

SOIL SURVEY OF TROUP COUNTY, GEORGIA.

By A. T. SWEET and HOWARD C. SMITH.

DESCRIPTION OF THE AREA.

Troup County is situated on the western border of the State of Georgia, slightly north of its median point. It is bounded on the north by Heard and Coweta Counties, on the east by Meriwether County, on the south by Harris County, and on the west by Chambers County, Ala. It has an area of 435 square miles, or 278,400 acres.

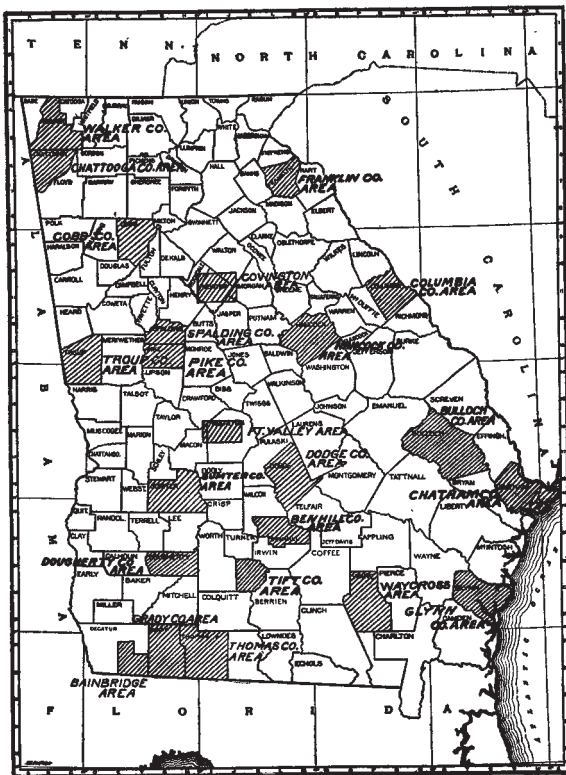


FIG. 13.—Sketch map showing areas surveyed in Georgia.

Troup County lies entirely within the Piedmont Plateau, slightly south of the mid-line of the belt. The surface of the original plateau has been altered considerably by erosion, its configuration now being rolling, with many divides, or irregular rolling ridges, separating the principal stream courses.

The drainage waters of the county flow to the southwest through the Chattahoochee River and its tributaries, Yellowjacket, Long Cane, and Flats Shoal Creeks on the east, and Whitewater and Wehadkee Creeks on the north. These streams and their various tributaries reach every part of the county, affording ample surface drainage.

The flood plain of the Chattahoochee River and of its larger tributaries lies slightly less than 600 feet above sea level and between 150 and 250 feet below the upland divides. The smaller streams thus have a fall of many feet to the mile and erode their channels rapidly. Erosion is especially active because of the character of the surface soils and the heavy and torrential rains. The result has been a thoroughly dissected topography, which varies from undulating and gently rolling near the divides to sharp and broken nearer the stream courses. Broad, flat valleys have been developed along some of the smaller streams and deep, narrow valleys along others. It frequently happens that along the same stream there is a broad valley, with considerable flood plain along its upper course, which disappears entirely farther downstream. High, rounded hills and steep, rock-covered slopes are frequently encountered. The bending and folding of the rock beds of different formations has also influenced to some extent the development of the drainage courses, accounting in part for the lack of uniformity in topography, but the direction of the streams has probably been determined more by the character of the rocks, the drainage courses following frequently the trend of the softer and more easily worn-down rocks.

Troup County, named for a former governor of Georgia, was settled about 1827 by colonists from other sections of the State, from the Carolinas, and from Virginia. During recent years there has been some immigration from the Northern and Middle Western States. The population of the county, according to the Thirteenth Census, is 26,226, a slight increase over that of 1900. Approximately 45 per cent of the inhabitants are white.

Lagrange, the county seat, is situated in the central part of the county and is a progressive city, with a population of 8,622. It has seven large cotton mills, built and equipped at an expense of \$300,000, fertilizer plants, two cottonseed-oil mills, two electric ginneries, two large cotton warehouses, and an excelsior factory. West Point, situated in the extreme southwestern corner of Troup County and partly in Chambers County, Ala., has a population of 3,145 and is an important local manufacturing center. Hogansville, in the northeastern part of the county, has a cotton mill and two fertilizer mixing plants, and is the principal trading point of a rich and well-developed farming community. Other smaller towns are Mountville, Antioch, Gabbettville, Cannonville, and Louise.

Three lines of railway traverse the area, the Atlanta, Birmingham & Atlantic, the Atlanta & West Point, and the Macon & Birmingham, bringing the important markets of Macon, Montgomery, Savannah, and Memphis within easy reach. Local markets are good and public roads throughout the county are generally in excellent condition. Rural free delivery of mail reaches all parts of the area.

CLIMATE.

The climate of the county is mild and pleasant, extremes of temperature being rare and of short duration. The summers are long and characterized by a continued steady but not extreme heat. On only a few occasions during the last 10 years has the temperature risen above 100° F. The maximum is 104° F. The winters are mild. The mean annual temperature is 63° F. The mean for July, the warmest month, is 80°, and for January and February, the coldest months, 46° F.

During the winter months most of the days are sunshiny, with a range in temperature from 50° to 60° during the day and a drop to 30° or 35° at night. This condition gives frequent frosts, although the ground seldom remains frozen during the day. Frosts are usually followed by several bright, clear days, and in turn by a general rain and clearing and colder weather. A few flurries of snow occur. The hardier garden vegetables can be grown during winter. Hardy grasses and along the stream bottoms switch cane furnish pasturage for stock the year around. Cattle, however, need shelter from the cold winter rains and winter pasturage should be supplemented by other feed.

