54	2.19	3.77
October.....	65.8	98	26	2.77	3.65	1.30
November.....	55.8	89	20	2.19	1.80	2.24
Fall.....	66.1	103	20	8.50	7.64	7.31
Year.....	65.2	106	9	44.87	32.04	61.37

AGRICULTURE

Agriculture was well established within the territory now included in Jenkins County long before the county was organized, in fact the outstanding development of the region created the demand for better judicial and commercial facilities and led to the organization of the county.

The early agricultural history is identical with that of the surrounding counties, from which it was formed. It began in scattering settlements in small clearings near the Ogeechee River. The needs for subsistence were easily obtained from a bountiful fish and game supply, supplemented by products from small patches of corn, oats, rye, buckwheat, and garden truck. A few cattle and hogs were usually kept. Cotton became a common crop very early.

The expansion of the farming industry followed closely upon the clearing of thickly forested uplands of their valuable supply of pine timber. Longleaf yellow pine (*Pinus palustris*) and slash pine (*Pinus caribaea*) were the most important timber trees of the upland, and cypress, oak, ash, and gum of the less well-drained lands. Considerable hardwood, chiefly oak, originally grew in the lime-sink region in the northwestern part of the county.

Shortly before the Civil War, cotton became the leading crop and was more securely established by conditions following the war, which made a cash crop necessary. Cowpeas, corn, and oats were grown to a limited extent, and hogs, cattle, and poultry were generally found on most farms. But the demand for feed, pork, beef, poultry, work stock, and dairy products was greater than the local supply, and importation became necessary. This condition prevails to the present time, though to a less extent than formerly. A slight diversification of crops was forced on many farmers by the advent of the boll weevil and by the financial depression following the World War. This diversification has been expressed in larger acreages of corn, hay, forage crops, and vegetables and more recently by a widespread introduction of purebred hogs, and by growing melons on a commercial scale and marketing them through a newly organized branch of a cooperative marketing association.

Cotton is the leading cash crop and is grown in all parts of the county. In 1919, 30,213 acres of cotton were reported by the census, with a yield of 15,947 bales, and in 1924, 26,065 acres yielded 10,191 bales. The average yield in 1919 was 0.52 bale per acre and in 1924 it was 0.391 bale. The lower yield in recent years has been due to a more thorough infestation by the boll weevil.

The 1920 census reported a larger acreage in corn than in cotton, the corn acreage in 1919 being 37,173 and the production 450,965 bushels. In 1909, 22,930 acres yielded 242,013 bushels. These figures show an increase of 62.1 per cent in acreage and an increase of 86.3 per cent in total yield. The preliminary announcement of the farm census taken in 1925 reports the acreage of corn in 1924 as 29,662 acres and the production as 324,909 bushels.

The smaller grains are not extensively grown, but oats are gaining in favor not only as a grain crop but also as hay. The total acreage

of oats in 1919, according to the census, was 521 acres. The yields range from 12 to 50 bushels per acre, depending on many factors, such as fertility of soil, kind of seed, preparation of the soil, and quantity of fertilizer applied. Wheat, rye, and rice are grown only to a very small extent.

Hay and forage crops are relatively unimportant as regards total acreage. They are chiefly velvet beans and cowpeas, which contribute greatly to the feed supply and also to the fertility of the soils.

Special crops, as potatoes, sweet potatoes, cabbage, sugar cane, sorgo, and tobacco are grown. Of these, sweet potatoes and sugar cane are by far the most important. A total yield of 61,889 bushels of sweet potatoes is reported for 1919 and of 44,797 bushels in 1924. Sugar cane occupied 330 acres in 1919 and produced 41,297 gallons of sirup.

Orchard fruits, such as apples, peaches, pears, plums, and figs, are not grown commercially, but are grown on many farms. Grapes and strawberries are not extensively grown. Blackberries, dewberries, and huckleberries grow wild in abundance around the swamps or ponds and in uncultivated areas. These various fruits, though not important commercially, form a valuable contribution to the food supply of the people.

Pecans are grown commercially in a few groves, and new groves are being planted. The 1924 census reports 2,303 trees of bearing age and 4,971 young trees in the county. In favorable years many farms have a small surplus of pecans for sale.

The raising of purebred hogs, chiefly Hampshires, has only recently been engaged in generally, and prior to the boll-weevil infestation of cotton very little interest was taken in the livestock industry. Cattle raising is relatively unimportant, though a few good herds of both the dairy and beef types have been developed and are demonstrating the possibilities in these branches of the livestock industry.

The total value of all agricultural products has increased from \$1,417,436 in 1909 to \$4,651,692 in 1919, with a decided increase in the value of each individual product. There were particularly striking increases in the values of cereals, hay and forage, fruits and nuts, which have more than trebled for each class of products. It should be borne in mind, however, that a part of this increase is due to the difference in the value of the dollar.

The natural crop adaptation of the various soils is recognized in a broad way. In general, cotton is planted on the better drained uplands, sugar cane and rice in lower and more poorly drained areas, and corn on the lighter sandier soils. The Tifton sandy loam, though covering a very small total area, is generally recognized as being particularly adapted to cotton. The deep sandy loams are chosen for sweet potatoes.

Farming methods and treatment of the various crops have not changed greatly in recent years and are fairly uniform in the different sections of the county. Occasionally improved labor-saving machinery and implements are utilized. The practice of winter plowing with light plows reaching only shallow depths is common, though

a few of the better farmers are using larger plows and more power on the heavier soils. Contour plowing and terracing on slopes is generally practiced to check erosion. A few tractors, disks, and large tractor plows have been used recently. The cheaper methods, utilizing colored labor and light implements, prevail at this time.

Since the advent of the boll weevil, the average date of planting cotton has been moved back 15 or 20 days, and is now early in March in seasons at all favorable. The practice of picking up the first "squares" that fall and destroying them is becoming general. Fence rows and hedges are kept free of brush and trash in order to destroy the winter habitat of the weevil. Poisons advocated for checking the weevil have not been used extensively. Commercial fertilizer or barnyard manure is always applied at planting time, and a few farmers make second applications after the crop has made considerable growth. Wanamaker (Cleveland Big Boll) and Bank Account are two popular varieties of short-staple cotton. Long-staple cotton is rarely grown.

The acreage of velvet beans is increasing rapidly from year to year. The beans are usually planted in alternate rows with the corn. The bush variety is usually planted if it is desired to cut the fodder. The yields range from one-half to three-fourths ton per acre when the crop is grown with corn.

Oats usually are sown broadcast on shallow-plowed land and harrowed or disked in. Nitrate of soda is sometimes applied after the crop is up. Much of the crop is cut green and cured for hay. The grain yields range from 10 to 35 bushels per acre. Wheat, buckwheat, and rye are only occasionally grown. Small patches of rice and sugar cane are grown on many farms and receive careful attention.

Sweet potatoes are bedded early in the spring and allowed to sprout. The "slips" or plants are usually transplanted on well-prepared ridges. Either barnyard manure or commercial fertilizer is spread along the row before the ridge is formed. The average yield in 1919, as returned by the census, was 91.5 bushels per acre, and in 1924 it was slightly more than 100 bushels.

Cowpeas and peanuts, like velvet beans, are occasionally planted in alternate rows with corn. Sometimes oat stubble is broken early in the summer and cowpeas are sown broadcast and plowed or harrowed in. Neither cowpeas nor peanuts are grown extensively.

Definite crop rotations have not been established in the county. The practice of rotating cotton with corn and velvet beans is common, but the rotation is very irregular. Some of the better farmers are trying out various rotations, but the present tenant system of farming discourages general adoption of scientific or systematic rotation of crops.

The 1920 census gives a total expenditure of \$621,028 for commercial fertilizers in 1919, 97 per cent of the farms of the county reporting their use. Mixtures analyzing 8-3-3 or 9-3-3, the figures indicating the percentage of phosphoric acid, nitrogen, and potash, respectively, are in most common use. The cotton crop receives a larger proportion of the fertilizer than all other crops combined,

An application of 300 to 500 pounds per acre is the average, but occasionally 1,000 to 1,500 pounds are applied on an acre. Corn usually is not fertilized, except with manure or velvet-bean hulls. Before the building of oil mills cottonseed was used for fertilizer, but this practice has ceased, though cottonseed meal is still applied to many fields. The oat crop sometimes receives a dressing of sodium nitrate. A liberal application of a standard fertilizer usually is applied in the commercial production of sweet potatoes.

The average expenditure for labor was \$313.90 per farm for the 547 farms reporting in 1919, and the total for these farms was \$171,701. Laborers and tenants are chiefly colored, and the supply is ordinarily sufficient to meet the demand. A monthly wage of \$12 to \$15, in addition to living quarters and principal provisions, is common. Men receive 75 cents to \$1 by the day and women and children from 25 cents to 75 cents. For labor in the sawmills, cotton mills, and in similar establishments the average daily wage is a little higher.

According to the census, there were 2,119 farms in the county in 1920, each tenancy being enumerated as a farm. The average size of farms was 78.3 acres, with an average of 39.7 acres of improved land. During the 10-year period prior to the 1920 census the number of owners operating farms decreased slightly, and in 1920, 78.7 per cent of the farms were operated by tenants. Most tenants pay cash rent or give a certain number of pounds of lint cotton per 1-horse farm. Under a popular system of renting on shares the fertilizer expense is divided equally between owner and tenant, the tenant furnishes the labor, the owner supplies the work stock, implements, and seed, and each receives one-half of the crop. Most of the unimproved lands are held in large tracts. Several large plantations of 1,000 to 5,000 acres are operated in various parts of the county.

