SOIL SURVEY OF MONROE COUNTY, GEORGIA.

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DESCRIPTION OF THE AREA.

Monroe County, Ga., is situated in the central part of the State, a little northwest of the geographical center. Forsyth, the county seat, which is centrally located, is 77 miles southeast of Atlanta and 26 miles northwest of Macon. The only natural boundary is the Ocmulgee River, which flows along the east side of the county. The greatest dimension of the county from north to south is about 24 miles; the average width from east to west is 19 miles. The county embraces an area of 394 square miles, or 252,160 acres.

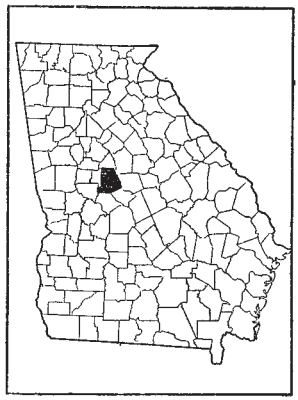

FIG. 3.—Sketch map showing location of the Monroe County area, Georgia.

Monroe County lies in the southern part of the Piedmont Plateau, near the Coastal Plain region, the line dividing the two provinces lying within a few miles of the southern border of the county. The topography is typical of the Piedmont region, which, broadly considered, is a rolling dissected plain, the original surface of which is shown by an even sky line. The topography varies in detail in different parts of the county from rolling and gently rolling to broken and hilly. A few small, undulating areas occupy the higher parts of some of the smoother divides. The county has no marked prominences or depressed areas. The present topographic forms are the result of erosion. The major streams cut the county into broad divides, which are in turn cut by the larger tributaries of these streams into smaller divides, and these divided again and again, until the whole region presents an embossed relief. The more rolling and hilly topography is found for a distance of 1 to 3 miles west of the Ocmulgee River, where the land breaks rapidly to the bottom land along the stream and is cut by numerous short, wet-weather streams into a series of narrow-crested, steep-sided ridges. A similar condition prevails back from the river for several miles along other

streams, especially along the Towaliga River up to High Falls. A little farther back the ridges become broader and smoother and the slopes become longer and more gentle. This condition prevails as a rule over the remaining parts of the county, except in the immediate vicinity of some of the larger streams, where the surface becomes more irregular. The topography does not prevent the use of improved implements, including tractors, except on a small part of the land in the county. Along the stream courses are narrow strips of alluvial lands which are characterized by a smooth, level topography. The streams have cut as much as 150 feet below the ridges in the rolling to hilly sections.

The upland part of the county is thoroughly drained by a dendritic system of streams and ravines which ramify all parts, so that each farm is directly connected with a natural drainage system. Practically all the county is included in the drainage basin of the Ocmulgee River system. The Towaliga River, the chief tributary, with its branches, drains the northern third of the county. Rum and Deer Creeks are the chief streams in the east-central part. The west-central and southern parts are drained by the Yellow and Tobesofkee Creeks. The chief tributaries of the latter are Little Tobesofkee, Reedy, and Echeconnee Creeks, and Mountain Branch. An area of about 5 square miles extent, lying southwest of the Macon & Birmingham Railroad, drains southwestward into the Flint River. The drainage waters of the northern part of the county flow almost due east, while those in the remainder of the area flow southeastward.

Monroe County was organized as a separate political unit May 15, 1821. Its original territory included Pike, Upson, and parts of Bibb, Butts, and Spalding Counties. Since that time, however, large areas have been cut from its original territory in the formation of surrounding counties. About the time of its organization the territory was divided into land lots of 202½ acres, which were distributed to settlers under a lottery system. The early settlers were Virginians and Carolinians who for the most part had first settled in other parts of Georgia.

The county in 1910 had a population of 20,450, and in 1920, 20,138, or 34.5 per square mile. The population is fairly well distributed. The most thickly settled areas are in the immediate vicinity of the towns, especially Forsyth and Culloden. The rougher areas of the county are more sparsely populated.

Forsyth, the county seat and most important town, has a population of 2,241. It was founded soon after the establishment of the county. Tift College is located at this place. Three cotton mills situated here afford employment for a large number of persons. The city owns and operates all public utilities. Culloden ranks sec-

ond in importance, with a population of 361. The other towns of the county are small trading points with less than 300 population. Chief among these towns is Juliette, where one of the largest corn mills of the South is located.

Transportation facilities are supplied by a number of railroads which pass through various parts of the county. No point is more than 8 miles from a railroad. The main line of the Central of Georgia Railway from Savannah to Atlanta runs northwestward through the central part of the county, passing through Bolingbroke, Smarrs, and Forsyth. The main line of the Southern Railway from Brunswick to Chattanooga traverses the eastern part of the county along the Ocmulgee River, passing through Popes Ferry station, Dames Ferry station, Juliette, and Berner. The Macon & Birmingham Railway and the Fort Valley division of the Southern afford transportation facilities for the southwestern part of the county. The chief town along these lines is Culloden.

The county possesses about 1,400 miles of public roads. About 400 miles of these roads are well graded, and all are built of natural earth material. Many of the roads become deeply cut during the winter months and are often scarcely passable.

Telephone lines connect the main trading points. Rural mail service is well established, covering practically the entire county.

The price of land ranges from $5 in the more broken and hilly regions to $100 an acre for well-located and improved lands; the average being about $30 an acre.

CLIMATE.

The climate of the general region in which Monroe County lies is characterized by short, open winters, long summers, and a plentiful supply of rainfall well distributed throughout the growing season.

The most disagreeable weather of the year comes in January, February, and March. The temperature sometimes falls as low as 6° F., and the cold is very penetrating. Cold spells are followed by a few days of warm, balmy weather, after which a period of rain usually occurs, which completes the cycle. The variation in temperature is one of the most disagreeable features of the winter season.

The summer months include a number of hot spells; which are usually broken by thunderstorms. The mean summer temperature is 78.7° F. The minimum for the summer is 47° F., and the maximum, 105° F.

The prevailing direction of the wind is from the northwest during the six months from November to April, from the south during May to August, inclusive, and from the northeast during September and October. The mean annual relative humidity, as recorded at Macon, is 83 per cent.

The average date of the last killing frost in the spring is March 24 and that of the first in the fall October 31, giving an average growing season of 220 days. Narcissi and violets bloom during all the winter months. Killing frost has occurred as late in the spring as April 17 and as early in the fall as October 11.

There are two periods of maximum rainfall, February and March, and July and August. Rainfalls of 2½ or more inches in 24 hours are of frequent occurrence. The period of least rainfall occurs in the fall, which is especially favorable for the harvesting of crops. The mean annual precipitation is 52.67 inches. In the driest year recorded it was 33.85 inches and in the wettest year 65.64 inches.

The following table is compiled from the records of the Weather Bureau station at Forsyth in the central part of the county.

Normal monthly, seasonal, and annual temperature and precipitation at Forsyth.[1]

(Elevation, 735 feet.)

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1878).	Total amount for the wettest year (1882).
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December	49.6	82	10	4.40	4.80	5.82
January	47.5	77	11	5.08	2.83	4.34
February	51.2	79	6	5.02	3.72	7.90
Winter	49.4	82	6	14.50	11.35	18.06
March	57.6	93	23	6.56	1.37	10.46
April	65.2	96	30	4.00	1.90	4.38
May	72.5	97	38	3.40	1.98	3.02
Spring	65.1	97	23	13.96	5.25	17.86
June	75.0	100	47	4.62	4.87	5.98
July	81.3	105	60	4.84	.32	5.77
August	79.7	101	58	5.74	6.28	6.62
Summer	78.7	105	47	15.20	11.47	18.37
September	76.3	99	40	3.27	.68	4.88
October	66.4	93	30	2.77	.75	3.42
November	56.3	86	19	2.97	4.35	3.05
Fall	66.3	99	19	9.01	5.78	11.35
Year	64.9	105	6	52.67	33.85	65.64

[1] This station was discontinued in 1910. However, the means established from these records, covering a period of 27 years, would not be appreciably affected by the records of subsequent years.

AGRICULTURE.

The agricultural development of Monroe County is generally similar to that of other inland counties of the State. The area was originally covered with a heavy growth of hardwoods, chiefly oak and hickory, intermixed with shortleaf yellow pine and some longleaf yellow pine. At the present time there is little of the original forest left, the existing forest being principally second growth and consisting of old-field loblolly pine and scattering stands of oak and hickory. The early settlers used the cleared areas in the production of such subsistence crops as corn, wheat, and buckwheat, with a little cotton. Cattle, hogs, and sheep were raised on the open range, both as a source of meat supplies and for trading purposes. Savannah was the earliest market.

