

SOIL SURVEY OF ROCKDALE COUNTY, GEORGIA.¹

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DESCRIPTION OF THE AREA.

Rockdale County is situated in the north-central part of the State of Georgia. Conyers, the county seat, is 31 miles southeast of Atlanta. The county is bounded on the north by Gwinnett and Walton Counties, on the east and south by Newton and Henry Counties, and on the west by DeKalb County.

Rockdale County is one of the smallest counties in the State. The area covered by this survey, including a narrow strip of territory claimed by DeKalb County but recognized by the State authorities as belonging to Rockdale County, comprises a land area of 130 square miles, or 83,200 acres.

The surface features of this county comprise smooth and gently rolling divides which have a gradual to steep slope toward the streams. Some of the smoother and more level areas lie west of Conyers, in the vicinity of Rockdale Church, south of Conyers, around Velta, and in the vicinity of Cedar Grove School. The more rolling, broken, and hilly areas are developed along the larger streams. Practically all of the county has a surface favorable for the operation of improved farm machinery, but terracing is essential on most of the slopes in order to prevent serious washing and gulying. Narrow strips of flat or level land occur along all the streams of the county.

Rockdale County has excellent natural surface drainage. Every farm in the county is connected with some stream or intermittent drainage way, and practically no ditching is necessary for any of the upland soils of the county. The first-bottom areas along the streams are poorly drained and are subject to overflows. The drainage of the county is effected through Big Haynes Creek, Yellow River, Snapping Shoal Creek, Honey Creek, and South River. A small amount of water power has been developed along some of the streams and is used for the operation of gristmills and cotton gins.



Fig. 16.—Sketch map showing location of the Rockdale County area, Georgia.

¹ Mr. Meyer mapped the soils of this county, but resigned before writing a report. This report was written by W. Edward Hearn, of the United States Department of Agriculture, and David D. Long, of the Georgia State College of Agriculture.

The elevation of Rockdale County is about that of the surrounding Piedmont counties. There are no high peaks or marked depressions in the county. The elevation at Conyers is 880 feet.

The population of the county in 1920 was 9,521. It is all classed as rural and well distributed over the county, the density being 80 persons per square mile. There are practically no foreigners and the percentage of negroes is relatively small.

Conyers, the county seat, has a population of 1,817. Milstead, a cotton-mill town, about 2 miles northeast of Conyers, is the second largest town.

The main line of the Georgia Railroad from Atlanta to Augusta passes across the county in a northwest-southeast direction. With the exception of the extreme southern end of the county, which is about 10 miles from Conyers, most of the county lies within a short distance of the railroad.

The public roads of the county are mainly earth roads, some of which have been graded and improved by the application of sand, clay, and gravel. The main roads are good the greater part of the year. Rural delivery mail service reaches all sections of the county. Churches and schoolhouses are located at convenient intervals. Fairly good farmhouses are seen in all parts of the county, and in many places good barns are not uncommon.

Conyers is the principal market for farm products in the county. Most of the cotton is sold at Conyers and in Milstead, while much of the truck crops, eggs and poultry, and animal and dairy products is sold in Atlanta.

CLIMATE.

There is no Weather Bureau station in Rockdale County. The data given in the table below are compiled from the records of the station at Atlanta. It is believed the figures given are fairly representative of local climatic conditions.

The climate is salubrious. The summers are long and hot, and the winters are generally mild and open, with brief periods of rather cold, penetrating weather. The mean annual temperature is 61.1° F., the absolute maximum 100° F., and the absolute minimum -8° F. The snowfall is usually light and remains on the ground for only a short time. The spring and fall months are pleasant, and often much farm work can be done during the winter months.

The rainfall is ample for the successful production of all crops of the region, the mean for the year being 49.04 inches. The total for the driest year of which there is any record was 33.13 inches, and for the wettest, 65.24 inches.

The normal growing season has a duration of 223 days. The average date of the last killing frost in the spring is March 27, and of the first killing frost in the fall is November 5. The latest killing frost in spring occurred on April 25, and the earliest in fall on October 19.

Normal monthly, seasonal, and annual temperature and precipitation at Atlanta, Fulton County.

[Elevation, 1,218 feet.]