The average value of farm land, as determined by the census of 1919, was \$32.71 per acre. The extreme range in selling price as gathered by interviews with farmers and other authorities in the county, is from \$5 to \$200 an acre, except for some pecan groves which are held at \$500 or more an acre. The price depends partly on the actual soil value, but is chiefly based upon the situation and improvements.

SOIL³

The representative soils of Jenkins County, as developed on the well-drained uplands, are characterized by light-colored very sandy surface soils. Over the greater part of the county this sandy covering is 6 to 18 inches thick and grades downward to a sandy loam and finally to a sandy clay. The sandy surface is uniformly medium textured, low in organic matter and in the finer grained mineral soil particles, such as silt and clay.

The soils of the poorly drained parts, developed in depressions and along all the drainage ways, are similar to the well-drained soils in

³ The soils as mapped in Jenkins County in general join with the soils as mapped in Burke, Screven, and Bulloch Counties. However, along the Screven County line a few areas do not join because the particular soil type is not extensive enough in Jenkins County to warrant mapping it as a type. Also along the Bulloch County line a few areas do not join because of changes in soil classification based on a better understanding of the soils and because of more detailed mapping in more recent surveys.

that they generally have a sandy surface soil and grade downward to heavier material. But, unlike those soils, they have developed darker colored surface soils, and heavier, more plastic and more highly mottled subsoils appear at shallower depths. In general they have higher ground-water levels.

The processes of weathering in this warm, humid climate have acted rapidly upon the original sandy material, so that the more soluble salts have been leached from the whole soil profile and the fine clay particles have been carried from the upper part of the soil into the lower. Smaller parts may even have been carried entirely out of the soil by the drainage waters. Thus the characteristic soil profile of this region is formed, consisting of three main horizons—(1) an upper light-textured horizon, (2) an underlying heavier textured horizon, and (3) the partially altered parent material, in which little or no textural change has taken place.

Weathering and the shifting of soil particles have been checked in varying degrees by erosion, high ground-water levels, and local induration or hardening of the subsoils.

On all slopes, and especially on unprotected slopes, the surface consisting of the upper part or the whole of the light-textured horizon is gradually being washed away. On many of the breaks and steeper slopes this horizon has been entirely removed exposing at the surface, in cultivated fields, numerous conspicuous spots of the heavier second horizon. High ground waters retard these soil-forming processes by preventing thorough aeration of the soil materials and by hindering the downward and capillary circulation of ground water. Locally rock outcrops form a temporary barrier to the normal progress of soil formation.

Through the processes of weathering the original sandy geological material has been greatly changed, so that the characteristics of the soil, which include a layer of material covering the surface of the region ranging from place to place between 1 foot and about 4 feet in thickness, are entirely different from those of the still unchanged geological material beneath it, the amount of the difference varying from place to place, but in types of the same texture the variations in the soil are slight, while those in the geological material below it are greater.

Results of chemical analyses of samples of soil collected in Jenkins County are not available to prove the statement just made. Mechanical analyses of samples collected in this county have been made which show well-defined differences in mechanical composition between the soil and underlying geological material, as well as differences between the several horizons of the soil itself.

Chemical analyses of samples of some of the same soil types as those widely prevalent in Jenkins County, collected from other parts of the State of Georgia, have been made by the laboratories of the Bureau of Soils. The results of analyses of samples from all the horizons of the Norfolk fine sandy loam including the geological formation beneath it follows, to illustrate the statement made above, that the soil is now different in character from the geological material beneath it. These samples were collected near Thomasville in Thomas County, Ga.

Norfolk fine sandy loam, 2½ miles northwest of Thomasville, Ga.

Constituent	Sample No. 29127, 0 to 6 inches	Sample No. 29128, 6 to 18 inches	Sample No. 29129, 18 to 48 inches	Sample No. 29130, 48 to 72 inches	Sample No. 29131, 72 to 144 inches
	Per cent	Per cent	Per cent	Per cent	Per cent
SiO ₂	91.74	92.48	82.98	51.63	74.12
TiO ₂.....	.44	.30	.64	.24	.91
Fe ₂ O ₃.....	.64	1.45	2.91	24.31	3.42
Al ₂ O ₃	1.93	2.87	9.20	15.94	15.40
MnO.....	.009	.006	.004	T.	.008
CaO.....	.32	.40	.30	.30	.10
MgO.....	.08	.16	.16	.24	.20
K ₂ O.....	T.	.11	.03	.07	.30
Na ₂ O.....	.05	.52	.04	.03	.51
P ₂ O ₅	T.	.024	.03	.09	.07
SO ₃.....	.05	.024	.03	.08	.05
Loss on ignition.....	4.73	1.94	4.03	7.53	5.80
N.....	.08	.024	.03	.007	.05
CO ₂ from carbonates.....	.00	.00	.00	.00	.00
H ₂ O at 100° C.....	.70	.45	.85	1.30	1.70

In this series of analyses samples numbered 29127, 29128, and 29129 were taken from the several horizons of the soil while sample 29131 was taken from the geological material beneath the soil. Sample 29130 is a transition sample and does not represent the characteristics of either soil or of the geological formation. It will be noticed that sample 29131 differs widely in character from any sample taken from any one of the three soil horizons. The percentage of silica is lower, that of alumina is much higher, and those of potash and soda are both higher. Experience has shown that samples of Norfolk fine sandy loam or sandy loam from whatever locality taken are almost identical in chemical composition, if comparable horizons be compared, but that samples from the geological formation underlying them show no such similarity.

The mechanical composition of several soils, mapped in Jenkins County, including the geological material underlying them, has been determined by analyzing Jenkins County samples. Two sets of analyses covering two soils have been selected to illustrate the relation of the several soil horizons or layers to the geological material beneath them.

Mechanical analyses of Norfolk sandy loam, Jenkins County, Ga.

Grade of material	Sample No. 256765, 0 to 1 inch	Sample No. 256766-67, 2 to 13 inches	Sample No. 256768, 14 to 20 inches	Sample No. 256769, 21 to 45 inches	Sample No. 256770-71, 46 to 65 inches	Sample No. 256772, 66 to 77 inches	Sample No. 256773, 78 to 87 inches	Sample No. 256774, 88 to 108 inches
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Fine gravel.....	3.2	3.1	6.0	7.2	5.1	7.8	13.6	10.6
Coarse sand.....	19.0	17.9	21.4	15.6	14.1	13.8	23.0	13.4
Medium sand.....	17.6	14.1	12.4	9.4	9.3	8.2	8.8	7.3
Fine sand.....	39.7	44.7	34.6	29.0	28.8	21.4	19.0	20.2
Very fine sand.....	6.0	8.9	6.6	6.6	8.2	7.4	4.2	5.0
Silt.....	9.7	7.3	7.0	5.6	7.6	8.4	5.5	4.5
Clay.....	4.8	4.0	11.9	26.7	25.8	33.0	26.0	39.1

Mechanical analyses of Susquehanna sandy loam, Jenkins County, Ga.

Grade of material	Sample No. 256753, 0 to 2 inches	Sample No. 256754-55, 3 to 14 inches	Sample No. 256756, 15 to 18 inches	Sample No. 256757, 19 to 24 inches	Sample No. 256758, 25 to 72 inches
	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Fine gravel.....	5.2	11.9	2.7	2.4	2.0
Coarse sand.....	14.6	23.1	8.8	5.7	7.8
Medium sand.....	10.9	9.5	4.4	3.2	4.2
Fine sand.....	37.1	25.5	13.4	9.2	12.1
Very fine sand.....	16.5	13.3	7.4	6.2	6.5
Silt.....	10.5	8.7	9.7	9.1	11.0
Clay.....	5.8	7.9	54.1	64.8	56.8

In the case of the Norfolk sandy loam the geological material represented in sample No. 256774 is not widely different in mechanical composition from the second or B horizon of the soil represented in samples Nos. 256768 to 256773, inclusive. This is also true of the Susquehanna sandy loam, as it is developed here. The character of the geological formation shown in samples Nos. 256757 and 256758 is quite similar to that of the second soil horizon shown in sample No. 256756. It will be noted, however, that this horizon is very thin, only 4 inches, and is therefore not fully normal. The difference between the geological material and the surface horizon of the soil whose character is shown in samples Nos. 256753 to 256755 is very striking.

Soils of the county which have been developed under similar conditions of topography, drainage, and under similar vegetation have tended to develop similar characteristic features, which form the basis for grouping them into soil series and soil types. These features are determined by a study of a soil section from the surface down to depths at which processes of weathering have not greatly altered the original material. Such a section is termed a soil profile and consists of various gradational strata, zones, or soil horizons. All soils having profiles that are similar with respect to number, color, texture, structure, relative arrangement, chemical composition, and thickness of the strata or horizons with the same character and geology of the partially altered original material, and differing only in the texture of the surface soil, are grouped in the same soil series. The series are separated into types on the basis of difference in the texture of the surface soil.

According to this basis of classification, the soils of the county are divided into two distinct groups: (1) The mature upland soils and those most closely associated with them; (2) the less mature soils of the county, which include (*a*) the less mature upland soils, (*b*) the immature terrace or second-bottom soils, and (*c*) the immature first-bottom soils of mixed character, which are permanently saturated or frequently flooded.