Cotton gradually grew in importance until the close of the Civil War, when the demand for a cash crop became so great that it was produced almost to the exclusion of other crops. The production of staple farm crops was insufficient to meet the local requirements, and wheat, corn, oats, hay, pork, and beef were shipped into the county. This condition prevails at the present time, though the ravages of the boll weevil have emphasized the advantages of a diversified system of farming, and there has grown up among the farmers a more favorable attitude toward the production of subsistence crops. Nevertheless at the present time only a very few farmers produce enough of the crops to supply their own needs. The acreage of the staple crops other than cotton will have to be materially increased before a surplus will be produced.

The present agriculture is centered about the production of cotton. This is the cash crop. Upon its success or failure depend the prosperity of the commercial interests, the price of land, and, indirectly, all the interests of the farmers. It is grown on every farm, and on a large number practically to the exclusion of other crops. The census of 1910 reports that cotton occupied 42.6 per cent of the improved land in farms, while in the 1920 census it occupied 45 per cent of the improved land. The 1920 statistics also show that in 1919 the production was 17,018 bales on 57,455 acres, or an average yield of 0.3 bale per acre.[1] Three local cotton mills use a part of the product, while the remainder is shipped principally to the cotton markets located at Macon, Atlanta, and Savannah.

Corn is the second crop of importance. In 1919 it occupied 33,931 acres, or 26.6 per cent of the improved farm land. These figures show an increase of 3,782 acres over that reported in the 1910 census. The production of corn in 1919 was 381,853 bushels, or an average

[1] Part of Monroe County taken to form Lamar County since 1920. Statistics therefore apply to greater area than shown in the soil map, which gives present boundaries.

of 11.2 bushels per acre, the average yield being the same as that of 10 years ago. The low average yield of corn is due to the fact that most of the tenants and many of the other farmers give the crop very little attention. The poorest land of the farm is usually selected for the crop, little fertilizer is used, and the cultivation is not as careful or thorough as in the case of cotton. Yields ranging as high as 80 bushels per acre are obtained on prize plots, especially in the boys' corn-club contests.

Oats are grown on 1.5 per cent of the improved land. In 1919 the acreage was 1,914 and the yield 39,351 bushels, or an average of 20.5 bushels per acre. The crop is all used locally, either thrashed or fed in the straw.

Wheat is grown to a very small extent, the 1919 acreage being reported as 1,678 and the production as 16,199 bushels, or 9.7 bushels per acre. It is all used locally, being ground in local mills. Rye is not produced extensively, being grown in small patches and used for winter pasture. A small proportion of the crop is thrashed for seed.

Cowpeas are grown mainly for the production of hay. They are also planted in corn rows and used for soil improvement. Much of the seed is harvested for food and for planting. Velvet beans are grown to a very small extent, being less common than cowpeas. A few small patches of alfalfa have been grown in an experimental way.

Pork and beef products are insufficient to supply the local demand. In 1920 the total number of hogs in the county was 10,706, and the total number of cattle was 7,457. More interest is being shown in the improvement of live stock, especially hogs, as is shown by the presence of a number of pure-bred sires of the Duroc-Jersey, Hampshire, Berkshire, and Poland-China breeds. Cattle are also being improved by the use of pure-bred sires of the Shorthorn, Aberdeen-Angus, and Hereford breeds. There are a few Holstein and Jersey cattle in the county. Bermuda-grass pastures are generally depended upon for the summer subsistence of cattle, and cowpeas and sorghum mixed, corn stover, and cottonseed hulls constitute the chief roughage in the winter ration.

Farmers generally recognize the broad difference in the soils of the county, especially where their physical properties plainly necessitate different handling. They also recognize natural adaptation of the soils to crops, but are unable to carry out a consistent plan of soil utilization on account of the one-crop system. The bottom lands or alluvial soils are generally used for corn. Cotton on these types produces a rank growth of stalk at the expense of fruit, and is more likely to suffer injury from frosts than on the uplands. The Davidson clay loam is generally recognized as the strongest and most productive of the upland soils. Vegetation produces a rank or more luxurious growth on account of the high nitrogen content of

this soil, and the small grains produce larger and better filled heads. The Davidson clay is not quite so productive, and is recognized as being more difficult to handle properly. The Cecil clay loam is regarded as strong land for general crops and nearly equal to the Davidson clay loam. The Cecil sandy loam can be handled with greater ease and is used for special crops in addition to the general farm crops. The Cecil sandy clay loam, an intermediate type, stands in high favor. The Iredell and Mecklenburg soils produce a rank growth of vegetation, but are not considered as desirable as the soils already mentioned on account of the heavy plastic subsoils. Stony areas of all types are recognized as being lower in value for crop production. Farmers are aware of the general fact that wet seasons are more favorable to crops on the heavy clay or clay loam types and that dry seasons are more favorable to crops on the sandy types.

Improved implements are fast taking the place of light farming implements, such as one-horse plows, scrapes, and sweeps, which are still in common use for cotton farming. On the better farms, especially where attention is paid to grain farming, such implements as two-horse plows, improved harrows, grain drills, mowers, and binders are used. Improved types of cultivators are becoming more popular. Mules are depended upon for the work stock, though a few tractors are in use at the present time. The use of improved implements is stimulated by the scarcity and high price of labor.

It is generally desirable to break the land for cotton in the fall, but because of the pressure of gathering the cotton crop, it is often impossible to plow the land at this time. It is plowed in the winter or early spring or as soon as weather conditions are favorable. In the spring the land is worked into beds, with centers from 3 to 4½ feet apart, in which the fertilizer is distributed. Some farmers no longer bed the land, but practice level culture. In other cases the bedded fields are gone over with a spike-tooth harrow after the beds are formed. The cotton is planted from early April to the middle of May. The young plants are chopped out or thinned with hand hoes, leaving them 10 to 20 inches apart. The crop is cultivated from four to seven times and is laid by during the latter part of July. The Cleveland Big Boll is the most popular variety. Toole, Hastings, Russell, and Cooks Improved are other varieties largely planted. A small quantity of the Columbia, a long-staple upland variety, is grown.

Land for corn is not prepared with the same thoroughness as that for cotton, except by the better farmers, who take considerable interest in corn production. The land is generally bedded with a one-horse plow and the seed is dropped in the water furrows.

The interval between corn rows is generally proportionate to the fertility of the land, being closer together on the more productive land. This is directly the reverse of the method used in spacing cotton. The planting of corn extends from the latter part of March to as late as June 30. It is a common practice to plant at different times to insure the crop against a possible summer drought. The leaves are pulled about the middle of August for fodder and the corn harvested in October and November. The prolific varieties, such as the Marlboro, Hastings, and Whatley, are most commonly grown. A local variety, the Kinnard, is grown to some extent, especially on the bottom lands.

The methods of sowing oats vary from broadcasting and plowing under the seed to plowing the land and planting the seed with a grain drill. A common method is to drill the oats between the cotton rows. When possible the seeding is done early in the fall, but often it is done as late as December. Practically no spring oats are grown. Fulghum is the most popular variety. Appler, Bancroft, and Texas Rust Proof are also widely grown.

Wheat and rye are generally seeded on well-prepared land with the grain drill.

When cowpeas are intended for use as hay they are sown broadcast and plowed under. They are also commonly planted in the cornfields about the time of the last cultivation for the purpose of improving the land or for hog and cattle forage. The Whippoorwill, Crowder, Brabham, Iron, Blackeye, and Unknown are the most common varieties.

The excess of acreage devoted to cotton does not allow the systematic rotation of crops that many of the farmers desire, but the crops are generally changed on the land as often as possible. Some fields, however, are continuously planted to cotton for a long term of years. The rotation practiced by a few consists of cotton, corn, and a small grain, such as wheat or oats, followed the same year by cowpeas for hay.

Commercial fertilizers are largely depended upon for the production of crops, and are used on all the soils except the Congaree types. On many farms they are depended upon exclusively and the question of general improvement of methods ignored. The expenditure for fertilizers is increasing yearly. In 1909, 2,339 farms reported a total expenditure of $138,615; in 1919, 2,746 farms reported $376,596, a total increase of $237,981.[2] Most of this expenditure is for ready-mixed fertilizer used for cotton. The average application throughout the county is from 200 to 400 pounds of a 9–3–3[3] mixture. On

[2] A part of this increase is apparent only, being due to higher prices paid for fertilizers in the later years.