The mean annual precipitation is 49.1 inches, fairly well distributed throughout the year. The greatest precipitation occurs during the period from December to March, inclusive, amounting to 19.6 inches. The normal precipitation from April to October is 26.4 inches, occurring as spring rains and summer thunder showers from the southwest. The spring rains are usually severe and cause considerable erosion to fields, unless they are protected by winter cover crops, soil mulches, or a well-devised system of terraces. Crops frequently suffer from drought or excess of moisture during the growing season, although a total crop failure is unknown. During the driest year recorded the precipitation was 34 inches, which was sufficient to mature cotton, as this crop does best under relatively dry conditions.

The average length of the growing season is 235 days; even in the shortest season on record there was ample time to ripen ordinary crops, with the possible exception of the top crop of cotton. Corn or other crops are seldom damaged by fall frosts. With an early

spring, tree fruits are likely to suffer, but even with the loss entailed by erratic frosts fruits for home use and the local markets are produced successfully. The average date of the last killing frost in spring is March 17 and of the first killing frost in autumn November 9.

The following table shows the normal monthly, seasonal, and annual temperature and precipitation, as compiled from the records of the Weather Bureau station at Opelika, Ala. These figures may be taken as representative of conditions in Troup County.

Normal monthly, seasonal, and annual temperature and precipitation, Opelika, Ala.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	<i>°F.</i>	<i>°F.</i>	<i>°F.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
December.....	47	78	9	4.4	1.3	7.2	0.6
January.....	46	74	10	4.7	6.5	3.5	.3
February.....	46	78	-7	5.3	3.9	10.9	1.5
Winter.....	46			14.4	11.7	21.6	2.4
March.....	56	88	16	5.2	2.5	6.1	T.
April.....	63	92	32	3.6	1.3	4.5	0.0
May.....	72	98	39	3.4	1.6	.1	0.0
Spring.....	64			12.2	5.4	10.7	T.
June.....	78	100	49	3.8	1.9	9.9	0.0
July.....	80	101	60	5.3	5.5	4.6	0.0
August.....	79	104	58	4.4	1.4	4.0	0.0
Summer.....	79			13.5	8.8	18.5	0.0
September.....	74	98	46	2.8	1.9	6.2	0.0
October.....	64	94	32	3.1	1.0	8.3	T.
November.....	54	81	20	3.1	5.1	7.8	T.
Fall.....	64			9.0	8.0	22.3	T.
Year.....	63	104	-7	49.1	33.9	73.1	2.4

The percentage of sunshine at all seasons is quite high, and the freedom from great extremes of temperature favors dairying, stock raising, and poultry keeping and makes trucking and the development of an intensive system of agriculture possible. Water for domestic use is easily obtained. Swamps and stagnant bodies of water are rare, and the climate favors excellent health.

AGRICULTURE.

The early settlers found the county heavily forested, the trees being removed as settlements were extended, and the older fields, depleted of organic matter through continued cultivation, were abandoned and new land taken up. This method in the early days, with the abun-

dance of cheap land, proved more profitable than to maintain the soil in productive condition through crop rotation and manuring. As a result most of the suitable land in the county has at some time been under cultivation. Where abandoned these old fields have grown up in pine. The uncultivated areas usually occur on the rocky hill-sides too steep for cultivation.

The Thirteenth Census reported 2,918 farms in the county, aggregating 220,330 acres, of which 124,977 acres were improved. These farm lands were appraised at \$3,085,257, the buildings at \$1,030,845, implements and machinery at \$179,714, and the work animals and other livestock at \$765,369. The average-size farm contains 75.5 acres, of which 42.8 acres are improved.¹ Of the total number of farms only 610 were operated by the owners, the remainder being worked by tenants under varying tenures, some paying a fixed cash rental, others a share of the crops, others a stipulated return in cotton or some other product.

Cotton is and has been for many years the money crop of the county. It figures as the basis for all transactions, rentals for tenant planters, collateral for loans, and as a medium for adjusting liquidations of outstanding accounts. This has of necessity evolved a one-crop system of farming, in which all other crops have been subordinated to cotton, the natural result of which has been a gradual decline, at least until recent years, in yields and the fertility of the soil. To combat this the efforts of farmers have been directed to an increased use of commercial fertilizers and the use of better seed rather than to the rotation of crops and the restoration of organic matter to the soil.

This condition is now attracting the attention of some of the more progressive farmers, who realize the value of a definite crop rotation and the need of increasing the organic-matter content of most of the soils of the county by means of green manuring and winter cover crops. The principal rotation practiced at present is cotton, followed the second year by corn and cowpeas, with small grain and cowpeas the third year. In the majority of cases the small grain crop is oats, although wheat is frequently substituted. Many of the farmers sow cowpeas in the corn, while others sow them only after the small-grain crop. In some cases a two-year rotation consisting of cotton followed by a small-grain crop and cowpeas is used.

The production of cotton for the county, according to the census of 1910, was 24,611 bales from 67,515 acres, an average of approximately one-third bale per acre. The acreage yield within the county varies from less than one-fourth bale to as high as one bale. The Christopher, a large-boll variety, developed in the county, is the most popular, and seems particularly suited to the red upland soils. Other varieties in general use are the Russell, Broadwell Early, Hastings

¹ In the census each tenancy is tabulated as a farm.

Upright, Truitt Prolific, and Dixon's Prolific. Selection of variety with reference to the type of soil upon which the crop is to be grown does not receive consideration, except that early maturing varieties, such as Broadwell Early and Hastings Upright, are known to be better for the rich bottom lands.

There is considerable variation in the fertilizers used, for cotton the most popular being a mixture of phosphoric acid, nitrogen, and potash in the ratio of 10-2-2. Brands analyzing 10-3-3, 9-3-4, 9-2-3, and 10-3-5 and others are also used in applications ranging generally from 300 to 600 pounds per acre.