The first group includes members of the Norfolk, Tifton, Ruston, and Susquehanna series. They represent those soils in which the three-horizon profile described above has been well developed.

The Norfolk series is characterized by gray to light-gray sandy surface horizons, grayish-yellow sandy subsurface layers grading

downward into brownish-yellow friable sandy clays to an average depth of 6 feet, and then into partially altered parent material consisting of mottled very light gray, brownish-yellow, red, and reddish-brown sandy clay. Locally the altered parent material lacks uniformity and contains sandy or gravelly lenses and pockets, and in some places small lenses or seams of almost pure clay. Of the Norfolk series the sand, loamy sand, and sandy loam, and a deep phase of the last type are mapped. The Norfolk sand represents the typical mature profile most completely.

The parent material underlying the Tifton and Ruston soils is identical with that of the Norfolk. Their differences in the upper horizons are primarily due to the variation in topographic situation, height of ground-water table, and relative degree of erosion. The parent material of the Susquehanna in places is much heavier in texture and generally has a plastic, tough structure. In some places it is a laminated clay of a steel-gray color, and in others it is similar to the parent material of the Norfolk, Ruston, and Tifton soils.

The Tifton series is most closely related to the Norfolk and differs from it primarily in having numerous pebbles (impure iron oxide nodules) scattered over the surface and through the upper two horizons. The sandy surface layer is shallower and has a brownish-gray color, and the subsoil is slightly heavier and has a deeper brownish-yellow color than is typical of the Norfolk. Only the sandy loam type of this series occurs in the county.

The Ruston series also is closely associated with the Norfolk, but is distinguished from it primarily in having a brownish-gray surface soil and a reddish-brown, slightly heavier, friable, sandy clay subsoil. The sandy loam type is mapped in the present survey.

The Susquehanna series is more remotely related to the Norfolk series with respect to maturity of its soil profile. Deep weathering and leaching have been retarded by an unfavorable topography and poor internal drainage. Its occurrence at the heads of drainage ways, along lower slopes to streams on the more abrupt breaks, and in regions of intricate dissection, suggests that surface erosion has progressed so rapidly with relation to deep weathering of the parent materials that a mature soil profile could not develop. The surface horizon is gray to light gray in the upper part, grading into a light grayish yellow to yellow sandy loam below. The second horizon, which is only a few inches thick in the typical profile, is a reddish-brown, friable, sandy clay corresponding to the second horizon of the Ruston series. The partly weathered material lies much nearer the surface than is typical of the Ruston, Tifton, or Norfolk soils. The Susquehanna sandy loam type is the only representative of the series developed in Jenkins County.

The group of less mature upland soils includes the Grady and Plummer series. They are poorly drained soils associated geographically with the better drained upland soils. They are saturated with water most of the year and therefore have not progressed far toward maturity.

The Grady soils occupy poorly drained depressions such as lime sinks and the upper courses and heads of streams. They are char-

acterized by dark-gray surface soils grading to a lighter gray or grayish yellow in the lower part. The second horizon is a bluish-gray, very sticky sandy clay to clay, which is underlain by a bluish-gray, heavy, plastic sandy clay, mottled with dull red, yellow, and reddish brown. The sandy loam type of this series is mapped.

The types of the Plummer series have a gray surface soil and a slightly plastic heavier layer below, commonly mottled with yellow and reddish brown. The third horizon is essentially the same as that underlying the Grady soils. The Plummer sandy loam type is mapped in this survey.

The immature terrace soils have been subjected to processes of weathering for a much shorter time than the well-drained upland soils. The terrace soils are members of the Kalmia, Leaf, and Myatt series, which respectively correspond in color of the surface and subsoil horizons to the upland types of the Norfolk, Ruston, Grady, and Plummer series, though in general the materials of the terrace soils are better assorted, and indurated iron-oxide pebbles, which are so prevalent in the better drained upland soils, do not occur. The partly altered parent material is reached at shallower depths. The sand, sandy loam, and fine sandy loam types of the Kalmia, the fine sandy loam of the Leaf, and the sandy loam of the Myatt series are mapped. Small patches of the Cahaba sandy loam are included with the Kalmia sandy loam.

In the third division of immature soils, classed as Swamp, the soils are young because they are poorly drained and have been deposited within comparatively recent times. Additional sediments are being deposited and redeposited along all the main streams. They are extremely variable in color and texture.

Briefly, the two main groups of soils are located as follows: (1) The older and well-drained upland soils occupy interstream areas and are rather uniformly distributed over the entire county, with the mature Norfolk soils occupying situations where they were least disturbed in the processes of normal soil formation, that is, on the comparatively level, broader and better drained areas and on the high divides. (2) The immature and more poorly drained soils are in general located along the Ogeechee River and the minor streams, in sinuous depressions, and in lime sinks. As a group they occur in all parts of the county.

The partially altered materials from which the soils of Jenkins County have been derived consist of two groups; (1) the older sediments immediately underlying all of the upland, and (2) the more recent alluvial deposits underlying the terrace soils.

The older materials underlying the uplands are sediments which were originally transported by water from the Piedmont region and deposited as unconsolidated materials over a large part of the coastal plain. They consist of irregularly bedded sandy clay, clay, sand, and gravel, in places indurated into claystone and sandstone. Considered over broad areas, the deposits are very uniform with respect to character and kind of material, but considered locally, they sometimes vary from clay to gravel or sandstone within a few feet. These local variations occur both vertically and horizontally. A seam of almost pure clay frequently traverses a sandy

clay stratum, or a lens of gravel or coarse sand varying in thickness from 1 inch to several inches often occurs in a mass of sandy clay.

The sandy clays are mottled red, yellow, gray, white, and bluish gray, with the gray shades becoming more pronounced with depth. They contain a high proportion of angular quartz sand, chiefly medium in texture, but coarser fragments, scattered throughout the material, range from one-eighth inch to 3 inches in their broadest dimension. The larger fragments occur very scatteringly. Mica flakes and semidecomposed feldspar fragments are of general occurrence in the sandy clays and clays. The clays are grayish white to bluish gray. The coarse sands and gravel are usually stained with iron oxide or other coloring matter when found in place, but they appear in the surface soil and on the surface as light-colored pebbles.

Indurated sandy clay and clay outcrops occur in all parts of the county except the northwestern. They are situated along the breaks and around the heads of small streams, as low bluffs or boulder outcrops. The higher bluffs are 10 to 15 feet high. Rock outcrops are indicated on the map by symbol when they are sufficiently extensive.

The consistent local variation of the original material from sandy clay to clay, gravel, or sandstone, indicates that these sediments were deposited as flood-plain and delta formations where shifting currents, rapids, and eddies caused variation within short distances. Evidence indicating a marine origin is lacking, for no marine fossils in any form or materials clearly calcareous have been found in the county that could be assigned geologically⁴ to these surface deposits. The rocks which are common in areas of Susquehanna soils are free of fossil shells and contain very little or no lime.

In the northwestern part of the county, where sink holes occur, limestone evidently underlies the surface deposits at no great depth. Light-yellowish, soft, marly limestone outcrops along Spring Mill Branch about 1 mile south of Magnolia Spring and also in a sink hole near by. The bed is about 3 feet thick and contains a few small fossil shells.

The second group of materials which have contributed to the formation of soils in the county, consists of those which have been deposited by the Ogeechee River and its larger tributaries more recently than the first group. They were transported from the surrounding uplands and from the Piedmont country. Their mineral constituents are similar to those of the upland deposits, but they are uniformly finer and better assorted. They vary from medium-textured quartz sands to heavy clays, with local occurrence of coarse quartz materials. The heavier deposits are usually sandy plastic clays mottled gray to bluish gray, yellow, red, and dull red.

Much more recent alluvium occupies the flood plains of the streams. Additional sediments are being deposited and redeposited along all the streams.

In the subsequent pages of this report the soils are described in detail. The distribution of the several types is shown on the accompanying soil map.

⁴ Bul. Geol. Survey of Ga. No. 26, p. 341.

The following table gives the actual and relative extent of the various soil types mapped in the county :

Areas of different soils

Soil	Acres	Per cent	Soil	Acres	Per cent
Ruston sandy loam	63, 424	28. 2	Norfolk loamy sand	3, 008	1. 3
Grady sandy loam	35, 264	15. 7	Kalmia sand	2, 560	1. 1
Norfolk sandy loam	13, 952	14. 1	Plummer sandy loam	1, 472	. 7
Deep phase	17, 856		Myatt sandy loam	1, 472	. 7
Swamp	28, 032	12. 5	Tifton sandy loam	1, 152	. 5
Norfolk sand	21, 952	9. 7	Kalmia fine sandy loam	704	. 3
Susquehanna sandy loam	21, 056	9. 3			
Leaf fine sandy loam	8, 896	3. 9			
Kalmia sandy loam	4, 480	2. 0	Total	225, 280	-----

NORFOLK SAND

The sandy surface material of the typical Norfolk sand is composed of light-colored, loose, incoherent, quartz sand and very scattering quartz and iron oxide pebbles. It extends to an average depth of about 63 inches. In virgin areas the upper layer of 4 inches is a gray sand, but under cultivation the surface soil becomes a yellowish-gray sand to a depth of 7 or 8 inches. Underlying this shallow surface layer is a light grayish-yellow sand growing downward into a light yellowish-gray sand containing considerable coarse material in the lower part. Below about 39 inches the material is chiefly a yellowish-white sand, containing scattering subangular crystalline quartz fragments and impure iron oxide nodules, and grading at an average depth of about 59 inches into a layer of 4 or 5 inches of grayish-yellow sand, mottled with reddish-brown loamy material and containing numerous iron oxide pebbles in various stages of induration.