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1920).
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December	43.7	73	1	4.61	3.25	4.36
January	42.9	73	-2	4.77	3.62	7.69
February	43.3	78	-8	4.96	3.51	5.67
Winter	43.3	78	-8	14.34	10.38	17.72
March	53.0	87	8	5.48	2.31	10.95
April	60.4	89	25	3.94	1.62	5.32
May	70.0	97	38	3.40	2.52	4.58
Spring	61.1	97	8	12.82	6.45	20.85
June	76.2	100	39	4.02	1.88	3.47
July	78.1	100	58	4.38	2.67	5.95
August	76.6	98	55	4.37	8.74	10.02
Summer	77.0	100	39	12.77	13.29	19.44
September	73.3	97	43	3.33	.56	3.36
October	62.4	94	27	2.55	.10	.54
November	52.1	82	14	3.23	2.35	3.33
Fall	62.6	97	14	9.11	3.01	7.23
Year	61.1	100	-8	49.04	33.13	65.24

AGRICULTURE.

The agricultural development of Rockdale County from the early days of its settlement until the present has followed closely the agricultural history of the inland counties of the State.

In the pioneer stage the agriculture consisted of the production of crops that were necessary for sustenance. Corn, oats, wheat, and barley were the chief crops. Cattle, hogs, and sheep furnished the necessary animal products for food and clothing. As settlement and shipping facilities increased and markets were established, the products which were formerly produced out of necessity were displaced by cash crops adapted to the soils and climate. Cotton was an important crop, annually increasing in value, until it became the chief crop shortly after the close of the Civil War. With each decade the acreage of grain crops decreased while that of cotton increased, until the present state of agricultural development was reached. To-day agriculture is chiefly concerned with the production of cotton. It is the leading cash crop, and about it are centered all business activities.

The diagram (Fig. 17), based upon reports of the United States census of 1920, shows the relative acreage of field crops in Rockdale County in 1919.

Fruits and nuts are not reported by acres and are, therefore, not included in the total acreage.

According to the census of 1920, 97.5 per cent of the land area of the county is in farms, and 61 per cent of the total area is improved land. Of this improved acreage, 38,859 acres were in crops, exclusive of fruits and nuts.

In 1919 cotton was grown on 23,561 acres, or 60.4 per cent of the total crop acreage. It produced 11,504 bales, or an average of 240 pounds of lint per acre. The crop is grown on practically every farm in the county, and in some instances almost to the exclusion of other crops.

Corn ranks second in importance. According to the census, corn was grown in 1919 on 11,710 acres, or 30.1 per cent of the total crop acreage, with a total production of 159,627 bushels, or an average yield of 13.6 bushels per acre. The corn crop is used principally on the farm, and it is said that the production is adequate for the needs

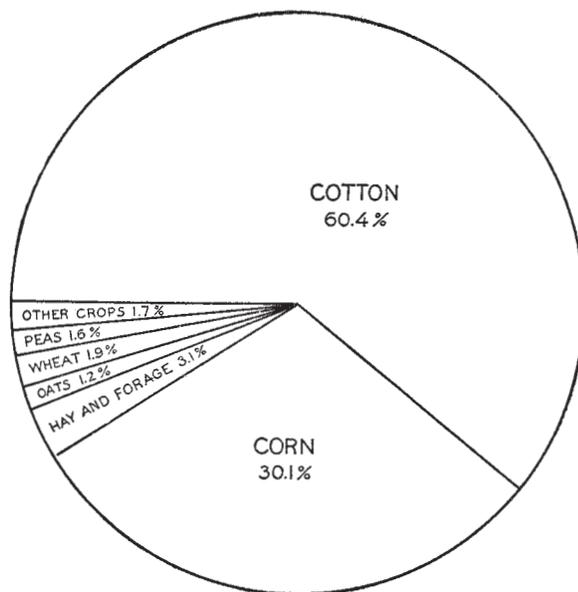


FIG. 17.—Relative acreage of field crops in 1919.

of the county. Indeed in the last few years enough corn has been produced to allow the shipment of considerable quantities to outside markets.

The small grains are grown to some extent, in small patches. In 1919 wheat was grown on 744 acres, or 1.9 per cent of the total crop acreage, and the production was 7,836 bushels, or an average of 10.5 bushels per acre. The land in oats in the same year was 486 acres, or only 1.2 per cent of the total crop acreage, with a production of 7,359 bushels, or an average of 15.1 bushels per acre. Practically no rye is grown. The oats and wheat are used locally, but do not begin to supply the needs of the present population.

Hay and forage crops were produced on 1,230 acres in 1919. Tame grasses occupied 475 acres, yielding 479 tons of hay. Annual legumes (almost exclusively cowpeas) were cut for hay on 527 acres and yielded 485 tons, or an average of 1,800 pounds of hay per acre.

The hay is used locally as feed for the work stock. Besides the cow-peas grown for forage, there was also a considerable acreage grown for seed.