In the cultivation of cotton deep plowing has been found to give good results. A large majority of the more progressive farmers recommend plowing in the fall, and some have secured good results from subsoiling. Nearly all favor frequent shallow cultivation after the crop has been planted.

Corn ranks next to cotton in importance, the output for 1909, according to the census, being 278,884 bushels from 25,727 acres, a yield of slightly more than 10 bushels per acre. Local estimates place the yield at 20 to 25 bushels per acre, and many farmers say that it is increasing. Much higher yields are secured in the better managed fields. The present production is far less than the demand, and large quantities of corn and hay are annually shipped into the county to be fed to the work stock. Fertilizer practice is more varied in case of this crop than in case of cotton. Nitrate of soda seems to be quite generally used by the more efficient farmers. The Kinard, Tennessee Red Cob, Hastings Prolific, Shaw's Improved, and Marlborough are the most popular varieties.

Oats is a relatively unimportant crop, the output for 1909, according to the census, being 46,248 bushels, from 2,744 acres, or nearly 20 bushels per acre. Nitrate of soda is used by many farmers as a fertilizer for this crop, which usually figures in a three-year rotation, with wheat in the third year, followed by cowpeas. The principal varieties grown are Appler, Bancroft, and Texas Red.

Of the minor crops, sweet potatoes yield about 150 bushels to the acre, wheat 15 to 20 bushels, Irish potatoes from 40 to 150 bushels, and sugar or ribbon cane from 300 to 400 gallons of sirup. Watermelons produce about \$100 an acre, and cantaloupes \$200 on the properly selected sandy lands. Some peanuts and sorghum are grown.

The principal pasture grass is Bermuda, although the clovers and other grasses are used to some extent. Roughage consists mainly of corn stover, sorghum, cowpea hay, crab grass, Bermuda and swamp grass hay, fodder, and lespedeza or Japan clover.

The disk plow and heavy turning plows are best suited to the soil types with heavy, sticky subsoils which occupy the larger part of the

uplands. Teams of three or four mules should be used in plowing. The land should be "flat broken," the entire surface being turned. Plowing should generally be done to a depth of about 10 inches, with occasional subsoiling, or if the subsoil is very heavy, it may be found better to increase the depth of plowing from 1 to 2 inches each year until a depth of 12 inches or more is reached.

Fall plowing is usually preferable to spring plowing, as the heavy subsoil is thus given a chance to weather under the winter rains and freezes, becoming loose and friable by spring. Coarse weeds and stalks which are turned under in the fall also have a chance to decay, and thus improve the soil structure. If the deep plowing is done in the spring, the heavy clay is in poor condition and becomes hard and cloddy; the coarse material which has been plowed under also forms a loose layer which may cut off the surface soil from the moisture beneath and cause the crop to suffer from drought. Deep plowing also aids in preventing erosion by enabling the soil to absorb a larger proportion of the rainfall, thus reducing the run-off. Where slopes are steep enough to wash, fall plowing, especially if clay is brought to the surface, should be followed with a winter cover crop, such as oats, crimson clover, vetch, or wheat.

Little attention is paid to the rotation of crops in this region. Some of the fields in the area have been in cotton continuously for 15 or 20 years, and on many others the crop has not been changed for 5 or 6 years. Cotton and corn are alternated to some extent, but the acreage in the former so far exceeds that of the latter that little relief is afforded in this way. There must be a diversification of crops before the planning of rotation systems will become practicable.

The rotation already suggested in connection with cotton, where this crop is followed by corn and cowpeas the second year and small grain and cowpeas the third, is perhaps the best that can be devised under present conditions. This might be further improved by the addition of a cover crop of some kind, such as rye, barley, vetch, or bur clover, to follow the cotton, and also to succeed the cowpeas when the latter precedes the small-grain crop. The cover crop should be sown in September or as early in October as possible. It will furnish winter pasturage, prevent erosion, and when plowed under in the spring will add humus to the soil.

Where the soil is in poor physical condition a small-grain crop followed by cowpeas may be used for two years, making a four-year rotation, or the land may be sowed in Bermuda grass and lespedeza and used for pasture, making the rotation of any desired length. The greatest benefit will result from the leguminous crop, which may be grown two years in three, where planted one year between the corn rows. This crop, like clover, alfalfa, and soy beans, enriches the soil with nitrogen gathered from the air. All of the upland soils in the

county are deficient in this constituent and for this reason respond readily to application of manure or nitrate of soda. The custom now followed by many farmers of burning cotton and cornstalks should be changed and the material carefully plowed under.

The surface soil of freshly cleared land is often dark and almost black in color, but with subsequent cultivation it loses this dark color and to some extent its friable structure, tending to become sticky and waxy when wet and hard and cloddy when dry. This change is due to loss of organic matter or humus.

The most serious objection to the present methods of using commercial fertilizers is that they are relied upon solely and no effort is made to build up and permanently enrich the soil by the methods outlined above. Where fields are so improved heavier applications of commercial fertilizer can be used with profit and crop yields materially increased.

Where live stock is kept the manure should be saved and applied to the soil. Comparatively little stock is found in the county, owing to the ravages of the cattle tick, the lack of pasture, and the fact that little attention is given to the forage crops.

The climate of the area, with its short, mild winters, is ideal for stock raising, the principal handicap being lack of permanent pasture. Most of the cattle now found in the county are Jerseys of inferior grade. Few of the farmers have had any extensive experience in handling stock.

Bermuda grass offers the best permanent pasture for this region, and many thousands of acres now grown up in old-field pine and briars might easily be converted into profitable pasture land. This grass should be supplemented by lespedeza, bur clover, redtop, sweet clover (*Melilotus*), cowpeas, sorghum, soy beans, and rape. With good permanent pastures large quantities of concentrates and hay or roughage will not be needed during the winter. Corn and corn fodder, either from the shock or shredded, sorghum, and grain and cowpea hay can easily be grown to supply this need.