The second main horizon consists of brownish-yellow, friable, light sandy clay with a high content of quartz sand. It is mottled with small accumulations of reddish-brown loamy sand, and contains iron oxide pebbles that have definite form but are usually soft and crumble with firm pressure in the hand. The stratum averages 19 to 20 inches in thickness, and its lower boundary usually occurs at a depth of about 83 inches. The upper boundary is very definite but its depth from the surface varies within a few inches up and down. A pocket of the sandy material often extends below the general plane of contact, or a tongue extends down along plant roots.

Below this the partially altered parent material is a mottled grayish-white, bright-yellow, red, dark-red, reddish-purple, and reddish-brown, plastic, sandy clay. The grayish-white, material is more plastic and sticky than the associated materials and becomes more predominant with depth. The dark-red mottlings are apparently incipient iron oxide nodules (pebbles) with sand and other impurities included. A rather definite angular fracture is developed in this material, which extends from an average depth of 84 inches to many feet, depending upon the depth of weathering and thickness of the geological formation of which it is composed.

The Norfolk sand, as mapped, varies locally from the typical soil, mainly with respect to the thickness of the principal layers, but also in color and assortment of materials. The type grades more or less into other soils, and at the outer margins, where it is associated with the Norfolk sandy loam, the sandy layer decreases in thickness and the sandy clay layer becomes more yellowish and slightly loamy at depths ranging from 30 to 40 inches. In local areas the surface soil contains coarser material and in places quartz and feldspar pebbles are very numerous on the surface and through the soil section. Along zones of contact with the Susquehanna sandy loam, mainly in the northeastern part of the county, the sandy clay layer is more mottled and plastic and occurs at shallower depths than typical. In some areas the individual sand particles in the surface soil have a brown to reddish-brown tint. The largest of these areas lies 2 miles southeast of Butts. Where surface wash and winds have contributed greatly to the formation of the deep sandy layer, it varies considerably in depth and arrangement of horizons.

The Norfolk sand occurs in all parts of the upland region of the county, but is most extensive in the "piny woods" section, where it forms the crests of divides, and in places extends down the slopes of ridges between two merging streams. It has developed in situations which have been least disturbed in the process of weathering and subsequent accumulation of soil.

The areas of the Norfolk sand consist of rolling country composed of knolls, ridges, and low hills. The slopes are generally gradual. Drainage is well established on the surface and also internally, but the internal drainage is sometimes excessive owing to the open porous structure of the subsoil. Terracing to prevent erosion is generally practiced.

A scattering growth of longleaf yellow pine (*Pinus palustris*), with scattering scrub oaks, constituted the original forest on this type, but practically all of the merchantable timber has been removed. About 50 per cent of the type is now under cultivation, and the rest supports a growth of scattering longleaf yellow pine, numerous scrub oaks, and clumps of wire grass (*Aristida stricta*).

Corn is the principal crop, though cotton is grown. The yields are low, corn averaging 8 to 12 bushels per acre and cotton one-fifth bale under good management. Cowpeas and velvet beans yield one-third to two-thirds ton of forage per acre.

This land sells for \$10 to \$40 an acre, along with adjoining land. Location and improvements are the basis for valuation.

The practice of using a short rotation including a legume, combined with light applications of complete fertilizer, is the most economical method of growing the general farm crops. When other conditions are favorable, the growing of special crops is satisfactory, for the returns are large enough to warrant heavy fertilization. Liberal applications of lime would improve the soil by aiding the growth of legumes. The sturdy growth of young longleaf yellow pine which occurs in a number of places suggests the profitable use of this soil for forestry.

The table below gives the results of mechanical analyses of samples taken at various depths in the profile of the Norfolk sand:

Mechanical analyses of Norfolk sand

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	<i>Per cent</i>
256745	Soil, 0 to 4 inches-----	6.8	25.0	5.8	41.9	12.9	5.0	2.5
256746	Subsoil, 5 to 23 inches-----	5.6	19.4	11.9	41.9	12.8	6.6	2.2
256747								
256748	Subsoil, 24 to 39 inches-----	5.8	16.4	10.2	45.5	14.5	5.4	1.5
256749	Subsoil, 40 to 59 inches-----	8.9	20.0	11.8	43.5	12.8	2.4	1.2
256750	Subsoil, 60 to 63 inches-----	7.0	16.0	10.6	43.8	12.5	5.2	5.4
256751	Subsoil, 64 to 83 inches-----	8.4	18.4	12.0	35.8	7.8	4.2	13.8
256752	Subsoil, 84 to 96 inches-----	1.0	5.0	3.2	10.9	9.0	26.8	44.1

NORFOLK LOAMY SAND

The Norfolk loamy sand in its typical development has a sandy soil extending to an average depth of 37 inches. The sand consists chiefly of angular quartz particles. In forested areas the surface covering, 1 or 2 inches thick, is a dark-gray sand with a slightly loamy feel owing to the presence of organic matter. Under cultivation the dark surface is mixed with underlying material, which, after leaching, forms a brownish-gray sand to a depth of 6 inches, or slightly deeper around plant roots. Below this, and down to the 37-inch depth, the material is a light yellowish-gray sand grading into a light grayish-yellow loamy sand. A few scattering iron oxide pebbles occur throughout this horizon.

The material of the second horizon is a yellow heavy sandy loam, slightly mottled with reddish brown, grading at about 54 inches into mottled reddish-brown, very light gray, and yellow sandy clay, which extends to an average depth of 72 inches and contains numerous iron oxide nodules in various stages of induration and ranging up to one-half inch in diameter.

Below this the material to depths of many feet is composed of mottled red, very light gray, yellow, and reddish-brown, plastic sandy clay. Locally it contains lenses of coarse gravelly material and light sandy clay, slightly cemented. There are no hard iron oxide pebbles, but the red mottlings are apparently incipient pebbles. Subangular crystalline quartz fragments occur here and there throughout the soil profile.

The type varies locally in the thickness of the sandy surface soil. It also includes areas of Norfolk sand and Norfolk sandy loam that are too small to map. It occurs throughout the uplands except in the northwestern part of the county. As a rule it occupies flat to gently sloping areas along the sides of ridges. It is adequately drained.

The type is not extensive in this county, but most of it is cleared and under cultivation. Originally it supported a growth of long-leaf yellow pine, slash pine (*Pinus caribaea*) black pine, and scattering oaks. Corn, cotton, and velvet beans are the principal crops. Like other types of the Norfolk series, the loamy sand is subject to rapid leaching and requires legumes, manure, or heavy applications of complete fertilizer to maintain production. Under good man-

agement corn yields 10 to 15 bushels per acre, and cotton one-quarter to one-third bale. This land has an average value of \$15 to \$30 an acre, according to location and improvements. It is best adapted to growing of early truck, sugar cane, sweet potatoes, and peanuts.

NORFOLK SANDY LOAM

The surface horizon of the typical Norfolk sandy loam to an average depth of about 20 inches is composed of several very distinct layers. The material is chiefly sharp, angular, crystalline quartz sand. The immediate surface in virgin areas, underneath the decaying vegetable matter, is a very dark-gray, loamy sand to a depth of 1 or 2 inches, underlain to an average depth of 7 inches by a gray, loose, loamy sand. Under cultivation the organic matter is rapidly depleted and the color changes to yellowish gray. Below this is a light grayish-yellow, incoherent, loamy sand, grading at about 14 inches into a light brownish-yellow, mellow sandy loam. Scattering quartz and iron oxide pebbles occur on the surface and through the soil.

Below 20 inches the material is a brownish-yellow, light sandy clay, with a slight reddish tint, which passes at about 45 inches into mottled brownish-yellow and reddish-brown friable sandy clay, with some light yellowish-gray mottlings below 55 inches, and extending to an average depth of about 65 inches. The iron oxide pebbles occur in various stages of hardness, and the reddish-brown mottlings are aggregates of iron oxide, which contain silica and other impurities and crumble readily between the fingers. In the lower 10 inches these pebbles form 10 to 15 per cent of the total mass and range from one-eighth inch to one-half inch in diameter. The sandy clay contains a high proportion of quartz sand. Scattering quartz fragments, which are mainly subangular and range up to 1 inch in diameter, occur throughout the entire depth of the type.

The substratum, consisting of the parent material in a partly weathered condition, is composed of mottled gray-white, brownish-yellow, reddish-brown, and red, heavy plastic sandy clay containing a high percentage of sharp quartz sand and scattering angular fragments of crystalline quartz, small flakes of mica, and fragments of feldspar. The upper part is hard and cemented, but crumbles under firm pressure between the fingers. The red color is predominant, but the grayish white becomes more pronounced at a depth of about 88 inches, and a definite angular fracture is developed.

This type as a whole is rather uniform in all respects except in the depth of the sandy surface soil. Where the sandy clay material is more than 24 inches below the surface, it is mapped as a deep phase. West and southwest of Perkins, 1 to 2½ miles, the type as mapped includes small areas of Ruston sandy loam and in many places reddish-yellow to red mottlings occur within 3 feet of the surface. The boundary between the Norfolk sandy loam and its deep phase is more or less arbitrarily fixed, as these two soils merge into each other very gradually. This is also true with respect to the closely associated Ruston sandy loam and Tifton sandy loam. On the slight breaks the soil tends toward the Ruston sandy loam. A few small areas of a flat phase have also been included.