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

a number of farms larger quantities of a higher grade are applied. Practically all the fertilizer is applied at planting time. Oats are not usually fertilized, except possibly in the spring, when 100 pounds of nitrate of soda is sometimes used. Nitrate of soda is also used on some farms as a side dressing for both cotton and corn. During the recent scarcity of potash the common fertilizer used has been a mixture of one part of cottonseed meal and two parts of acid phosphate. This, like the complete mixtures, is applied at the rate of 200 to 400 pounds per acre.

Expenditures for farm labor for Monroe County are given in the 1920 census as $163,946, which represents an average of $194 for each of the 845 farms reporting labor. Farm labor is largely drawn from the negro population and at the present time is inadequate for all needs. Day labor for ordinary farm work is paid $1.50 to $2 a day. Lighter labor, such as hoeing cotton, is done by women and children, and is paid at the rate of 75 cents to $2 a day. Farm hands hired by the month receive $25 to $30 in addition to their board and living quarters. The standard rate for picking cotton is 75 cents to $1.50 per 100 pounds, depending upon the conditions in the particular field.

In 1920, Monroe County is reported as having 2,958 farms, 62.8 per cent of the total land area being reported in farms. The average size of the farm is 79.4 acres, of which 43.2 acres is improved.

The farms of the county are operated chiefly by tenants, 70.5 per cent of the farms being worked under this system in 1919. More than half the tenants rent for cash or a standing rent in cotton. One thousand pounds of lint cotton is the standard rental for a one-horse farm consisting of 25 to 40 acres. Under the share-rent system the landowner furnishes the stock, implements, and one-half the fertilizer and seed, and the tenant the labor and one-half the fertilizer. Each receives one-half the total proceeds of the farm.

SOILS.

The Piedmont region, of which Monroe County is a part, consists of a plain of low elevation and low relief but thorough dissection, beginning in New Jersey and extending southwestward through Virginia, the Carolinas, and Georgia, and terminating in eastern Alabama. The region crosses Georgia in a northeast-southwest direction and covers practically the northern part of the State. The geological formations of this region in Georgia consist of a complexity of crystalline and semicrystalline, igneous, and metamorphic-igneous rocks of undetermined age.

The upland soils of the county are residual, being derived through the weathering in place of the various formations found throughout

the county. The soils may be broadly divided into three groups, according to the materials from which they were derived. The first group is derived from the dark-colored basic rocks belonging in the Roan gneiss series and include hornblende gneiss and hornblende schist, with associated areas of diorite or diabase. The predominating rock here is a diorite or hornblende gabbro, which ranges in texture from medium and fine grained to porphyritic and in structure from massive to schistose. With increase in the content of hornblende and the development of the gneissic and schistose structure, the rocks change to hornblende gneiss or hornblende schist, respectively. They are made up mainly of basic plagioclase ranging from labradorite to anorthite and secondary hornblende.[4]

This formation occurs in disconnected areas in the eastern part of the county from Berner to the Bibb County line. It is also found locally in the southern and southwestern parts and rarely occurs in the northern part. From this formation are developed very distinct soil types, characterized by the dark-red color of soil and subsoil in some series or by a pronounced plasticity and stickiness of the subsoil in others. They are also characterized in most areas by a high degree of natural fertility. These soils fall into three series, the Davidson, Mecklenburg, and Iredell.

The Davidson series includes types characterized by chocolate-brown to dark reddish brown surface soils and a heavy, brittle, reddish-brown to dark-red clay subsoil. Two types of this series are mapped—the clay loam, which has chocolate-colored surface soil, and the clay, in which the soil is red.

The Iredell soils present a decided contrast to the Davidson. The surface soils are brownish gray or dark gray, and the subsoil, a heavy, plastic, sticky clay, is prevailingly brownish yellow, with an olive or greenish tint. As the soils are derived from the same class of rocks as those of the Davidson series, the difference in color is believed to be due to a difference in the processes of weathering. The fine sandy loam member of this series is mapped.

The Mecklenburg soils are intermediate in character between the Davidson and Iredell. The surface soils are brown and friable, and the subsoil is light reddish brown, frequently mottled with red, yellow, and brown, and is a heavy, sticky or waxy, plastic clay. The soils thus resemble the Davidson in color, but have a subsoil structure and texture typical of the Iredell. They probably represent an intermediate stage of weathering of the same original soil material. Two types of the Mecklenburg series are mapped, the sandy loam and the stony loam.

[4] Hopkins, Oliver B., Bulletin 29, Georgia Geological Survey.

A second group of rocks giving rise to a distinct group of soils belongs to the Carolina gneiss formation, composed of light-colored acidic or feldspathic rocks. These are mainly gneisses varying in texture from fine grained to very coarse grained or porphyritic, but some areas of mica schist are included. Massive granitic gneiss or granite is only locally developed and does not contribute materially to the formation of soils in this county. The various formations are cut by narrow dikes of pegmatite and veins or stringers of quartz. They are also interrupted by narrow dikes of hornblende schist or diorite and diabase. The Carolina gneiss formation is best developed in the northwest quarter of the county. It is, however, present in all parts of the county. In many places it is intermixed with the basic rocks. From this class of acidic rocks two series of soils are derived, the Cecil and the Appling.

The types of the Cecil series have gray to brownish-red surface soils, and a light-red or brick-red, stiff, brittle clay subsoil, contrasting strongly with the deep-red, smooth clay subsoil of the Davidson series. The Cecil series is represented in the present survey by three types, the sandy loam, sandy clay loam, and clay loam, with a hilly phase of the clay loam.

The types of the Appling series are characterized by gray surface soils and a mottled yellow and red, friable, sandy clay subsoil. One type, the Appling sandy loam, is mapped in this county.

At various points throughout the county the underlying formations are mixed, and the resultant soils belong to neither of the broad groups above described, but to a mixture of the two. This is particularly true in the southern and southwestern parts of the county, where an interlaminated formation of various acidic rocks is closely associated and cut by appreciable bodies of basic rocks of the Roan gneiss formation. The Cecil clay loam which results from the weathering of these formations could be appropriately grouped under the head of soils of mixed derivation.

A somewhat different mixture of rocks gives rise to soils of distinctly different character. This consists of an aplitic granite and a closely associated hornblende gneiss, both of which are cut by dikes of gabbro-diorite, and in a few places by dikes of pegmatite. This formation gives rise to the soils of the Wilkes series, which are characterized by brownish-gray to gray surface soils underlain by a subsoil which typically consists of two sections. The upper section is a yellowish to brownish-yellow, or a mottled red and yellow, sandy clay, while the lower is a plastic, sticky clay of a brownish-yellow color with an olive or greenish cast. The upper part of the subsoil is similar to the subsoil of the Appling series, while the lower part resembles that of the Iredell. The sandy loam is the only member of the Wilkes series mapped in this county.

The alluvial soils of the county differ from the residual soils in the manner of their formation. The materials giving rise to these soils are derived from the same rocks as the upland soils, but have been transported a considerable distance from their point of origin and deposited along the stream courses during periods of overflow. The alluvial soils of this county are classed with the Congaree series and as Meadow.

The types of the Congaree series are characterized by gray to brown surface soils and a light-brown to reddish-brown, friable subsoil of variable texture. The fine sandy loam and silty clay loam of this series are mapped.

Meadow (Congaree material) consists of alluvial material which varies so greatly in texture and color that it could not be mapped as a definite soil type.

The soils of Monroe County are grouped into series on the basis of origin, color, topography, and structural characteristics. The series are divided into types on the basis of texture of the surface soils. Seven soil series are recognized in this county. Twelve types and one miscellaneous classification are shown on the accompanying soil map. The table below gives the name and the actual and relative extent of each soil type mapped:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil sandy clay loam	116,416	46.2	Appling sandy loam	4,736	1.9
Cecil clay loam	57,792	23.4	Congaree fine sandy loam	4,160	1.6
Hilly phase	1,216		Davidson clay	3,072	1.2
Davidson clay loam	26,880	10.6	Iredell fine sandy loam	3,008	1.2
Cecil sandy loam	13,056	5.2	Mecklenburg sandy loam	1,280	.5
Meadow (Congaree material)	7,808	3.1	Mecklenburg stony loam	768	.3
Congaree silty clay loam	6,976	2.8			
Wilkes sandy loam	4,992	2.0	Total	252,160	

CECIL SANDY LOAM.