The principal forest growth now found on the uplands consists of pine, oaks of several varieties, sweet and black gum, and sassafras. Beech, wild cherry, and chestnut are also of frequent occurrence. In the valleys laurel, soft maple, birch, sycamore, and willow are the prevailing growths. Dogwood, persimmon, hawthorn, holly, and wild plum are also common. China berries grow in the old fields and along the roadsides, and many of the small valleys support a dense growth of alder.

One important change has taken place in the forest growth. Formerly there was little pine, but now this is the predominating growth in the old fields. Loblolly pine in particular is very abundant, and some of these second-growth trees have diameters of 15 to 18 inches.

The great difficulty in changing the present system of agriculture or in improving the methods now in vogue throughout the county lies in the fact that the bulk of the farms are operated by tenants, mostly negroes, who are unskilled usually in the production of any crop except cotton. The tenants pay a standing rent and their interest in the land is limited to working it in such a manner as to secure the largest yield possible, with no thought of maintaining its productiveness. When the land becomes too poor to work profitably the tenant secures another farm and the owner has either to rehabilitate his land or allow it to lie idle until it can again be used for crops. Leases usually run from year to year and there is much changing of tenants.

Farm improvements throughout the county are as a rule poor. Many of the farms are large. In many cases the owners live in town and rent the land to tenants, who work with little or no supervision. Labor is fairly plentiful, wages ranging from 75 cents to \$1 a day, or \$15 a month with rations. Unless under direct supervision, it is not very efficient.

Progressive men throughout the South are now urging a change in the basis of agricultural rents, making 80 bushels of corn equivalent to a bale of cotton and permitting the tenant to pay one-half his rent in corn. It is also proposed to make corn interchangeable with cotton as collateral for the necessary supplies advanced to the tenant. Such a change would undoubtedly prove beneficial by encouraging the growing of more corn, but to secure the best results a much larger proportion of the farm labor must be done by hired hands under intelligent and constant supervision. In some communities there is a considerable movement of white families into the country, which will undoubtedly result in the adoption of better farming methods.

SOILS.

The soils of Troup County fall naturally, according to origin, into two broad classes or divisions—the upland or residual soils and the bottom-land or alluvial soils.

The residual soils, on account of their greater extent, are the more important. They are characterized by the gray to red color of the surface soils and by the red and yellow color and clay to sandy clay texture of the subsoils. They are easily cultivated, retain moisture readily, and are naturally productive.

The alluvial soils are generally light brown to reddish brown in color and characterized by frequent and wide variations in texture over limited areas and within the soil section. They occur in long, narrow strips adjacent to the stream courses and are naturally productive where properly drained and well managed.

The geological formations of the Piedmont Plateau are composed entirely of crystalline or semicrystalline rocks, including granites, schists, diorite, diabase, and others. The most abundant rocks are gneiss, schist, and granite, and it is from the disintegration and weathering of these that the residual soils have been formed. Owing to the ease with which rocks of this kind break down where exposed to weathering agencies, the underlying formations are seldom seen, except where the soil mantle has been removed by erosion. Some exposures, however, are to be seen in the deep cuts of the newly graded roads, where the formations are folded and contorted, with frequent veins and intrusive dikes.

Differences in soils are due in part to differences in the rocks from which they have been derived and in part to the varying conditions of weathering and erosion under which they have been formed. Owing to the frequency with which one formation gives way to another in Troup County and the thorough mingling of the soils derived from them, no separation of the types on a strictly geological basis seems practicable. In general the soils with a sandy surface are found along the crests of the ridges or divides between the drainage courses and on those portions of the slopes which tend to collect the wash from the higher areas. Such areas occur where a steep slope terminates in a more gradual incline and where basinlike areas are found.

With the clearing away of the forest growth and the cultivation of the soil under conditions more or less favorable to rapid erosion the areas having a sandy surface have doubtless decreased very materially. On the other hand, areas of clay soil are frequently found on the steeper slopes where the sandier surface material has been partly or entirely removed. Under cultivation these areas are increasing in number and extent. In some places, frequently on steep slopes and around the crests of some of the small hills which extend above the surrounding areas, numerous rock fragments are found. These steep slopes and hills, as well as the stony soils which cover them, are due to the more resistant nature of the underlying rocks. In some cases, owing to the softer rock material and the greater ease with which it breaks down, soils have been formed differing so markedly from the typical red soils that they have been placed in distinct series. These are described in detail in the sections following devoted to individual soil types.

The depth of the material giving rise to the residual soils varies greatly, ranging from only a few feet to 20 or 30 feet or more. In a few places small areas of bare rock outcrop occur, while in others the subsoil is filled with rock fragments, the content increasing as the underlying solid rock is approached. Over almost the entire area

covered by the residual soils the soil layer ranges in depth from 10 to 20 feet or more, the lower part of the substratum in places showing a mottling of yellowish red and gray and in others grading through layers of partially disintegrated rock to the parent formation.

The residual soils have been grouped into four series, the Cecil soils, distinguished by the red color of the subsoil and usually of the surface soil; the Durham, characterized by their gray surface soil and yellow or mottled subsoil; the Iredell, characterized by an almost level surface and a greenish or yellow color, with heavy clay subsoil, and the Louisa, readily recognized by the presence of a relatively large proportion of mica scales and fragments of mica schist throughout the soil section.

The Cecil soils are the most important both in extent and agricultural value. Three distinct types are mapped—the Cecil clay, the Cecil clay loam, and the Cecil sandy loam. The Cecil clay loam includes two phases which have been shown on the map by rulings over the type color. Many other minor variations can also be noted, but these, on account of the small size of the areas in which they occur, can not be shown on a map of the scale used. Only one type each of the Durham, Louisa, and Iredell series was mapped.