The Norfolk sandy loam occurs in all sections of the county, but is not a dominant type in any locality except in the vicinity of Perkins. It occupies gently sloping to undulating uplands which are not subject to excessive erosion. It has a favorable topography for agriculture and is well drained.

The virgin forest consisted chiefly of longleaf yellow pine and slash pine, with some red oak and post oak. Wire grass was the native grass. Approximately 95 per cent of the type is under cultivation. Terracing of the more sloping areas is practiced to check erosion.

This soil ranks high in agricultural value and is well adapted to general farming. Corn, cotton, cowpeas, and velvet beans are the principal crops; cotton is the most important. Corn produces from 12 to 25 bushels per acre under normal conditions. Cotton averages one-half bale, though the average was about three-fourths to 1 bale per acre before the boll weevil came into the county. Cowpeas average about three-fourths ton of hay per acre. Oats, rye, pecans, orchard fruits, garden truck, potatoes, and strawberries do well on the type and produce satisfactory yields when properly fertilized. Wheat is grown in small areas. Sugar cane does well, yielding a high grade of sirup. Pastures of Bermuda grass (*Capriola dactylon*) are maintained on this soil in a few places.

An average of 400 pounds per acre of 8-3-3⁵ or 9-3-3 fertilizer is applied to cotton. Corn is sometimes given 250 to 400 pounds of an 8-3-3 fertilizer or a light top-dressing of nitrate of soda, but more generally barnyard manures or velvet-bean hulls are used on corn land if it is fertilized at all.

When favorably located and well improved, this type is valued at \$75 to \$125 an acre, but in the outlying districts it sells with adjoining land for \$25 or \$30 an acre.

The Norfolk sandy loam is generally deficient in plant-food constituents, but responds well to fertilizer and is highly prized for cotton, corn, and other staple crops. The physical condition is very desirable. In other sections of the State, tobacco, peanuts, and melons are successfully grown on this soil. In all cases it is urgently in need of organic matter, which can be supplied by growing and plowing under cowpeas, velvet beans, or soy beans, and by adding liberal quantities of manure. A soft, yellow, marly limestone outcrops in places in the vicinity of Magnolia Spring, and it might be economically utilized on the Norfolk sandy loam and other soils of the county. Unless a well-balanced crop rotation is followed, it will be necessary, in order to maintain the yields, to continue and increase the application of fertilizers.

Norfolk sandy loam, deep phase.—The deep phase of the Norfolk sandy loam is separated from the typical sandy loam chiefly on the basis of the greater depth of the light-textured soil. The surface layer is a light yellowish gray, loose, incoherent sand to loamy sand, with a depth of 7 inches, except in virgin areas where it is dark gray grading downward to gray. This is underlain, to an average depth of 26 inches, by a light grayish yellow loamy sand, becoming heavier with depth. Below this the material is essentially the same as in the typical soil, except that in the first few inches the sandy

⁵ Percentages of phosphoric acid, nitrogen, and potash, respectively.

clay is slightly lighter in texture. In some places the deep phase grades into or includes small areas of the loamy sand type and also the typical sandy loam, but these variations are very small in extent and can not be accurately mapped on a scale of 1 inch to 1 mile. The phase represents an intermediate soil between the typical sandy loam and the loamy sand types.

The principal development of the phase is north and northeast of Millen, but small areas occur in all parts of the uplands. It has a topography similar to the typical soil, but frequently occupies lower positions on the points of low ridges and around the heads and lower slopes to streams. Generally the slopes are gradual and the surface is gently rolling. Drainage is well established.

About 80 per cent of the deep phase is cleared and largely under cultivation. It is utilized in the production of the same crops as the typical soil, but yields are generally lower. Corn is the principal crop, with average yields of 8 to 10 bushels per acre. Velvet beans, cowpeas, or peanuts are usually planted in alternate rows with the corn. Corn is planted farther apart in the row than on the heavier soils, plants being left from 20 to 30 inches apart. Terracing and contour plowing is practiced on the slopes to retard erosion.

The need for organic matter is even more urgent than in the typical soil, and special attention to maintenance of fertility is necessary if the yields are to be kept normal. With heavy applications of fertilizer and growing of special crops which warrant the expense, this soil is very profitable in other sections of the country. Early garden truck and certain types of tobacco have been grown successfully where markets and transportation facilities were favorable.

The table below gives the results of mechanical analyses of samples taken at various depths in the profile of the typical Norfolk sandy loam:

Mechanical analyses of Norfolk sandy loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	<i>Per cent</i>
256765	Soil, 0 to 1 inch.....	3.2	19.0	17.6	39.7	6.0	9.7	4.8
256766	Subsoil, 2 to 7 inches.....	2.0	14.6	13.8	48.6	10.2	7.0	3.8
256767	Subsoil, 8 to 13 inches.....	4.2	21.2	14.4	40.8	7.6	7.7	4.3
256768	Subsoil, 14 to 20 inches.....	6.0	21.4	12.4	34.6	6.6	7.0	11.9
256769	Subsoil, 21 to 45 inches.....	7.2	15.6	9.4	29.0	6.6	5.6	26.7
256770	Subsoil, 46 to 54 inches.....	5.8	15.6	9.9	30.8	7.0	5.8	25.1
256771	Subsoil, 55 to 65 inches.....	4.4	12.6	8.7	28.8	9.4	9.5	26.6
256772	Subsoil, 66 to 77 inches.....	7.8	13.8	8.2	21.4	7.4	8.4	33.0
256773	Subsoil, 78 to 87 inches.....	13.6	23.0	8.8	19.0	4.2	5.5	26.0
256774	Subsoil, 88 to 108 inches.....	10.6	13.4	7.3	20.2	5.0	4.5	39.1

RUSTON SANDY LOAM

The Ruston sandy loam in virgin areas is characterized by a dark grayish-brown loamy quartz sand 2 inches deep, underlain to an average depth of 6 inches by a grayish-brown loamy sand. In cultivated areas the surface soil is brownish gray. Below this, to an average depth of 16 inches, the soil is a yellowish-brown loamy sand. A few hard, dark-brown iron oxide pebbles occur on the

surface and through the soil. The lower boundary passes into the heavier material below within 1 or 2 inches and approximately parallels the surface of the ground, though the sandy material extends downward a little around roots.

In the second horizon the material is a light reddish-brown to slightly yellowish-brown sandy loam grading downward into a heavy sandy loam and passing at a depth of 30 inches into mottled bright-red and yellow sandy clay containing a high percentage of quartz sand, consisting predominantly of sharp crystalline quartz. Coarser quartz fragments ranging from one-sixteenth inch to one-half inch in diameter are scattered throughout the entire soil profile. These quartz fragments are more resistant to weathering and transportation than the finer soil particles and accumulate in the soil. Iron oxide pebbles also occur in the weathered horizons, but in the partly altered parent material they occur only in the extreme upper part as friable concentrations of iron oxide, sand, and other impurities.

The partly weathered substratum is similar to the corresponding material in the Norfolk and Tifton soils, except that the average depth to its upper boundary is less than in the Norfolk and Tifton and more than in the Susquehanna soils. It fractures readily along curved fissures and tends to cave in in wells or other deep holes. Mica flakes and semidecomposed feldspar fragments are conspicuous in the lower part. Below depths of 30 feet or more the material is a mottled purple, yellow, gray-white, and red sandy clay.

There is considerable variation in the type in different sections of the county. In a number of places it grades into adjacent areas of the Norfolk sandy loam or the Susquehanna sandy loam. Iron oxide pebbles are abundant in places on the surface and through the soil section, and gravel symbols indicate their location. On the steeper slopes and in close proximity to Grady and Susquehanna soils the subsoil is frequently more compact and heavier than typical. In all parts of the uplands there are extensive areas that are not typical of either the Ruston or the Norfolk sandy loam, but because of the brownish color of the sandy surface soil and the reddish tint and reddish mottlings of the sandy clay subsoil they have been mapped as Ruston sandy loam. In much of the type, but principally in the eastern half of the county, small areas of a deep phase, in which the sandy soil extends to a depth of 20 to 25 inches, have been included.

In the southeastern part of the county, 1 mile southwest of Paynes Church, a few small areas of Orangeburg sandy loam are included. These occupy prominent knolls and differ from the Ruston chiefly in the red to bright-red color of the friable sandy clay layer. Also on the higher knolls in the lime-sink region a few small areas of Orangeburg sandy loam are included. Another inclusion lying $1\frac{1}{2}$ miles southeast of Buckhead Church consists of an area of Greenville sandy loam one-half mile long and one-quarter mile wide. It occurs on a very gentle slope paralleling the abrupt breaks along the south side of Buckhead Creek. The surface soil is a dull-red sandy loam 5 or 6 inches deep grading into a dark-red, rather heavy friable sandy clay.

The Ruston sandy loam is the most extensive soil in the county and is distributed over all parts of the county. Generally it occurs on knolls, breaks, or broad sloping areas and is very well drained.

The ground water level is usually 25 feet or more below the surface. Owing to its sloping topography it is subject to sheet erosion, and terracing is generally practiced to check surface washing, especially on the steeper slopes.