The surface soil of the typical Cecil sandy loam is a gray or brownish-gray to light-brown, friable, rather open, and loose loamy sand, with an average depth of 8 inches. The subsoil usually begins with a layer of friable, yellow sandy loam from 2 to 10 inches thick. Below this is the typical heavy, stiff, brittle, brick-red clay which may extend to considerable depth below 3 feet. Usually the type is free of any stony material, except in local areas, where there may be a scattering of small quartz and granite fragments not large enough or numerous enough to interfere with cultivation.

This type includes a few minor variations and gradations. There is a heavy variation, in which the sandy surface soil rests immediately upon the heavy red clay without the intervening stratum of heavy sandy loam and in which the surface soil has a reddish-brown cast. In places where the surface layer is relatively thin the type grades toward the Cecil sandy clay loam, a few areas typical of the latter being included.

Another variation occurs in areas where the surface soil is very light gray in color and rather open and loose, and the yellow stratum of the subsoil is developed to its greatest thickness. Like the soil, the subsoil varies in some places. It may be slightly mottled with streaks of yellow and resemble the Appling sandy loam, and some small areas of true Appling have not been separately mapped on account of their intricate association with the Cecil soil. One area of this kind is found about 3 miles west of Popes Ferry and another 2 miles north of Bolingbroke. Other variations include areas of coarser texture developed chiefly on the south side of the Little Towaliga River, and some of finer texture occurring in the vicinity of Unionville and High Falls Pond.

In the northwestern part of the county, near the Lamar County line, are small spots of reddish-brown sandy loam containing a noticeable amount of angular and subangular particles of mica schist and garnets. Such soil has been shown on the map by gravel symbols on color of Cecil sandy loam. The soil is really Madison gravelly sandy loam and large areas of it will be found in Lamar County. Small areas of Cecil stony sandy loam occur here and there. These are indicated on the map by stone symbols.

The Cecil sandy loam ranks fourth in extent in the county. Areas of this soil, ranging in size from a few acres to several square miles, occur in all parts of the county. The largest lie in the northwestern part.

The soil is derived through the weathering of various acidic rocks, including massive fine-grained biotitic granite or granitic gneiss, coarse-grained to porphyritic gneiss, and porphyritic biotite gneiss, with some interlaminated mica schist.

The Cecil sandy loam has a generally undulating to rolling topography, and occupies relatively smooth positions, such as broad divides or long, gentle slopes. As a general rule, where the topography becomes broken, the type gives way to the Cecil sandy clay loam. The smoothest areas are in the vicinity of High Falls and Unionville. In general, the topography is favorable to the use of improved implements, including tractors. The drainage conditions of the soil are imperfect, notwithstanding the rolling surface, on account of the difference between the rate of absorption of the light

sand surface soil and the heavy, stiff clay subsoil. In rainy seasons the water is absorbed rapidly by the surface soil, but is checked by the subsoil, so that the sandy part becomes saturated and the young crops may be drowned out. Seasons of frequent moderate showers are the most favorable for crops on this type.

The native forest consisted of shortleaf pine, various species of oak, and hickory. Practically all the virgin forest has been removed, the present growth being second-growth old-field or loblolly pine. About 80 per cent of the type is without forest cover.

The Cecil sandy loam is used entirely for the production of the staple crops of the county. Cotton is the principal crop. It yields from one-fourth to three-fourths bale per acre, although on a few of the best-managed farms a bale per acre is obtained. The corn yields range from 8 to 25 bushels per acre, with an average of about 14 bushels. Considerably higher yields are obtained on the better managed farms, where the crop is given proper attention. The average yield of oats is about 18 bushels per acre, and of peavine hay about three-fourths ton per acre. Ordinarily the yields of wheat and rye range between 8 and 15 bushels per acre.

The Cecil sandy loam is a strong, durable soil, and is highly prized by many farmers. It supports a number of prosperous farms. The soil has the widest range in crop adaptations of any of the more extensive soils of the county. Besides being suited to general farm crops, it is also adapted to trucking where market and shipping facilities are favorable. It is successfully used in some other parts of Georgia for the production of peaches and pecans.

The soil of this type, being loose and sandy, favors the use of light implements and work stock. It can be plowed and worked into a good seed bed with ease.

Land values are as high as $75 to $100 an acre for the well located and better improved farms.

The greatest need of this type is organic matter, which should be supplied by plowing under stable manure or leguminous crops, such as cowpeas or velvet beans.

CECIL SANDY CLAY LOAM.

The surface soil of the Cecil sandy clay loam, in its virgin state, usually consists of a layer of brownish-gray friable loamy sand of an average depth of 3 inches, underlain by a brownish-red friable clay loam extending to 7 or 8 inches. When this is disturbed, however, as in plowed fields, the soil consists of a grayish-brown to brownish-red friable mellow sandy clay loam, which is very sticky and slightly plastic when wet. The subsoil is a heavy stiff red clay to a depth of 3 feet or more.

Included with the type are small patches of gray soil (Cecil sandy loam) and spots of red soil (Cecil clay loam). The greater part of the type is intermediate between these two extremes. There are some areas of these extreme textures that it would be possible to separate on a map of larger scale. On account of its mixed nature the farmers have named this type "mulatto land."

In the northeastern part of the county there are areas which vary somewhat from the soils described. They contain a considerable proportion of the materials giving the Davidson clay intermixed with more or less sandy material. In this case the type is derived from materials coming from both acidic and basic rocks. The type is generally free from stones, except for small fragments of quartz scattered over the surface in such small quantities that they do not affect the agricultural value. In a few small areas the surface soil throughout consists of a reddish-brown sandy clay loam to a depth of 7 or 8 inches.

The Cecil sandy clay loam is the most extensive soil of the county. It is developed in large continuous bodies in nearly all parts of the county except the eastern. It is most typically developed in the vicinity of Cabaniss, Bolingbroke, High Falls, Blount, and Deerlick Academy.

The Cecil sandy clay loam in its largest areas appears to be derived from an interlaminated formation in which occurs biotitic gneiss of various textures, mica schist, some garnetiferous schist, and narrow belts of hornblende schist. These various rocks appear in bands from a small fraction of an inch to as much as 2 inches in thickness. In some places the bands of granitic gneiss have greater thickness. All these formations may be cut by narrow pegmatite dikes, veins of quartz, and in a number of places by very narrow dikes of basic rocks. The presence of basic rock in sufficient quantities to affect the soil is indicated by a darker red color in the subsoil. Where the quartz veins outcrop local stony areas have developed.

The Cecil sandy clay loam has a gently rolling to rolling topography. The surface features include smooth rounded ridges with long gentle slopes, narrow ridges with more steeply inclined slopes, and rather hilly and broken areas. The areas having a more gentle surface relief are found in the vicinity of Cabaniss and Bolingbroke.

North of Socrates the surface is somewhat more irregular. In the vicinity of High Falls Pond the type has a considerably greater relief and in places is quite rough and hilly. In the more hilly localities and around the heads of drainage ways the surface wash has removed much of the sandy surface layer and left the subsoil exposed. Where they were of sufficient size these bodies were mapped

as the Cecil clay loam and the hilly phase of that type. Surface drainage is well established, and the run-off is rather rapid in places, so that the land must be terraced to prevent erosion.

The Cecil sandy clay loam originally supported a forest consisting chiefly of oak and hickory, with a scattering of shortleaf and longleaf pine. About 65 per cent of the type is now cleared. On the remaining 35 per cent the forest is second-growth pine. The soil is utilized in the production of all the general farm crops and is considered a very strong and desirable type. It supports a number of well-established and prosperous farms.

The yields upon this type vary considerably with the different management of the individual farms. Cotton, the leading crop, yields from one-third to one bale per acre, with an average of about one-half bale, and corn from 10 to 50 bushels, with an average of about 17 bushels. The average yield of oats is 20 bushels. Cowpeas yield one-half to one ton of hay per acre.

Crops do not suffer so severely from excessive rainfall on this type as on the sandy loam, nor so readily from drought as on the clay loam. The sandy clay loam is essentially a general farming soil. It has been used in other parts of Georgia in the successful production of alfalfa, clovers, and vetches. It has also proved a good soil for pecan and peach orchards.

Land of this type sells for $20 to $100 an acre, depending upon the location, improvements, topographic features, and the care with which the farm has been handled.

The Cecil sandy clay loam can be made more productive and maintained in a high state of fertility by deeper plowing, the incorporation of organic matter, the rotation of crops, and the control of erosion.

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

Mechanical analyses of Cecil sandy clay 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.*	*Per cent.*
256801	Soil	3.8	9.6	5.6	29.4	25.8	15.6	10.6
256802	Subsoil	3.1	5.0	2.5	10.7	9.6	26.3	43.3

CECIL CLAY LOAM.