The alluvial soils have been derived from material washed from the uplands and deposited along the stream courses. They consist largely of the same material as the upland soils, but differ from them in the sorting and arrangement of the materials and in their larger content of organic matter. These have been classed as Congaree soils and divided into Congaree loam, fine sandy loam, and Meadow (Congaree material).

A soil of somewhat variable texture, mapped as the Altavista clay loam, is found on the benches and terraces along the Chattahoochee River. On the lower parts of the terraces it corresponds with the Congaree soils and on the higher parts with the Cecil soils.

The following table gives the names and extent of the various soils mapped in the county:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil clay loam.....	48,768	73.7	Iredell loam.....	2,112	0.8
Eroded phase.....	152,320		Louisa loam.....	1,664	.6
Chocolate-colored phase.....	4,480		Altavista clay loam.....	1,600	.6
Cecil sandy loam.....	35,968	12.9	Cecil clay.....	1,024	.4
Meadow (Congaree material).....	16,320	5.9	Congaree fine sandy loam.....	1,024	.4
Congaree loam.....	6,720	2.4	Total.....	278,400
Durham coarse sandy loam.....	6,400	2.3			

CECIL CLAY LOAM.

The surface soil of the Cecil clay loam consists of a bright-red, reddish-gray, or reddish-brown, medium to coarse sandy loam to sandy clay loam, underlain at about 2 to 5 inches by a red clay loam which quickly passes into heavy red, brittle, clay fairly uniform in color and texture, which continues to a depth of 3 feet or more, grading finally at an average depth considerably greater than 3 feet into partially disintegrated parent rock. Mica flakes and coarse sharp sand are found throughout the subsoil, giving it a slightly brittle structure and a somewhat gritty feel.

On the tops of the ridges and on the slopes where there is a rapid movement of surface water the soil is usually rather gray and sandy, owing to the removal of the finer material by the run-off. In the small depressions along slopes and below the foot of steep declivities the light surface covering is frequently darker in color, containing much fine material and more organic matter. This land is easier to cultivate and retains moisture better than the eroded soil, for which reason it is slightly more productive. It is, especially, better suited to garden and truck crops than the heavier phase. Rock fragments, mainly quartz, of varying size occur throughout the soil section and scattered over the surface, occasionally in quantities sufficient to interfere with cultivation. Such areas have been indicated on the map by appropriate symbol. Small eroded areas known locally as "gall spots" are found in cultivated fields on the steeper slopes where there is no surface soil, the heavy clay subsoil being left exposed. These eroded spots really represent patches of the Cecil clay too small to map.

When plowed under proper moisture conditions the type works up easily into a good, friable seed bed and subsequent shallow cultivation can be carried on without difficulty. The clay content, however, causes the soil to puddle and bake if cultivation is attempted when too wet or too dry.

The Cecil clay loam is residual in origin, and is derived from the breaking down and weathering in place of gneiss, granite, and to some extent mica schist and other igneous and metamorphic rocks.

The type is the most characteristic soil of this part of the Piedmont Plateau, and on account of its extent and productiveness is the most important type of the area. It is known locally as "red clay" or "red land" and its color has made famous the red hills of Georgia.

Surface drainage and underdrainage are good, the former because of the undulating topography and the latter because of the porous structure of the subsoil, yet with deep plowing and the incorporation of organic matter the type holds moisture remarkably well. In a few places where it is very micaceous it has a greater tendency to droughtiness. Such areas also erode rather easily.

The type as a whole is especially valuable, not only on account of the large and comparatively sure crops which it produces, but also because it can in a few years be brought, with proper care, from a poor condition to a state of marked productiveness. By means of deep plowing, the growing of cowpeas, the use of cover crops, and the incorporation of large quantities of organic matter it can be easily made to produce a bale of more of cotton, 40 bushels of corn, 45 bushels of oats, or from $1\frac{1}{2}$ to 3 tons of grain and cowpea hay per acre each year. It is well suited to Bermuda grass, clover, and lespedeza. Fertilizers can be profitably used for most crops. Mixtures of acid phosphate or other phosphate material with cottonseed meal and other nitrogen carriers give the best results. Generally it seems that potash does not show any very marked increase in the yields.

On account of the roughness of the topography and the character of the material, this soil has suffered more than any other type in the county from erosion. It is particularly susceptible to injury after the sandy surface soil has been removed. The red, unproductive "gall spots" are mainly small areas from which the surface mantle has been washed by heavy rains. Terracing has been practiced extensively on all of the steeper slopes in the area to prevent erosion. Where properly constructed so that they check but do not hold the water this practice is beneficial and should be continued. On slopes which are not so steep, however, deep plowing, which will enable the soil to absorb large amounts of moisture, and the maintenance of cover crops during the winter may be substituted. Where the slopes are very steep they should be used for permanent Bermuda pasture. Besides the measures for protecting the fields from erosion, steps should be taken to improve spots already damaged. Liming and the incorporation of coarse manures will greatly benefit the "gall spots."

Two phases of the Cecil clay loam have been recognized in Troup County. The clay loam which has a surface covering of lighter sandy soil, described above, may be considered the typical portion of the type, although it is not the most extensive. The red clay loam from which this sandy covering has been largely removed by erosion and a darker brownish red clay loam, known as "chocolate land," represent the phases.

Cecil clay loam, chocolate-colored phase.—The "chocolate land" usually occurs in small, irregular areas distributed throughout the county. Its dark-red or dark reddish-brown color is due in part to the larger percentage of humus which it contains and in part to the rock formation from which it has been derived (mainly a greenish schistose rock—possibly chloritic schist), the darker color extending through the soil and in places, the subsoil. It is generally recognized as the most productive upland soil in the county, and yields of a bale

of cotton to the acre are not uncommon. Where the areas of this soil are of sufficient size they have been separately indicated on the soil map. This land has a mellow structure, but frequently it does not "scour" well in plowing, the clay sticking to the moldboard. In the main it consists of a mellow, slightly sandy clay loam of a dark reddish-brown color, underlain at about 3 to 5 inches by dark-red clay loam, which passes quickly into dark-red, somewhat crumbly clay.