The type was originally covered with a heavy forest. In the northwestern lime-sink region hardwoods predominated, chiefly black oak, tulip, and ash; in other sections the longleaf yellow pine and slash pine predominated. About 85 to 90 per cent is cleared and under cultivation.

General farming is practiced extensively on this soil, and its topography, physical condition, and capacity for holding moisture are very favorable. Cotton, corn, and velvet beans are the chief crops. The yields are slightly better than are obtained on the Norfolk sandy loam. Applications of 400 to 500 pounds per acre of an 8-3-3 or 9-3-3 fertilizer are commonly made on cotton land, but occasionally 1,000 pounds or more are applied.

The price of this land averages \$50 an acre, but ranges up to \$200 or \$300 an acre for a few of the best pecan groves. On the better improved and favorably located general farms it ranges from \$75 to \$125 an acre. Very little of this land is on the market.

The general practice of growing legumes and cover crops and the use of a definite crop rotation which would allow for recuperation of the land are considered necessary to maintain production.

The results of mechanical analyses of samples taken at various depths in the profile of the Ruston sandy loam are given in the following table:

Mechanical analyses of Ruston sandy loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	<i>Per cent</i>
256720	Soil, 0 to 2 inches.....	7.0	23.9	12.3	32.3	11.4	8.6	5.1
256721	Subsoil, 3 to 8 inches.....	4.3	20.9	12.2	35.9	13.1	8.5	5.1
256722	Subsoil, 9 to 12 inches.....	6.5	16.4	8.2	25.3	9.2	6.9	27.8
256723	Subsoil, 13 to 46 inches.....	7.6	18.4	8.6	23.4	7.5	7.7	27.0
256724								
256725	Subsoil, 47 to 60 inches.....	4.7	17.1	9.4	23.9	6.0	8.5	30.9
256726								

TIFTON SANDY LOAM

The typical surface of the Tifton sandy loam in virgin areas consists of 2 or 3 inches of very dark grayish-brown loamy quartz sand, underlain by 3 or 4 inches of grayish-brown loamy quartz sand. When mixed by cultivation the surface soil is a grayish-brown loamy sand. Hard iron oxide pebbles, very dark brown in color, with smooth surfaces and irregular shapes, form about 40 per cent of the mass.

The subsoil has two divisions and extends to a depth of about 56 inches. The upper averages 35 inches thick and grades downward from a yellow light sandy loam containing numerous iron oxide pebbles to a deep-yellow, firm, but friable sandy clay. The lower averages about 15 inches thick and consists of a heavy, friable sandy clay, mottled deep red and yellowish brown. The red mottlings

are deeper red toward their centers, are very numerous, and average three-quarters inch in diameter. Iron oxide pebbles varying in degree of hardness occur throughout the subsoil layer, forming about 30 per cent of the mass in the upper 10 inches but decreasing with depth. They average about one-half inch in diameter but some reach a maximum of 2 inches.

The material below an average depth of 56 inches down to many feet is similar in all respects to the corresponding substratum of the Norfolk series. Scattering angular quartz fragments occur throughout the soil profile. The sandy material is usually poorly assorted, but averages a medium texture.

In a few places the type grades into or includes a pebbly phase of the Ruston sandy loam. In these places the subsoil is slightly heavier and has a distinctly reddish tint.

The Tifton sandy loam has a small total extent. It occurs in small scattering areas on the crests of the higher hills and ridges in all sections of the county except the northeastern. The ground-water level is usually below 30 feet, and both the surface and internal drainage are well established.

This type is generally recognized as the strongest soil in the county. Originally it supported a heavy growth of longleaf pine and scattering oaks, but 90 per cent of it is cleared and intensively farmed.

Cotton is the principal crop grown, and many of the scattering areas have been planted to cotton each year for 12 years or more. The yields range from one-half bale to 1½ bales per acre, with an average application of 400 pounds of a complete standard fertilizer. Corn, velvet beans, and cowpeas are grown successfully on the type. Corn averages 25 bushels per acre and yields up to 50 and 60 bushels under good management. Velvet beans and cowpeas yield 1 to 2 tons of hay per acre. Alfalfa has been successfully grown on this soil for three years without reseeding. All staple crops and fruits and vegetables do well.

The soil is handled in the same manner as the Norfolk and Ruston soils. In many places it requires more power for plowing, owing to the firmer and heavier subsurface layer. Organic matter is the principal need of this soil, and it can be supplied from legumes. The harder and shallower variations can be rapidly improved in tilth as well as fertility by growing legumes and plowing under green-manure crops. The lime requirement is not high, but a light application would be beneficial to leguminous crops.

SUSQUEHANNA SANDY LOAM

In the typical Susquehanna sandy loam the surface soil is a light-gray to yellowish-gray quartz sand, with a loamy feel, grading at about 10 inches into a light grayish brown loamy quartz sand extending to an average depth of 14 inches. In forest areas the upper layer of 2 or 3 inches is dark gray owing to the presence of organic matter. A few scattering iron oxide pebbles occur on the surface and in the surface soil. The quartz fragments are angular and poorly assorted, and range from very fine sand to 1¼ inches in diameter, but the average is a medium-textured sand. The lower boundary is distinct but varies a few inches in depth,

The subsoil layer, averaging about 10 inches in thickness, consists of 4 inches of dull reddish-yellow, slightly plastic, light sandy clay, with very faint gray mottlings, grading into mottled dull-red, light brownish-yellow, red, and gray-white sandy clay.

The partly weathered parent material lies much nearer the surface than it does in the other better-drained upland soils, usually at about 24 inches. It is a mottled gray-white, dull-red, red, yellowish-red, purplish-red, and light brownish-yellow, heavy, sticky, plastic, intractable clay, containing some sand, and has a fairly well-defined angular fracture. The mineral constituents are identical with those found in the third horizon of the other upland soils. The gray material becomes predominant at higher levels than in the Norfolk, Tifton, and Ruston series. Locally the type is conspicuous because of outcrops of rocks which are apparently formed by hardening or cementing of a part of the sandy clay, clay, and sand of the parent materials. The rocks range from 2 to 10 feet in thickness and are usually underlain by a bed of very stiff or indurated bluish and purplish clay. Bedrock occurs at an average depth of 48 to 72 inches.

The type varies within very short distances, chiefly in the thickness and texture of the upper two layers. In places the sandy surface soil is 24 inches or more deep. On the lower slopes the upper two layers are very thin in places or the parent material may appear in eroded places as "gall spots." Areas of Norfolk sand and sandy loam, too small to map separately, are included within the boundaries of the type.

This soil occupies the steeper slopes and more dissected parts of the county and is distributed over all sections except the lime-sink region in the northwest. It occurs chiefly around the smaller streams and their numerous tributaries in belts ranging from a few feet to one-fourth mile or more in width. The topography is rolling to undulating, with numerous sharp irregularities which form locally a rough choppy surface. The surface is usually well drained, but the heavy, almost impervious subsoil prevents proper underdrainage and results in seepage at the lower elevations.

The type is one of the more extensive soils of the county but is only of moderate importance agriculturally. About 30 or 35 per cent is cleared and cultivated; the rest is forested with longleaf, shortleaf, and slash pine or is lying idle as cut-over land. Scattering clumps of wire grass and broom sedge occur and gallberry bushes and gum trees are common in the wet seepy places.

In the more favorable locations fair yields of cotton and corn are obtained, cotton yielding from one-fourth to one-half bale, and corn 10 to 15 bushels per acre. Most of the type is not suitable for cotton because of poor underdrainage. Rye, oats, sugar cane, and some garden products are grown and give fair yields.

It is advisable to have cover crops on this soil at all times in order to check further washing. In the wetter situations, which are unfavorable for cultivation, a mixture of Bermuda grass, carpet grass, and lespedeza makes a fair pasture. Legumes plowed under and liberal applications of manure and lime would do much toward improving the physical condition of the soil after it is adequately drained.

The land usually sells with adjoining uplands for \$25 or \$30 an acre, but as a separate type it has a much lower value.

The table below gives the results of mechanical analyses of samples taken at various depths in the profile of the Susquehanna sandy loam:

Mechanical analyses of Susquehanna sandy loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	<i>Per cent</i>
256753	Soil, 0 to 2 inches.....	5.2	14.6	10.9	37.1	16.5	10.5	5.8
256754	Subsoil, 3 to 14 inches.....	11.9	23.1	9.5	25.5	13.3	8.7	7.9
256755								
256756	Subsoil, 15 to 18 inches.....	2.7	8.8	4.4	13.4	7.4	9.7	54.1
256757	Subsoil, 19 to 24 inches.....	2.4	5.7	3.2	9.2	6.2	9.1	64.8
256758	Subsoil, 25 to 72 inches.....	2.0	7.8	4.2	12.1	6.5	11.0	56.8

GRADY SANDY LOAM

The typical Grady sandy loam has a sandy surface soil averaging 17 inches in depth, which consists of a mouse-gray light sandy loam in the upper 2 or 3 inches, passing into a gray loamy sand, and this grading at about 9 inches into a light-gray loamy sand. The better drained and cultivated areas have a light-gray to bluish-gray surface. The subsoil is a bluish-gray light sandy clay, containing a few faint yellow and reddish-brown mottlings or iron stains around roots and rootlets. It grades into the partly altered parent material at a depth of about 23 inches. A high proportion of angular quartz sand is present through the entire soil profile, but the relative proportion of clay increases with depth in the upper part. Crystalline subangular quartz fragments averaging one-half inch in diameter are scattered throughout the soil profile. A few iron oxide pebbles develop in the better drained situations.