The Cecil clay loam has a brownish-red, friable clay loam surface soil with an average depth of 6 to 8 inches. The upper limit of the subsoil is marked by an abrupt change to a heavy, stiff, brittle, brick-red clay, which is sticky and somewhat plastic when wet.

The substratum is like the subsoil, and similar material extends to depths of 20 or 30 feet. The type is generally free from stony material, except in places where small fragments of quartz, coming from outcropping veins, are scattered over the surface.

Throughout the areas of this type there are minor variations from the typical soil. In a number of places it is dark colored, and somewhat like the Davidson clay loam, though the subsoil is typical Cecil, as the material has not been derived from the basic rock. In other places the soil so closely resembles the Davidson clay loam that the two types are separated by arbitrary lines. In these cases the darker material is due to intrusions of dark-colored rocks which occur in close association with the acidic rocks giving rise to the Cecil type Some narrow strips of the true Davidson clay loam are mapped with this type on account of their small extent and there is a large area between Strouds, Brent, and Russellville which it is difficult to classify. Here the color of the soil is similar to the Davidson, but the rock contributing the material is either concealed or is composed of interlaminated hornblende gneiss, mica schist, and biotite gneiss cut by small dikes of basic rock, so that the whole mass of soil is of mixed or indefinite origin. On account of the apparent preponderance of the acidic rocks, the area was finally included with the Cecil series.

Throughout the Cecil clay loam there occur areas of the Cecil clay. These are isolated areas which, taken collectively, would form a considerable acreage, but the individual areas are small, only an acre or two in extent, and separation was not practicable. They occur around the heads of branches and on knolls and slopes. They either have a clay loam soil, 1 to 3 inches deep, or where erosion has been active a heavy clay from the surface to a depth of 3 feet or more. Spots of the Cecil sandy clay loam also are included on account of their small extent.

The Cecil clay loam is mapped in large areas throughout the county, but it is most extensively developed in the southwestern part, in the vicinity of Culloden and Strouds. Smaller areas, ranging in size from a few acres to 3 or 4 square miles, occur in nearly all parts of the county.

The greater part of this type is derived from a mixed rock formation in which biotite gneiss, mica schist, and hornblende schist are the chief rocks. Where the hornblende schist predominates the soil has a darker color than elsewhere. The whole formation is cut by numerous veins of quartz, and outcrops of these veins give rise to small local areas of a stony clay loam. Erosion may have contributed toward the formation of this type to a small extent through the removal of the sandy surface layer characterizing the lighter textured types of the series.

The Cecil clay loam has a rolling topography, which includes broad, undulating ridges with long, rounded slopes, narrow-crested ridges with short and steep slopes, and some rather steep and broken areas around heads of streams. Improved implements can be used throughout the type. The topography is favorable to drainage, and commonly the run-off is too rapid. Terraces to protect the land from erosion are especially necessary, as the absorptive power of the heavy soil, after lying uncultivated for some time, is very low.

This soil originally supported a heavy growth of hardwoods, chiefly various species of oak and hickory, with some longleaf and shortleaf pine. Nearly all of the original growth has been removed. Second-growth pine has taken its place in the uncultivated areas. At present about 65 per cent of the land is cleared.

The Cecil clay loam is used for the production of the common crops of the county, including cotton, corn, oats, cowpeas, a little wheat, and some rye. The yields of these crops are quite variable, depending upon the management of the farms. All the crops are very successful when the soil is carefully and intelligently handled. Low yields are the rule on the tenant farms and others where inefficient methods are employed. The land is very responsive to good care.

Cotton yields range from one-fourth to 1 bale or more per acre. Corn averages about 15 bushels per acre, as little care is ordinarily given this crop. With the improved methods used by the best farmers, yields of 30 to 40 bushels per acre are common. There is about the same range in the yield of oats as of corn. The higher yields are usually obtained from fields well supplied with organic matter. From one-half to 1 ton of cowpea hay per acre is obtained. Wheat and rye average 8 to 15 bushels.

This type when well managed is a productive soil. It is better suited for growing general crops than for the production of truck crops. Alfalfa has been successfully grown on this type of land in patches throughout the Piedmont section. Peaches and pecans also have done well on this type in other parts of Georgia.

The heavy texture of this soil makes careful handling necessary. Strong implements and heavy work stock are required to plow the land to a depth of 6 to 8 inches, and in order to keep the soil in good physical condition it must be plowed within a narrow range of moisture conditions. Plowed when wet, the material forms clods that are difficult to break down, and when the ground is dry it is commonly too hard to plow. In seasons of frequent showers grass and weeds gain headway, causing serious damage to cotton and making necessary an extra hoeing of the crop. Nevertheless the best yields are obtained in seasons of abundant rainfall.

Land of the Cecil clay loam ranges in price from $30 to $60 an acre, depending upon improvements and topography. The more rolling and hilly areas are generally lower in price.

Although the soil has a high moisture-holding capacity, crops often suffer from drought. This is chiefly due to shallow plowing, which restricts the absorption of rainfall. Deeper plowing and the turning under of summer legumes or winter cover crops as green manure are suggested for remedying this condition. Productiveness of the soil, where in a run-down condition, can be greatly increased by following crop rotations that include cowpeas or velvet beans to be turned under.

Cecil clay loam, hilly phase.—The Cecil clay loam, hilly phase, includes areas of the Cecil clay loam in which the topography is so steep, rough, and gullied as to be unsuited for crop production. A comparatively small proportion of the type in Monroe County is of this phase. The areas are used solely for woodland. In a few places where erosion has been less active a sparse covering of grass is found.

APPLING SANDY LOAM.

The surface soil of the Appling sandy loam is a light-gray to brownish-gray or yellowish-gray, friable, loose sand to slightly loamy sand, 5 to 10 inches deep, or it may be composed of two layers—the upper as described above and the lower slightly heavier and of more pronounced yellowish-gray color. The typical subsoil in the upper part is a pale-yellow or salmon-colored friable loamy sand, which becomes heavier with depth, and passing through a sandy loam grades at an average depth of 20 inches into a mottled red and yellow friable sandy clay. Both soil and subsoil are generally free from stony material.

The Appling differs from the Cecil sandy loam chiefly in having a pale-yellow or mottled subsoil instead of a red subsoil. This difference is believed to have been brought about by two different processes. In areas occurring along lower slopes and around heads of streams the lighter color is due chiefly to leaching; in higher areas it is probably due to a lack of weathering.

This type as mapped includes gradations toward the Cecil sandy loam, in which the subsoil becomes redder but still shows slight mottlings of yellow, and some unimportant areas of true Cecil sandy loam are included on account of their small extent. The type also grades toward and includes small patches of the Durham sandy loam, which is characterized by a pale-yellow sandy clay subsoil.

The Appling sandy loam is a soil of small extent in Monroe County. It occurs chiefly in the southeastern part, a large and uniform body lying northwest of Parker.

This type is an upland residual soil, which, like the Cecil soils, is derived from light-colored acidic rocks. Quartz veins are commonly found cutting through the formations, and where they outcrop patches of stony soil occur.

The Appling sandy loam in general has an undulating topography, the areas occupying smooth, even-surfaced parts of ridge crests or similar lands at the base of slopes. The topography seems to determine largely the variations in this soil, as in the more undulating positions the subsoil is redder and approaches that of the Cecil sandy loam, while in lower positions the subsoil is yellower and grades toward the Durham sandy loam.

Owing to its undulating topography, the type has good surface drainage. The internal drainage, however, is not so thorough, especially where the lower subsoil is compact, and crops are damaged in wet seasons as a result of continued saturation of the soil.

Practically all of the type is cleared and a large part of it is under cultivation. The common crops of the county are grown. The yields in some fields equal those obtained on the Cecil sandy loam, but in general they are considerably lower. Cotton yields from one-fifth to two-thirds bale per acre, the average being about two-fifths bale. Corn yields are low, averaging about 12 bushels. The yield of oats is about 15 bushels per acre.

The price of land of the Appling sandy loam is variable, depending upon the surrounding soils, as land of this type is usually sold in conjunction with more extensive soil types.

In addition to its use for general farming, this soil can be used for market gardening where shipping and market conditions warrant. It is also adapted to the production of bright-leaf cigarette or plug-wrapper tobacco. Fertilizers are essential in the production of all crops on this soil. Organic matter is the chief need of the soil, and this should be liberally supplied by turning under green manuring crops.

DAVIDSON CLAY LOAM.