Cecil clay loam, eroded phase.—This phase embraces eroded areas where the sandy mantel and mellow clay loam, "chocolate loam," have been largely washed off, exposing a heavy clay loam of a rather raw, fresh character. This is the least productive portion of the Cecil clay loam. It needs deeper plowing, liberal incorporation of organic matter, and heavy application of lime. Some of the steeper slopes should be used for Bermuda pasturage. Winter cover crops should be generally grown.

CECIL SANDY LOAM.

The surface soil of the typical Cecil sandy loam consists of a gray to yellowish-gray or reddish-gray loamy sand to light sandy loam, becoming heavier with depth and grading into a sandy clay loam of a yellowish-red color at depths ranging from 6 to 12 inches. The subsoil is a rather heavy brick-red clay, frequently containing fragments of yellowish, partially decomposed gneiss. In places the texture of the soil is nearly or quite that of a coarse sandy loam. There are also many areas where the surface soil is underlain at about 6 to 8 inches by light-red or reddish-yellow heavy sandy loam to sandy clay loam passing at an average depth of about 12 inches into the subsoil proper, which consists of a red clay containing sufficient sand or coarse sand to impart to the material a rather friable structure. This friable nature of the subsoil in such areas, however, is not typical of the Cecil sandy loam in the main, as found, in other surveys. That portion of the type having a shallow sandy loam surface soil grades into the Cecil clay loam in such a way that the boundary was difficult to draw in places. Rock fragments, principally quartz, occur on the surface and throughout the soil section. Where the stones are very numerous the areas have been indicated on the map by the proper symbol.

The origin of the type is identical with that of the clay loam, except that the proportion of more resistant rocks, especially quartz, is higher and erosion has been less severe.

Owing to its higher content of insoluble quartz sand, the type is of somewhat lower natural fertility than the clay loam, but it is more easily cultivated, absorbs and holds moisture well, and produces good crops of cotton, corn, and oats. It is commonly known as "mulatto land," although the lighter-colored, grayer portions are sometimes called "gray soil."

The average topography is rolling, but not too rolling for cultivation. Considerable areas of this soil extend along the principal stream divides in the southern and eastern parts of the county, and smaller areas occur in other parts. Erosion is likely to ensue if the land is not properly handled. The type includes occasional eroded patches of Cecil clay loam. The steeper slopes—those most susceptible to erosion—should be terraced or used mainly for grass. Some of the best improved and cultivated farms, as well as some of the highest-priced land in the county, are to be found on this type.

The same recommendations for deep plowing, the use of legumes, and the rotation of crops made for other members of the series apply to this type. Under favorable conditions it should produce nearly as large crops of cotton, corn, and oats as the clay loam. It is especially suited to the growing of sweet potatoes, melons, and garden truck. Incorporation of vegetable matter such as cowpeas or rye plowed under, is advisable. Commercial fertilizers are also necessary for the best yields, especially mixtures of phosphoric acid and a nitrogen carrier, such as cottonseed meal.

CECIL CLAY.

The Cecil clay consists of about 2 to 3 inches of a dark reddish-brown loam or clay loam, grading below this depth into a red, reddish-brown, or yellowish-brown clay, then into a heavy red clay, which in places continues to a depth of 3 feet or more, but is frequently underlain at lesser depths by the parent rock. Fragments of hornblende gneiss are found throughout the soil section, frequently representing from 25 to 50 per cent of the soil mass. In places the red clay is exposed at the surface.

The type is well suited to cotton, corn, oats, and other crops of the area, and the yields, except when the percentage of rock fragments is very high, are about the same as for the better grades of the Cecil clay loam. Where the slopes are too steep or too rocky for profitable cultivation this soil can best be used for permanent pasture and should be sowed to Bermuda grass. Moderately deep plowing, applications of lime, and the turning under of vegetable matter give good results.

Only a few small areas of this soil occurring principally in the western part of the county have been indicated on the soil map. Many other smaller areas exist, but these can not be shown on a map of the scale used in this survey.

DURHAM COARSE SANDY LOAM.

The surface soil of the Durham coarse sandy loam consists of a gray to yellowish-gray, coarse, incoherent sand or light sandy loam, from about 7 to 14 inches deep. This grades into a yellow to yellowish-gray sticky, friable sandy clay, which is from 3 to 10 feet deep and almost impervious to water in the lower depths. In places the

type includes patches which show mottlings of gray and reddish brown in the upper section of the subsoil, and streaks and mottlings of red and reddish brown in the lower subsoil. The streaks are frequently from 1 to 2 inches wide. These are usually more pronounced near the boundaries of the Cecil soils. These areas of mottled and streaked subsoil represent the Appling coarse sandy loam. They were not separated from the typical Durham, with its nearly uniform yellow subsoil, on account of their small size and irregularity of occurrence.

The origin of this soil is apparently, in part at least, from the weathering of a whitish-gray, coarse-grained granite containing a high percentage of quartz. Large masses of this rock occur in or near all the larger areas of the type. These are usually well rounded and extend to a height of from 10 to 25 feet above the level of the surrounding soil. In a few spots they were found level with the surface, forming the so-called "table rock."

The largest areas of this soil occur in the vicinity of Mountville, near Knott, and to the east of Lagrange. Small areas ranging from less than an acre to about 40 acres or more are scattered throughout the entire county. These small areas usually occur on the point of the low divides separating the headwaters of small branches, in the basins formed by the confluence of several small streams, or along the slopes immediately above the flood plain of some of the small streams. In such situations the type is poorly drained. Small areas of coarse-grained gray sandy soils are especially abundant around the heads of the small streams which form Mud Creek, southeast of Lagrange.