The substratum extends to depths of many feet, but is less deep in the sink-hole region, where limestone underlies the surface at a depth of 35 to 50 feet in many places. To a depth of 60 inches it consists of a bluish-gray, heavy sandy clay, mottled with dull red, yellow, and reddish brown, hard and compact, but crumbling readily between the fingers. The intense mottling occurs as lenses or pockets in the matrix of bluish-gray sandy clay.

In places surface wash has increased the depth of the sandy soil to 25 or 30 inches, and in some places a thin layer of mucky material has accumulated on the surface. There are some slight variations in surface texture from fine to coarse, but owing to their small extent such areas were not mapped as a different type.

Small areas of the Grady clay loam and Plummer sandy loam are also included in places where separation is not feasible on account of close association and relatively small extent. The spots of Grady clay loam are very small and for this reason were combined with the sandy loam. The surface soil is a dark-brown mucky loam or a gray clay loam, 3 to 5 inches deep, underlain by a heavy sticky clay, gray in color or mottled gray, brown, and yellow. It is covered with water most of the time, and supports a growth of cypress and oaks.

Along some of the draws, narrow belts of Susquehanna sandy loam are included with this type, since they are too narrow to show on the map without considerable exaggeration.

The Grady sandy loam is developed most typically and extensively in the northwestern part of the county in the lime sinks and sinuous depressions. It occurs also in the poorly drained and poorly defined upper courses of streams in all parts of the county. The sinks range in depth from 4 to 10 feet, except in the vicinity of Magnolia Spring, where they are 30 feet deep in places. They are usually circular in shape, but many of them are more or less connected, forming indefinite drainage ways. The surface of this soil is generally level to gently sloping, and drainage is poor. The ground water level is usually within 25 or 30 inches of the surface. Many of the sinks contain ponded water during the driest seasons. All the type is saturated with water during most of the year.

Although the total acreage of this type is considerable, it is not an important agricultural soil, and less than 10 per cent is under cultivation. The timber growth is slash pine, loblolly pine (*Pinus taeda*), tupelo, and cypress, and, on the edge of sinks and depressions, maple, white oak, ash, persimmon, and water oak. The undergrowth consists of gallberry, reed, brier, white violets, pitcher plants, and other plants which thrive on poorly drained soils.

A few small tracts of this land have been cleared and drained in the more favorable situations, and corn, oats, and some rice, sugar cane, sorgho, and onions are grown successfully. Where conditions warrant the expense of proper drainage, this soil can be utilized for crop production. Its tilth gradually improves with cultivation. Liming and the growing of legumes would be advisable.

The present valuation is low, for most of the best timber has been removed, and the land is utilized primarily as a "run" for hogs and cattle and as a source of fuel supply for tenants.

PLUMMER SANDY LOAM

In virgin areas the typical surface soil of Plummer sandy loam consists of 1 or 2 inches of very dark gray, loamy quartz sand passing into a gray loamy quartz sand, with numerous faint brown and yellowish-brown iron oxide strains. Below this it grades into a mottled brownish-yellow and yellowish-gray, light sandy loam, extending to an average depth of 15 inches. Coarse fragments, ranging up to one-half inch or more in diameter, occur in small amounts on the surface and throughout the soil profile.

The subsoil is a light bluish gray sandy loam, mottled with brownish yellow, passing at an average depth of 35 inches into mottled bluish-gray and brownish-yellow, light sandy clay, grading into a slightly sticky, plastic sandy clay, which extends to an average depth of 48 inches.

The substratum is a mottled red, yellow, brownish-yellow and bluish-gray sandy clay, containing a high percentage of quartz sand. The red and yellow mottlings are predominant. The sandy clay is slightly sticky and plastic when wet, but when dry is friable and readily crumbled between the fingers. It is more or less impervious and is much drier in places than the subsoil above.

The Plummer sandy loam is developed in a few small scattering areas distributed in all sections of the county. The largest and most typical area is in the extreme southeastern corner of the county. The type occupies the lower gentle slopes along small streams or around the edges of shallow lime sinks. The soil is poorly drained, owing to the heavy nature of the subsoil and to the seepage from surrounding uplands.

This type is not used for crop production, except where small patches have been included with better drained soils. It supports a growth of slash pine, longleaf yellow pine, and a few scattering water oaks. The undergrowth is principally gallberry, briars, wire grass, carpet grass, and scattering patches of pitcher plants.

Unless a favorable location and a demand for a special crop should warrant the expense of drainage, this type is most economically utilized for the production of timber and for pasture. It should remain in forest. Its present value is low, averaging \$8 to \$10 an acre.

KALMIA SAND

The Kalmia sand in its typical development is a light-colored quartz sand to an average depth of 78 inches. Organic matter has given a dark-gray shade to the first inch or two in virgin soils. It grades downward from a yellowish-brown sand, through grayish-yellow and light grayish-yellow sand, into a gray-white sand with a light-yellowish tint. This gray-white sand extends from about 48 inches down to 78 inches and in the lower part contains pockets of reddish-brown loamy sand ranging from 6 inches to 15 inches in diameter. Below this is a layer of mottled reddish-brown, yellow, and gray, heavy sandy loam, grading into a plastic sandy clay, which extends to an average depth of 90 inches. The gray material is more sticky and plastic than the associated materials.

This type varies considerably, chiefly in the texture, intensity of mottling, and thickness of the lower horizons, and in the total depth of the incoherent sand. Small areas of fine sand are included with the type. The largest of these lies in the northwestern part of the county one-half mile due east of Buckhead Church.

The Kalmia sand generally occupies a very slight rise along the inner edge of the terraces, only 1 or 2 feet above the general level. A few small sandy mounds and ridges were included within the boundaries of the type, which apparently are partly of wind-blown origin. These are located southeast of Herndon along the southern side of the Ogeechee River and the eastern side of Cypress Creek. They rise 10 or 12 feet above the general level.

This type is very small in extent and is not utilized for crop production, except where small tracts have been included with fields of the sandy loam type. It supports a scattering growth of stunted oak, black pine, and some slash pine around the edges. Its value is low, ranging from \$8 to \$10 an acre when sold in conjunction with other terrace lands. It should be used for forestry.

KALMIA SANDY LOAM

Kalmia sandy loam in virgin areas has a surface soil consisting of mouse-gray sand, about 4 inches deep, underlain by a light grayish

yellow, slightly loamy sand extending to an average depth of 13 inches. Under cultivation the organic matter is rapidly depleted and the color of the upper few inches becomes grayish brown and finally light gray. The subsoil extends to an average depth of 48 inches, which is the level of the ground water, and is usually marked by a well-defined horizontal plane. It passes downward from a yellow, very mellow sandy loam into brownish-yellow heavy sandy loam, faintly mottled with reddish brown and gray, and at an average depth of 38 inches grades into a mottled reddish-brown, brownish-yellow, and light-gray sandy loam.

The substratum below an average depth of 48 inches down to 60 inches is a bluish-gray sandy clay, intricately mottled with dull red, reddish brown, and brownish yellow. It is slightly cemented and breaks in angular clods which crumble readily under pressure of the fingers. Underlying this and extending to 78 inches or more is a mottled brownish-yellow and bluish-gray, heavy, stiff, plastic sandy clay, the gray material being much more plastic than the brownish yellow.

To the northwest of Millen, at the confluence of Buckhead and Little Buckhead Creeks, and in a few other places are spots of Cahaba sandy loam which are included on account of small extent. Here the soil is a grayish-brown loamy sand and the subsoil is a reddish-brown to yellowish-red, friable sandy clay.

Very small areas of Myatt and Leaf sandy loam and Kalmia sand and fine sandy loam were included in the type as mapped on account of their close association.

The Kalmia sandy loam is confined to the better drained parts of the second bottoms of the Ogeechee River and its larger tributaries. It is very gently undulating. The surface drainage is fair, but owing to a high ground-water level the soil remains cold late in the spring. Only scattering tracts of the better drained parts are cultivated. About 90 per cent is forest or cut-over land, and is utilized chiefly for turpentine production and for open pasture land. Longleaf yellow pine, slash pine, and scattering water oaks constitute the principal tree growth.

Corn, cotton, velvet beans, oats, cowpeas, sorgo, and sugar cane are grown on the type. Cotton is not grown extensively, owing to the lateness of the crop on this soil. Corn yields 10 to 15 bushels per acre, and fair yields of other staple crops are obtained. Commercial fertilizers are generally applied to most crops.

The timberlands average \$10 an acre in value, and the better drained and cultivated land ranges from \$30 to \$50 an acre, depending on location and improvements.

Where drainage conditions are favorable to farming, the growing of legumes, addition of organic matter, and light applications of complete fertilizers and lime would be necessary to maintain and increase production. Large tracts under present conditions are most valuable for timber and turpentine and for pasture.

KALMIA FINE SANDY LOAM

The soil in typical virgin areas of Kalmia fine sandy loam consists of 1 or 2 inches of mouse-gray loamy fine sand, changing to dark gray, underlain at about 7 inches by a light grayish yellow

loamy fine sand, which grades at an average depth of 11 inches into a yellow loamy sand becoming heavier with increasing depth. In cultivated fields the surface layer of 6 inches is a yellowish-gray loamy fine sand.