The surface soil of the Davidson clay loam consists of a dark reddish brown, chocolate, or snuff-colored friable clay loam, with an average depth of 8 or 10 inches. The subsoil is a dark-red or maroon, stiff, smooth, friable clay, extending to depths well below 3 feet. The type as a whole is readily distinguished from the other soils of the county by its darker color, which has given it the local name "chocolate land" or "black land." It is also referred to as "push land" or "gummy land," on account of a peculiar quality that prevents the turning of a smooth furrow slice or the scouring of the moldboard of the plow.

This type varies considerably in the details of its profile in different parts of the county. Such variation, however, is not sufficient to warrant the recognition of distinct soil types. One of the most pronounced variations, which is considered the best land of the type, has a dark-colored surface soil, 12 to 15 inches deep, and a dark reddish brown silty clay loam subsoil to 30 inches, instead of a maroon-colored clay subsoil throughout the 3-foot profile. These areas are generally small and widely distributed through the type, the largest and best developed appearing in the southeastern part of the county. One of the most uniform bodies is located in the vicinity of Williams Chapel.

The type also has a heavier variation in which the surface soil extends to depths of only 4 or 5 inches and rests directly upon a heavy clay subsoil. In places this variation, as a result of admixture of a larger proportion of clay, has a surface soil redder than the typical soil. The type here grades toward the Davidson clay, and small areas of the latter are included. This variation is usually developed in rolling or hilly areas where erosion has removed part of the surface material, but it also occurs in smoother topographic positions where a thick layer of the surface material has not developed. Areas of this variation lie in the region of hilly country along the Ocmulgee River near Popes Ferry and also in the eastern part of the county about a mile north of Holly Grove School.

Small areas of the type contain a larger proportion of sand than usual. This is chiefly due to the decomposition of quartz veins or to a small proportion of more siliceous rocks in the contributing formation. Areas of this kind occur about 2 miles northeast of Forsyth.

Outcrops of quartz veins form small stony areas, shown on the map by stone symbols. An area of this kind occurs about 2 miles west of Juliette. The parent rock also outcrops in a few places and gives rise to small stony areas, particularly 2½ miles north of Forsyth and one-half mile west of Holly Grove School. The type in its broad development, however, is free of stony material, except a few scattered fragments which in no way interfere with cultivation.

The Davidson clay loam, which is a widely distributed type, is mapped in both large and small areas. The largest areas are in the vicinity of Williams Chapel, east of Deerlick Academy, and in the general region between Dames Ferry and Juliette. Areas isolated from the general region of occurrence lie in the northwestern part of the county, east of Socrates and northeast of Blount.

The Davidson clay loam is a product of the weathering of basic rocks, whereas the other more important soil types of the county are derived from acidic rocks. The most common of these basic rocks is a hard, tough, massive, dark-colored diorite or diabase, high in

lime feldspar. From this rock the darkest colored variation of the type is derived. Hornblende schist, the rock of second importance as a source of material for this soil, commonly gives rise to the heavier variation of the type. In a number of places the rock is a gneiss in which the predominant material is basic, but acidic minerals are also present. This rock formation gives rise to a mixed soil, which, being more like the Davidson clay loam than the Cecil, is included with the former. The rock is deeply weathered and only occasionally shows in road-cut exposures. This variation occurs chiefly as scattered bodies in the southeastern part of the county.

This Davidson clay loam generally occurs in the more rolling and dissected parts of the county. The topography is for the most part rolling to strongly rolling, but the surface features vary, and some areas occupy the smooth crests of ridges and long, gentle slopes. Improved implements can be used, but on over probably 30 per cent of the type the use of tractors would be impracticable. The smoother areas of the type are in the southwestern part of the county and the more rolling and hilly areas along the bluffs bordering the Ocmulgee River.

The type has good surface drainage, and in many places the run-off is so rapid as to cause erosion. Terraces are generally required to prevent serious damage from this cause.

The Davidson clay loam is a strong, durable soil of high natural productiveness. Chemical analyses of samples of this soil from Jasper County, Ga., have shown that the type has a high content of the principal elements of plant food. The fertility is indicated by the vigorous growth of the native trees, which consist chiefly of oaks, hickory, and pines, but include dogwood, redbud, and other small species. Sassafras and persimmon are common in old fields. About 90 per cent of the type is cleared and utilized for the production of the general farm crops. It supports a large number of well-established farms and is generally considered a most desirable soil.

Cotton, corn, oats, cowpeas, and wheat are the principal crops. Cotton yields from one-third to 1 bale or more per acre, with an average of about one-half bale. The average yield of corn is about 18 bushels per acre, but yields as high as 75 bushels are obtained from land that has been well cared for and is well fertilized. Yields of 40 bushels are common in favorable seasons. Wheat yields 12 to 35 bushels per acre. The average yield of oats is about 25 bushels per acre, but many farmers obtain 50 to 60 bushels. Cowpeas yield from one-half to 1 ton or more of hay per acre. Cotton makes a heavier growth on this type than on the other soils, at least those of the upland, and small grains make a thicker and heavier growth and develop better filled heads. In some places where the surface

soil has been washed away, crops planted in the subsoil have produced normal yields. It is said that the soil can be maintained in a productive condition more easily than any other type in the county.

Land values have a wide range, depending upon the location and improvements. The best farms bring $65 to $75 an acre. Land in less well-developed sections may be bought for as little as $20 an acre.

The soil of this type is especially suited for general farm crops, including alfalfa, clovers, and grasses. The type has proved to be good for peach orchards, the trees making a vigorous growth and bearing for a relatively long period. Pecans have also done well on this type.

While the soil is rather strong and durable, it should be handled with care to preserve this productiveness. It should not be plowed when wet. A rotation of crops in which cowpeas or soy beans are included should be followed in order to keep up the nitrogen and add organic matter, the latter being needed for its effect on the physical condition of the soil.

DAVIDSON CLAY.

The surface soil of the Davidson clay is a very heavy, friable, dark-red clay loam, from 1 to 3 inches deep. This is underlain by a dark-red or maroon-red heavy clay, very sticky and somewhat plastic when wet, extending to depths of many feet.

This type is generally free from stones, except in places where quartz veins outcrop. Here angular fragments of this rock are present, but not in quantities sufficient to interfere with cultivation. There are also a few local areas where fragments of the basic rock, from which the materials giving rise to this soil come, are scattered over the surface.

The Davidson clay is readily distinguished from the Davidson clay loam by a decidedly heavier texture and by a deep-red instead of a chocolate color. The clay does not have the peculiar physical qualities that have given the clay loam the local name "push land."

The Davidson clay is developed principally in the eastern part of the county. One of the largest areas occurs along the slopes bordering Rum Creek and its tributaries. The soil is typically developed, but may include spots of less than one acre of the clay loam type. In a few scattered spots there is a thin layer of sand and fine sand on the surface, derived through the breaking down of vein quartz. The boundaries between this and the adjoining soils, except the alluvial soils, are very difficult to determine, and in some cases they are drawn arbitrarily.

This type is an upland soil derived through the weathering of basic rocks, which vary from massive, hard diorite or diabase to a schistose hornblende gneiss or hornblende schist. The formation is cut in a few places by narrow dikes of pegmatite or other acidic rocks, but these do not contribute essentially to the soil. Quartz veins or stringers are common. The heavy texture of the type may be due in part to the topography, as small remnants of the clay loam are found in positions not affected by erosion.

The Davidson clay occurs in the more rolling and broken region of the county. Its topography is decidedly rolling to hilly. It occurs on rounded ridges, which have steep slopes to the many small drainage ways that cut this section of the county into a series of narrow ridges and rounded knolls. There are practically no smooth, level areas, although there are some smooth slopes. The relief promotes good surface drainage. The run-off is generally rapid, and the land must be protected by terraces to prevent erosion.

The native forest consists of hardwoods, chiefly oaks and hickory, but the most of this has been removed, and loblolly or old-field pine now occupies the uncleared area, which is about 50 per cent of the total area of the type.

The Davidson clay is used for the production of the general farm crops. The yields are considerably lower than on the Davidson clay loam, because the soil lacks organic matter and is somewhat more difficult to handle properly. A large proportion of the type is farmed by negro tenants. The soil is adapted to the same crops as the clay loam.