The Durham coarse sandy loam is easily cultivated and when well supplied with manure or other forms of organic matter can be made fairly productive. It is naturally less productive than the red soils of the Cecil series. On account of the large content of coarse sand, the percolation of the rainfall is rapid, tending to leach much of the more soluble fertilizer constituents downward beyond the reach of the plants. Crops on this type generally can not withstand extremes of heat or drought as well as on the Cecil soils.

The average yield of cotton varies from one-fourth to one-half bale and of corn from 15 to 20 bushels per acre. This is a good trucking soil. Small fruits, melons, sweet potatoes, and peanuts also do well. With fertilizers and better methods of soil management, including the plowing under of liberal quantities of green manures, the yields can be increased materially, especially in the case of corn.

IREDELL LOAM.

The surface soil of the Iredell loam consists of a light-brown, greenish-brown, or grayish-brown loam, from about 12 to 20 inches deep, becoming heavier in texture and somewhat yellower in color

in the lower portion, where mottlings of brown, gray, and yellow are frequently encountered. The subsoil is a stiff, plastic, waxy, impervious, heavy clay, extending to the underlying rock, usually encountered at depths of 3 feet or less. The rock is usually soft and schistose in structure. The subsoil color is generally yellowish brown, often having a greenish tinge. A relatively large proportion of medium sand and quantities of iron concretions are found throughout the soil section. This type is of small extent in the county.

The type includes a phase occupying a few broad, flat valleys, which are unusually wide for the small streams which flow through them, and which, no doubt, have been formed partly by the wearing down of the underlying rocks. This phase is known locally as "glade lands." It varies considerably in texture between its range from the Cecil soils along the outer edges of the valleys and the Congaree or alluvial soils along the streams, where it has been modified by deposits from overflow. Iron concretions and occasional tinges of olive green in the subsoil are characteristic of this phase.

The type is not very productive, but can be improved by the incorporation of organic matter and by thorough drainage. Only one area of importance has been cultivated, consisting of about 1,000 acres, situated between Lagrange and Cannonville. Another small area lies about $2\frac{1}{2}$ miles northwest of Gabbettville.

Only one small area of the hill or upland phase was mapped. This lies just north of West Point on the east side of the river, and is considerably mixed with the surrounding Cecil soils, having their characteristic color and texture; the abundant iron concretions, and the mottled clay subsoil have caused its classification with the Iredell. The greater proportion of this phase is uncultivated and covered principally with black-jack oak.

The soil is best suited to grass, such as Bermuda, and to small grains. Corn and cotton do very well under good management when the seasons are favorable. Both of them suffer in wet years. Applications of potash salts or kainit are generally beneficial with both cotton and corn, which crops are inclined to injury on the Iredell soils generally by "rust" and "frenching."

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Iredell loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
252325.....	Soil.....	6.2	9.8	5.9	14.1	19.6	28.4	16.1
252326.....	Subsoil.....	1.9	6.2	5.8	16.3	10.1	24.4	35.1

LOUISA LOAM.

The Louisa loam, sometimes known as "isinglass land," varies in the color of the soil from the brick red of the Cecil soils to a reddish or grayish brown. Mica scales and fragments of mica schist are usually so abundant that the surface generally has a glistening or shiny appearance and when rubbed between thumb and fingers often leaves a silvery coating of mica. The texture of the soil is loam to light clay loam. The subsoil differs but little in color or texture from the soil, consisting of a red, heavy clay, which, on account of the mica present, has a greasy feel. The underlying mica schist from which the soil is derived is usually reached at depths of from 2 to 3 feet.

The largest areas lie about 5 miles east of West Point. Many areas too small to be indicated on the soil map occur throughout the county.

This soil does not withstand drought well and crop yields are low. Better results can be secured by turning under green manuring crops, such as cowpeas and rye, and by the use of complete fertilizer mixtures. The type is adapted to the general farm crops, including cotton, corn, oats, and sorghum.

CONGAREE LOAM.

The surface soil of the Congaree loam, although somewhat variable in texture, averages a yellowish-brown to reddish-brown loam, from 12 to 16 inches deep, becoming slightly heavier with depth. In places the soil has the texture of a fine sandy loam, and sometimes of a silt loam, but such areas were not separated, owing to their small sizes and irregularity of distribution. Over the more elevated parts of the bottom lands away from the stream courses the subsoil is a yellowish or yellowish-red heavy clay loam, with occasional mottlings of gray and brown. On the narrow ridges near the stream courses the subsoil is a fine sandy loam of about the same color as the surface soil.

The principal bodies of this type are found on the flood plains of the Chattahoochee and other large streams of the area. It also forms a considerable proportion of the Meadow (Congaree material) found along the smaller stream courses in the county.

This type has been derived principally from wash from the soils of the Piedmont Plateau deposited by the flood waters of the streams along which it occurs, its arrangement depending upon the conditions under which it was deposited, the sandy material having been laid down from the swifter currents and the fine particles from the quieter water.

The Congaree loam is a rich, productive soil, easily cultivated and fairly well supplied with nitrogen and humus. The larger proportion

of it is subject to rather frequent overflow, and some of it is naturally wet and needs artificial drainage. Over poorly drained areas there is a tendency to acidity, which must be corrected by applications of lime before the best yields can be obtained.

At present this soil is used principally for the production of corn and pasturage. Some cotton is grown upon it, but the danger from late frosts in the spring and early frosts in the fall and also the tendency of the bottom-land cotton to rust makes it rather undesirable for this crop. Under favorable seasonal conditions good yields are obtained. Quick-maturing varieties should be used. This type is well suited to corn, small grains, grass, and cowpeas. Where well drained and limed, alfalfa and clover should do well. Corn should yield 40 to 50 bushels, oats about the same, and wheat 15 to 20 bushels per acre. Potatoes and garden truck also do well

CONGAREE FINE SANDY LOAM.