From an average depth of 17 inches the second main horizon extends to about 75 inches. The material grades downward from a brownish-yellow sandy loam to a light brownish yellow slightly plastic sandy loam with faint traces of gray. Below an average depth of 39 inches the material is lighter textured, grading from a mottled gray-white and yellow loamy fine sand into a gray-white fine sand extending to an average depth of 68 inches. This is underlain by 7 inches of bright reddish yellow loamy fine sand containing a few scattering very small seams of gray-white fine sand.

The unweathered substratum below 75 inches consists of mottled gray, yellow, and red sandy plastic clay to a depth of 100 inches or more. It varies locally with the character of the original sediments deposited by the Ogeechee River and its tributaries.

With respect to assortment and kinds of materials this type resembles the Kalmia sand and sandy loam types, and like those types it has developed a light-textured zone within which the ground-water level varies according to the season and the stage of the river.

Locally the type varies slightly in the thickness of the upper soil layer. Small areas of Leaf fine sandy loam and Myatt sandy loam have been included, since they could not be shown separately on the map.

This soil is not extensive. The largest area lies $2\frac{1}{2}$ miles south-east of Emmalane. It is similar to the sandy loam type with respect to agricultural value, drainage, topography, vegetation, and occurrence, and the means for improving the soil are the same. Very little of this type is under cultivation.

The results of mechanical analyses of samples taken at various depths in the profile of the Kalmia fine sandy loam are presented in the following table:

Mechanical analyses of Kalmia fine sandy loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	<i>Per cent</i>
256727	Soil, 0 to 2 inches.....	3.2	9.9	8.5	50.9	12.9	10.1	4.7
256728	} Subsoil, 3 to 11 inches.....	1.7	10.9	8.6	52.7	12.8	9.0	4.2
256729								
256730	Subsoil, 12 to 17 inches.....	1.1	9.1	7.5	53.0	13.9	8.7	7.0
256731	} Subsoil, 18 to 38 inches.....	.6	4.7	4.0	50.6	15.8	7.4	16.8
256732								
256733	Subsoil, 39 to 60 inches.....	.0	1.4	2.9	71.0	15.2	2.1	7.3
256734	} Subsoil, 61 to 75 inches.....	.6	6.0	9.9	72.0	6.9	.7	3.8
256735								

LEAF FINE SANDY LOAM

The typical Leaf fine sandy loam in virgin areas has a sandy surface soil to an average depth of 12 inches, consisting of a dark-gray to gray fine sandy loam grading at 6 inches into a brownish-yellow

heavy fine sandy loam, the relative proportion of sand decreasing rapidly with increasing depth. Below this is a very poorly defined layer which usually consists of bluish-gray, heavy, plastic sandy clay, slightly mottled with brown, and varies in thickness from 3 inches to 12 or 15 inches, depending on the topographic situation and drainage conditions. This is underlain by a tough, plastic, mottled yellow, red, and gray clay, extending several feet deep and varying in character with the original sediments deposited by the streams.

The type varies chiefly in the thickness and texture of the sandy surface soil. A few areas of Leaf sandy loam are included with the type, since they are not large enough to warrant separate mapping. The largest of these lies along the south side of Beaverdam Creek at a point $1\frac{1}{4}$ miles northeast of Old McCoy Church. The type also includes areas of Kalmia sand and sandy loam, occurring as slight knolls, and areas of Myatt sandy loam occupying narrow, poorly defined drains. Owing to the small size and close association of these areas, they could not be shown without considerable exaggeration.

The Leaf fine sandy loam is the most extensive of the terrace types. It is developed principally on the broad, gently undulating second bottoms along the southern side of the Ogeechee River. It is poorly drained, but generally lies 1 to 3 feet above high water level.

Only a few tracts on the better drained situations have been cleared and cultivated. Corn is the principal crop grown and produces fair yields. Until properly drained, its present utilization for pasture, timber, and turpentine is considered the most valuable. Even when drained, the soil is difficult to handle on account of the heavy subsoil. This condition can be improved, after adequate drainage has been established, by using the methods suggested for the Grady soils. The soil is moderately fertile and ordinarily is chiefly in need of acid phosphate.

The valuation is based primarily on the timber value, and averages about \$10 an acre. Slash pine is the principal tree growth, but longleaf pine, gum, and oak also are found on the type. The type is best suited to pasturage or forestry.

MYATT SANDY LOAM

The surface soil of the Myatt sandy loam is a dark-gray, light sandy loam to an average depth of 6 inches. The subsoil consists of a yellowish-gray sandy loam, with scattering yellowish-brown mottlings, grading downward at an average depth of 18 inches into a mottled light-gray and yellow, sticky sandy clay which extends to a depth of about 48 inches.

The type varies locally in the thickness of the surface layer, which reaches to a depth of 22 inches in places. Areas of Myatt fine sandy loam and Kalmia sandy loam too small to map separately are included with the type.

The Myatt sandy loam occupies low, poorly drained positions on the broad terraces. The largest development is along the west bank of Sculls Creek, 5 miles west of Scarboro. Normally it is above overflow, but some of the low parts near the river swamp are flooded during extremely high water.

This type is not extensive and is not utilized for the production of crops owing to its poor drainage. The characteristic vegetation consists chiefly of loblolly pine, slash pine, a few gums, scattering oaks, and an undergrowth of gallberry, briars, and carpet grass. The valuation is about the same as that of other low, poorly drained soils of the county.

For agricultural development thorough drainage is the first requirement. The organic matter in the surface would rapidly disappear under cultivation unless continually replenished. Large applications of a complete fertilizer or manure and the growing of legumes would be necessary and liming would be beneficial. The best use of this land is for forestry or pasturage.

SWAMP

The first-bottom land is mapped as Swamp along all the main stream courses and far up toward the heads of many of their tributaries. It comprises areas that are subject to frequent overflow and remain saturated most of the year. The surface soil material ranges from coarse quartz sands to heavy clays in texture and from almost white to very dark gray in color. The lower material consists of beds, lenses, and pockets of sand, sandy clay, and clay. The heavier materials are often mottled red, yellow, and gray. Owing to the variation and close association of the soils, and to the fact that in some places the surface materials are shifting location and in other places receiving additional fresh sediments, a separation of these types is not justified.

The largest areas of Swamp lie in the first bottoms of the Ogeechee River and average about 1 mile in width. A dense growth of vegetation covers these areas except in the main channels of the larger streams. The characteristic tree growth consists of cypress, water oak, white oak, gum, tupelo, ash, loblolly pine, bay, and some slash pine. The undergrowth is usually a mixture of briars, grapevines, smilax, cane, reeds, palmetto, and other water-loving plants.

The total area of this type is considerable, but owing to its poor drainage it is not utilized for crop production. Enormous expenditures would be required to adequately drain the larger tracts, but many of the small areas in the upland region could be drained by cleaning out, straightening, and deepening the channels. If properly drained, the more favorably situated areas could be utilized for the production of corn, sorgo, sugar cane, and rice, or for pasture.

Most of this land is held in connection with large plantations or by lumber companies. The present valuation is based primarily on the timber value. The small areas in the upland regions are included in the farms and utilized as hog lots or pastures and as a source of fuel supply.

SUMMARY

Jenkins County is situated in the east-central part of Georgia, about 20 miles from the South Carolina State line. Its area is 352 square miles, or 225,280 acres.

The topography is gently undulating to rolling. Most of the county is well drained, but a considerable acreage of poorly drained soils and swamp land occurs along all the larger streams and extends up their tributaries. Poorly drained sinks and depressions occur scatteringly in the northwestern part.

The 1920 census records a total population of 14,328, all of which is classed as rural. Millen, the county seat, is the largest town.

Two railroad systems afford good transportation facilities. Well-improved sand-clay roads reach all parts of the county, and rural delivery of mail is provided for all sections.

The climate is generally favorable to a well diversified agriculture.

The agriculture of Jenkins County is gradually overcoming the handicaps of a one-crop system of farming, but cotton remains the leading crop. Corn and velvet beans are next in importance. Diversification is expressed chiefly in an increasing acreage of hay and forage crops and in a widespread introduction of purebred hogs. Cereals, fruits, pecans, potatoes, sweet potatoes, garden truck, poultry, and dairy products greatly increased in importance during the 10-year period prior to 1919, as shown by the census reports.

Commercial fertilizers are very extensively used, but are being supplemented with leguminous crops and green-manure crops in increasingly large acreages.

Nearly 80 per cent of the farms are operated by tenants. Labor is chiefly colored.

Nine soil series are represented by 13 soil types and one phase mapped in Jenkins County. The more mature and better drained upland soils are the Norfolk, Ruston, Tifton and Susquehanna. The poorly drained and less mature soils are represented by two groups. The Grady and Plummer soils, which are closely associated geographically with the mature upland soils, represent the first group, and the Kalmia, Leaf, and Myatt soils, occupying terraces or second bottoms along the Ogeechee River and the larger streams, comprise the second group. First-bottom lands frequently flooded or permanently saturated are mapped as Swamp.

The Norfolk, Ruston, Tifton, and some of the Susquehanna and Kalmia sandy loams and Kalmia fine sandy loam are extensively utilized for the production of the important crops. The Norfolk sand and loamy sand, and the Kalmia sand are best suited to light crops, and much of the land of these types would do well for forestry. The Swamp, Grady sandy loam, Plummer sandy loam, Leaf fine sandy loam, and Myatt sandy loam are best adapted to pasturage or forestry.



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