Notwithstanding the low average yields obtained at present, the type is regarded as a strong, durable soil and productive when handled with care and intelligence. The soil is sticky and plastic when wet, but can be worked into a friable seed bed if plowed and harrowed when it contains the right amount of moisture. The soil is generally hard to plow on account of its heavy texture and clods easily. The best yields are obtained in wet years. Crops suffer in dry seasons, because the compact, heavy soil does not absorb and store the rainfall. It is advisable to keep the soil as open and loose as possible, and coarse vegetable matter should be plowed under. This type is especially suited to the production of cotton, grain, grass, and forage crops, including alfalfa, which is successfully produced on it near Rock Hill, S. C., and in small patches in Monroe County. It could probably be profitably devoted to stock farming. Heavy implements and draft stock are required to handle this soil properly. Land of this type has an average selling price of about $20 an acre.

MECKLENBURG STONY LOAM.

The surface soil of the Mecklenburg stony loam is a dark-brown or rusty-brown loam to fine sandy loam having an average depth of 4 or 5 inches. The subsoil is a reddish-yellow to reddish-brown, smooth, plastic clay. Large quantities of rounded and angular, heavy, dark-colored diorite or diabase rocks

are scattered over the surface and mixed with the soil, and to some extent with the subsoil. In most places these are so abundant as to prevent the use of this soil for general agriculture.

Included with this type are small bodies of Iredell stony loam, which is brownish-gray loam underlain at about 5 inches by a dingy-yellow to brownish-yellow, waxy, impervious clay, grading at 18 to 24 inches into disintegrating greenish-yellow diorite rock.

Only a small area of Mecklenburg stony loam occurs in Monroe County. It is developed chiefly in the eroded country bordering the Ocmulgee River. A large and uniform body lies along the Berner-Juliette wagon road south of the Towaliga River. A smaller area occurs between Juliette and Dames Ferry, about 3 miles south of Juliette, and a small body lies east of the Holly Grove School along the road from Forsyth to Dames Ferry.

The Mecklenburg stony loam occupies ridges and gentle slopes. The surface drainage is good, but the internal drainage is slow, being retarded by the impervious subsoil.

This soil is cultivated in only a few places where the stones are less numerous or where they have been removed from the fields. Fair yields of corn, oats, and wheat are obtained. Most of the land is used for pasture, and a considerable part supports a hardwood forest.

MECKLENBURG SANDY LOAM.

The surface soil of the Mecklenburg sandy loam is a dark-brown to grayish-brown sandy loam, 5 to 7 inches deep. The subsoil is a yellowish-brown or light reddish brown, sticky, waxy clay. The subsoil in most places is underlain at about 30 inches by a greenish-yellow, disintegrated, diorite rock, though in many places the heavy clay extends to a depth of 3 feet or more. In local spots the subsoil is redder, approaching the Davidson subsoil in color; in other localities it has the character of the Iredell subsoil. The type is really intermediate in character between the Davidson and Iredell soils. Fragments of the parent rock are thickly scattered over the surface in a few places.

The soil is derived, through weathering, from diorite, diabase, and similar fine-textured basic rocks. The material has been oxidized more thoroughly than that giving rise to the Iredell soils, but to a less degree than that forming the Davidson soils.

The Mecklenburg sandy loam is not extensively developed in this county. The largest areas occur in the eastern part, along Rum Creek. A small though typical development is situated 2¾ miles south of Juliette. Other areas lie near Ephesus Church, Parker, and along Deer Creek.

The topography is more rolling than that of the Iredell fine sandy loam and the surface drainage is better, but the impervious nature of the subsoil results in poor internal drainage.

Only about 50 per cent of the type is cleared, the rest being used as pasture and woodland. The forest growth consists largely of hardwoods. Cotton is the main crop on this soil. It makes a good growth and produces from one-fourth to one-half bale of lint. Corn yields 12 to 30 bushels and oats from 20 to 40 bushels per acre. Cowpeas yield one-third to 1 ton of hay per acre. Alfalfa can probably be successfully produced on this soil, provided the land is well drained, as the content of lime is relatively high.

IREDELL FINE SANDY LOAM.

The surface soil of the Iredell fine sandy loam consists of a mellow, smooth, loamy fine sand to fine sandy loam, with an average depth of about 7 inches. It ranges in color from light gray in the more level, poorly drained areas to dark gray or brownish gray where the surface drainage is adequate. Small, dark-brown iron concretions are scattered thickly over the surface in many places, and in a few spots fragments of the parent rock are present. The upper subsoil, normally a yellow, friable fine sandy loam, gradually becomes heavier with depth, and passes at 12 to 15 inches into a heavy plastic or waxy clay of yellowish-brown color, mottled with minute streaks of yellow, brown, and green, the latter giving the material a distinct greenish or olive tinge. This rests on the disintegrating diorite rock at an average depth of 30 inches. In a few places, especially on slopes, where drainage is better and oxidation is more advanced, the color of the subsoil is reddish and the type approaches in character the Mecklenburg soils.

The Iredell fine sandy loam does not occupy a large acreage in Monroe County. It occurs chiefly in the eastern part, where it is closely associated with the Mecklenburg and Davidson soils. The areas are commonly isolated and of small extent, seldom exceeding 160 acres. A typical development is situated about three-fourths mile east of Holly Grove School and another 3 miles south of Juliette. Smaller areas occur near Ebenezer Church, Ephesus Church. and Dames Ferry.

The topography of this soil varies from low and flat to gently undulating. A considerable part of it occupies the crests of low, flat ridges.

Drainage as a rule is inadequate, owing both to the character of the topography and to the impervious nature of the subsoil. The best crops are obtained during seasons of moderate rainfall, and crops suffer more during wet seasons than during droughts.

About 50 per cent of the Iredell fine sandy loam is under cultivation and the rest is used as pasture and woodland. The native forest consists largely of hardwoods, among which oaks predominate.

Cotton, the chief crop on this soil, averages one-fourth to one-half bale per acre. Corn yields 10 to 30 bushels, and oats 15 to 30 bushels per acre. Cotton rusts badly, especially in wet seasons, and kainit is locally applied as a corrective.

The Iredell fine sandy loam sells for $15 to $20 an acre, depending upon drainage and improvements.

WILKES SANDY LOAM.

The surface of the Wilkes sandy loam has a somewhat variable texture. Prevailingly, however, it consists of a brownish-gray to grayish-yellow fine sand to sandy loam, 6 to 8 inches deep. In a few places, especially around the heads of drainage ways and on the steeper slopes where erosion has removed much of the finer material, the soil consists of a medium to coarse sandy loam. The subsoil also is quite variable both in color and texture. The typical subsoil, however, is developed in two sections. The upper section, extending to a depth of 15 to 24 inches, consists of a brownish-yellow or mottled red and gray sandy loam to loose sandy clay, much resembling the subsoil of the Appling series. The lower part is much heavier in texture, being a stiff, plastic, sticky or waxy clay, minutely mottled with green, yellow, and gray. This heavy layer may be absent, the upper section resting directly upon the disintegrated rock. The type is usually free from stones, but over local areas there is a scattering of small quartz fragments, and outcrops of the underlying rocks occur.

The Wilkes sandy loam is derived from a mixture of different kinds of rocks. The underlying formation consists of light-colored granitic gneiss intermixed with hornblende schist, cut by dikes of diabase or diorite. The gneiss is composed largely of quartz and feldspar, with little or no mica. The light sandy material of the soil and upper subsoil is derived from granitic gneiss, and the heavy, intractable clay of the lower subsoil is derived largely from the diabase, diorite, and hornblende schist.

The type occurs in close association with the Davidson, Mecklenburg, and Appling soils in the eastern part of the county. One of the most typical developments is located about 2½ miles west of Dames Ferry. An area of considerable size lies on both sides of Deer Creek near the mouth of the stream.

The type occupies rolling to hilly country and has excellent surface drainage, but owing to the heavy, plastic nature of the subsoil the internal drainage is rather poor.

The Wilkes sandy loam is not an important agricultural soil in Monroe County. It is unfavorably located with respect to markets, and the rough topography and low productiveness of the soil make the type rather unsuited for crop production. About 20 per cent of it is farmed and the remainder is used for pasture land. The native forest growth consists of oak and loblolly pine, with a little hickory.

Cotton yields one-sixth to one-fourth bale per acre, corn 7 to 12 bushels, and oats about 10 to 12 bushels. Low-grade fertilizers are commonly used on cotton, but corn and oats are seldom fertilized. The best yields are obtained in years with moderate rains or frequent showers.

The average selling price of this land ranges from $8 to $15 an acre, depending largely upon improvements and topography.