The Congaree fine sandy loam consists of a light yellowish brown to reddish-brown loamy fine sand to light, micaceous fine sandy loam. The soil mass is practically the same throughout the 3-foot section, the subsoil being a fine sandy loam, slightly lighter in color than the surface soil. Along the immediate stream front the texture is generally lighter than at some distance back.

The Congaree fine sandy loam occurs in long, narrow strips in the flood plain of the Chattahoochee River, usually in positions next to the river channel or as ridges slightly higher than the adjacent loam. There are some shallow swales in which the material is of heavier texture than on the ridges, ranging from reddish-brown loam to reddish sandy clay loam.

The origin of this soil is the same as that of the Congaree loam, the type consisting of the coarser particles of the alluvial material. Much of the type is too sandy for corn or cotton, but it can be used for Bermuda pasture, sweet potatoes, melons, and garden truck. With liberal fertilization cotton, oats, and corn succeed. As high as 50 to 70 bushels of corn are reported from some of the better portions. The sandier areas are much in need of vegetable matter.

The results of mechanical analyses of samples of the soil and subsoil of this type are given in the following table:

Mechanical analyses of Congaree fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
252303.....	Soil.....	0.0	0.2	0.6	20.3	39.1	25.3	14.4
252304.....	Subsoil.....	.0	.5	.7	21.3	31.2	25.9	20.4

ALTAVISTA CLAY LOAM.

In several places along the Chattahoochee River, but principally along the west bank north of West Point, terraces or second bottoms occur, and above these are the fragments of higher and older terraces. The soil of these upper terraces is red or reddish brown in color and differs but little in texture from the typical Cecil clay loam. Typically it consists of a dark reddish-brown to red heavy sandy loam, underlain at about 3 to 5 inches by red clay. Scattered over the surface and throughout the soil mass well rounded, waterworn gravel, mostly of quartz and quartzite, varying in size from small gravel to pebbles up to 2 or 3 inches in diameter, are encountered. In places these almost cover the surface. Where exposed in cuts they appear in compact strata, being bound together with red and ochreous-yellow clay.

On the lower terrace, which has an elevation of 10 to 30 feet above the present flood plain and an almost level surface, the gravel is less plentiful and the soil at the surface somewhat resembles the Cecil sandy loam and the Congaree loam. In general, it is a yellowish-brown to reddish-gray sandy loam, grading at depths of 3 to 5 inches into a reddish or yellowish loam or sandy clay loam. At a depth of 8 to 12 inches the typical red clay loam subsoil is encountered.

This soil is well suited to all the crops of the area, the yields being the same or possibly a little larger than on the Cecil sandy loam. The methods of management recommended for the Cecil sandy loam are applicable to this land.

MEADOW (CONGAREE MATERIAL).

Along all the streams in the area are strips of alluvial and alluvio-colluvial soil varying in width from only a few yards to several rods. Along the smaller streams a considerable proportion of the material represents wash or colluvial material which has gradually worked down from the adjacent slopes. Along the larger streams this wash has been covered up and mixed with true alluvial material carried in suspension, sorted, and redeposited during periods of overflow. Thus the soils of these small bottoms vary greatly in texture and arrangement, areas of any definite type being small and very irregularly distributed. The range in texture is from sand to sandy clay loam, there being included sand, sandy loam, fine sandy loam, sandy clay loam, and silt loam. There is a variation in color from reddish to brown. The subsoil is even more variable in texture, color, and profile arrangement than the soil, sand, sandy loam, silt loam, etc., frequently being interbedded. As a whole, however, the areas are rich and productive and usually well supplied with organic matter. On account of the frequency with which these bottoms overflow, only small portions of them have been cleared and farmed and the greater part is at present covered with a dense growth of alders.

When properly diked to prevent overflow and provided with an adequate system of open drains to carry off excess precipitation many hundreds of acres of the most productive land in the county will be brought under cultivation. By strengthening and deepening the main drainage channels a considerable proportion of the type can be reclaimed to agriculture without diking.

Corn, oats, and grass will generally give best returns.

SUMMARY.

Troup County is situated on the western border of Georgia and has an area of 435 square miles, or 278,400 acres. It lies entirely within the Piedmont Plateau, the elevation of the area varying from 600 to 850 feet above sea level.

The climate is mild and salubrious. Extremes of temperature are rare and rainfall is abundant and well distributed throughout the year. The average length of the growing season is 235 days, which is ample for all crops.

The agriculture of the area is conducted on the one-crop system, cotton being the money crop. Some corn, oats, cowpeas, hay, and vegetables are grown, but not enough to supply the local demand. Much of the land is farmed by tenants.

The yield per acre of cotton varies from one-fourth to over one bale per acre and of corn from 10 to 50 bushels. Many farmers say that yields are increasing as a result of careful seed selection, the use of commercial fertilizers, and rotation of crops. The rotation most commonly used consists of cotton the first year, followed by corn and cowpeas the second year, with a small grain crop, such as oats or wheat, followed by cowpeas the third year. A cover crop, such as rye, barley, or vetch, might profitably be added to the rotation each year, to be planted late in September and plowed under in the spring.

The soils of the area are residual and alluvial. The former are found on the uplands, having been derived from the weathering of granite, gneiss, mica schist, and other metamorphic rocks. The alluvial soils occupy the bottom lands and are formed by wash from the higher-lying residual soils. All of the upland soils are deficient in organic matter or humus.

Many of the bottom land areas are in need of drainage, and in some cases the soil is slightly acid, needing the application of lime before it can be used for leguminous crops.

On account of the danger from frost and the tendency of cotton to rust, the bottom lands are used largely for corn and for pasture.

Ten distinct types, including Meadow, were mapped. Of these the Cecil soils are the most important.

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at <http://offices.sc.egov.usda.gov/locator/app>.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotope, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.