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

Mechanical analyses of Wilkes 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.*	*Per cent.*
256817	Soil	1.4	10.8	9.4	47.4	15.6	10.5	5.1
256818	Subsurface	2.9	8.0	5.8	30.1	13.6	18.3	21.5
256819	Subsoil	.3	3.8	3.9	22.6	9.9	12.2	47.6

CONGAREE FINE SANDY LOAM.

The Congaree fine sandy loam, as mapped in this county, is very irregular, but in a typical area the surface soil consists of 7 to 10 inches of grayish-brown, friable, mellow, fine sandy loam, containing a considerable quantity of finely divided mica flakes. The subsoil is a heavy, friable, fine sandy loam, generally of a more brownish color, but in places consists of strata of various colors and textures. It also contains a considerable quantity of finely divided mica. Small areas of more sandy or coarse sandy material occur on narrow ridges along the stream banks and elsewhere throughout the areas, and narrow strips of a heavy silty clay are found in the sloughs and depressions. Some of the areas have a character similar to Meadow (Congaree material).

This type is mapped in broken strips of various widths in the alluvial lands bordering the Ocmulgee and Towaliga Rivers. The

largest areas are mapped in the vicinity of Juliette and Berner, and north of Dames Ferry along the Ocmulgee River.

The Congaree fine sandy loam is an alluvial soil, the material having been brought down by the waters of the Ocmulgee River and deposited during times of overflow. The material was originally derived from regions of crystalline rocks. The variations in the type are due chiefly to the fact that the deposits were laid down in different flood periods.

This soil occupies the first bottoms and has a smooth, level surface which is not sufficiently high to be above flood stages. At a few points it is higher lying, and is overflowed only during the highest floods. The type is well drained except at flood times.

The Congaree fine sandy loam is practically all cleared. It is a desirable and productive soil for corn and forage crops, but the crops are subject to damage through overflows. Corn produces from 20 to 40 bushels per acre. Cotton is grown to a small extent and averages about one-half bale per acre. Cotton sometimes fails to mature because of early frosts in the valleys. A large part of the type is used for pasture. Bermuda grass, white clover, lespedeza, and broom sedge are the chief pasture grasses. Fertilizers are generally used on this type the same as on the uplands.

Land of the Congaree fine sandy loam is usually sold in conjunction with the adjoining uplands, but when sold separately the price ranges from $20 to $50 an acre.

CONGAREE SILTY CLAY LOAM.

The Congaree silty clay loam has a surface soil consisting of a brownish-red to dark reddish brown, friable, smooth, mellow silty clay to silty clay loam, from 7 inches to 10 inches deep. The subsoil is very similar to the soil, but usually is somewhat heavier and redder in color; the lower part is marked by streaks of a grayish-brown color, and in places contains strata of sand and various other materials. In some of the areas the surface soil contains more sandy material than typical, while in others the soil is a silty clay and redder than the average. A few mica flakes are usually present in both the soil and subsoil. There are also included narrow strips of Meadow (Congaree material), which are relatively of small extent and unimportant.

The Congaree silty clay loam is found along many of the drainage courses of the county. It is most extensive along those streams traversing the heavier upland soils. The type is also found here and there in the bottoms of streams that traverse soils of sandy texture, generally where these bottoms are wider than usual. The

most extensive areas of this soil occur along Beech, Rum, and Tobesofkee Creeks.

The material of this type is of alluvial origin, having been deposited along the various drainage ways during flood periods. With each overflow additional material is deposited. This material is transported by the streams from areas of soil derived from crystalline rocks. The deposits along streams in the southern part of the county consist largely of material brought from regions of the Davidson clay loam and Cecil clay loam areas, and, consequently, they contain less sand. In the northern part of the county there are more sandy soils within the drainage area, and the bottom lands are therefore more sandy.

The areas of the Congaree silty clay loam consist of low, flat, first bottoms subject to periodical overflow. In some cases the land is overflowed with each heavy rain, but the areas are not deeply flooded and are under water for only a short time. During some of these inundations the material has been considerably changed by heavy deposits of sand.

A great part of this type has been cleared, the original growth consisting of a heavy forest of many different kinds of trees. In uncleared areas there is at present a mixed growth of gum, tulip poplar, ash, white oak, water oak, chestnut oak, shortleaf pine, hackberry, sycamore, and other species. The cleared areas are used in the production of corn, oats, and forage crops. Practically no cotton is grown on this type. Corn yields from 20 to 35 bushels per acre without the use of fertilizer. Oats yield about the same. Cowpeas make a luxuriant growth, yielding an average of more than a ton of hay per acre. Bermuda grass, white clover, and lespedeza thrive and afford excellent grazing.

The Congaree silty clay loam is a strong, productive soil, especially for grain, hay, and forage crops. The type is valuable and should be utilized to its full extent. The danger from overflow can and should be reduced by straightening the streams and installing drainage systems.

Land of this type is usually sold in conjunction with the associated upland soils.

MEADOW (CONGAREE MATERIAL).

Meadow (Congaree material) represents alluvial lands which are so variable in texture, structure, and color of the soil and subsoil that type designation is impracticable. A large part of this land consists of recently deposited sand, which in some places is 3 feet or more deep. In general, it consists of small patches of the Congaree silt loam, fine sandy loam, sandy loam, and coarse sandy loam, in-

tricately mixed. The material is also irregular in the arrangement of the profile. The color ranges from a rich brown to light gray.

Areas of this sort form narrow, broken strips along the Ocmulgee River and many of the small streams of the county. Typical developments lie on Deer Creek and its tributaries. This land has a low, flat topographic position and is subject to frequent overflow. The material is subject to change with every flood. The areas are fairly well drained under ordinary conditions.

Meadow (Congaree material) is largely used for pasture. The soil is in some places suitable for farming, but on account of the large proportion of sand it is generally considered poor. The recently sanded areas are almost worthless.

SUMMARY.

Monroe County, Ga., is situated in the central part of the State. It embraces an area of 394 square miles, or 252,160 acres.

The general topography is rolling, ranging from undulating to strongly rolling or hilly. The topography permits the use of improved machinery, including tractors, except in small local areas.

The drainage is well established by a network of stream courses that connect every farm with a drainage outlet. Practically all the county is drained through the Ocmulgee River system.

Monroe County in 1920 had a population of 20,138. The population is well distributed, and averages 34.5 persons to the square mile. Forsyth, the county seat and leading town, is centrally located. Its population in 1920 was 2,241.

The public roads are numerous, leading to all parts of the county. They are built of earth, and during the winter seasons become badly rutted in many places. Rural mail service extends to all parts of the county.

The climate of the county is characterized by short, open winters and long summers, with ample rainfall, well distributed throughout the year. The growing season averages about 220 days.

The agriculture of the county is centered about cotton production. The quantity of corn, oats, hay, pork, and beef produced is not sufficient to supply the needs of the farmers.

The cotton crop in 1919 was grown on 57,455 acres, with a total production of 17,018 bales. The boll weevil is active in the county and as a result of losses there is a growing tendency toward diversification of crops.

No well-established system of crop rotation is followed, although the farmers try to change the crop as often as possible.

Much of the farming is done by tenants. The standard rental for a one-horse farm is 1,000 pounds of lint cotton.

The soils of the county consist principally of residual or upland types, with narrow strips of alluvial or bottom lands along the stream courses. Some of the upland types are derived from diorite or diabase and included hornblende schist and hornblende gneiss, which are commonly termed dark-colored or basic rocks. Others are derived from granitic gneisses and small inclusions of mica schist, all of which may be included in a class of light-colored or acidic rocks. These two classes of rocks also occur mixed and give rise to soils of mixed character.

The Cecil sandy loam and sandy clay loam are desirable soils, suited for the general crops of the region, and for some special crops, such as peaches and pecans. The sandy clay loam is the most extensive soil type in the county. The Cecil clay loam is somewhat heavier, and is suited for general farm crops.

The Appling sandy loam is the lightest type of the county. It is suited for general farming crops, truck crops, and bright-leaf tobacco.

The Davidson clay loam and Davidson clay are strong, durable soils, well suited to general farming. Small grains, grasses, and legumes do especially well. Peaches and pecans are products of this soil in some parts of the State.

The Mecklenburg sandy loam and stony loam types are of small extent and relatively little agricultural value.

The Iredell fine sandy loam is of small extent and comparatively of little importance.

The Wilkes sandy loam is of little value on account of its heavy plastic subsoil and broken topography.

The Congaree fine sandy loam and silty clay loam comprise the principal alluvial soils. They are fertile soils and well suited to the production of corn and forage crops.

Meadow (Congaree material) is used chiefly for pasture.

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