Other crops of small acreage are peanuts, sweet potatoes, and sorghum. Only 43 acres were planted to peanuts in 1919, but since that time the acreage has been materially increased. The average yield for 1919 was 23 bushels per acre. Sweet potatoes are produced in small patches for home use. The total acreage in 1919 was 277 acres, with a production of 32,779 bushels, or an average of 118 bushels per acre. The sorghum is used in making sirup.

Many of the farmsteads have young, vigorous orchards of peaches, apples, plums, and pears. Practically all the fruit is used for immediate home needs.

The raising of live stock, especially hogs, is becoming more widely established on the various farms throughout the county. Improved breeds of hogs are found, and more cattle are being kept on the farms than in the previous decade.

The soils of the county, being of a sandy nature, are adapted to a wide range of crops, and particularly to special crops such as vegetables and fruits. However, the farmers have not utilized the soils for special crops to any great extent, and the agriculture of the county has not been intensified to any marked degree, although the value of the different types for different purposes is generally known. The farmers recognize that in dry years the sandy soils are best suited to the crops which they have been growing. During wet seasons, it is known, the sandy soils fill with water and often drown the young growing crops, particularly cotton. On the other hand, the Cecil sandy clay loam and clay loam types, commonly called the red lands, produce the best yields in wet seasons, as the soil, owing to its closer or more compact condition, does not absorb as much moisture and, therefore, requires more rainfall to keep it in condition than the sandy lands.

To a small extent the farming operations are carried on with modern implements, and tools and machinery of improved types are steadily gaining in popularity. Although at least 50 per cent of the land is of such topography as would permit of the use of tractors, they are not used as yet to any appreciable extent. Two-horse turning plows are common and improved harrows and cultivators are in general use. The work stock consists chiefly of mules. The farm buildings are generally small, but adequate for the type of farming carried on in the county.

It is a common practice to prepare the land for cotton with a two-horse turning plow, breaking the soil broadcast, after which it is harrowed, laid off in rows, and the fertilizer applied. The land is then listed over the fertilizer and the seed is planted on the resulting bed. The planting period generally extends through the month of April, very little cotton being planted after the first week in May. Cultivation of the crop is generally thorough, being performed with cultivators and sweeps or scrapes. As a general rule the crop is hoed once or twice. The cultivation of the crop continues until about July, when it is "laid by." Ordinarily the crop receives from 4 to 6 cultivations, though many of the more progressive farmers give as many as 8 or 10. Many different varieties of cotton are

grown, the most popular being the Cleveland. Since the advent of the boll weevil early-maturing varieties have been gaining in favor. Among the recent introductions that have been planted on considerable acreage may be mentioned College No. 1.

Preparation of the land for corn is quite variable. The more progressive farmers break the land broadcast and work the soil into a good tilth. The rows are laid off from $3\frac{1}{2}$ to 5 feet, depending upon the productiveness of the land, the closer spacing being given on the stronger soils. Generally the land is not as well prepared for corn as for cotton; neither is it cultivated as thoroughly or as often as cotton. On some of the best-managed farms the cultivation is as adequate for one crop as for the other. Owing to the less thorough preparation of the land and cultivation of the crop in most cases, the yields are naturally much lower than they should be. Corn is planted from the latter part of March to the latter part of May. The plantings ordinarily are distributed through this period, so that at least a part of the crop may meet with favorable seasonal conditions during critical stages of growth. Cultivation of the crop usually ceases by the middle of June or early July. In August usually the fodder is pulled, but this practice has been abandoned by some farmers. Only a small percentage of the corn is cut and shocked or shredded, the ears being snapped from the standing stalk. The varieties grown are chiefly of the prolific type. There is, however, a large acreage planted to a mixed variety which has been grown in the county for years with considerable success.

The small-grain crops are sown in several different ways. The most satisfactory method consists of breaking the land broadcast, harrowing, and drilling the seed. The method varies from this one to merely sowing the seed broadcast and covering it with a small turning plow or disk cultivator. The deep-furrow method is used to some extent, particularly where the grain is seeded between the rows of cotton with small drills. Most of the crop is seeded during October and the early part of November. The Fulton, Appler, and Texas Rustproof are the leading varieties of oats.

Cowpeas grown for hay are usually sown on the oats stubble, being broadcasted and covered with small turning plows or disks. The seed also may be sown broadcast through the cornfields just before the last cultivation, or in the rows of corn at the next to last cultivation, so that the last cultivation of the corn will also give the cowpeas at least one cultivation. When the crop is sown in cornfields it is usually for the purpose of furnishing pasture for hogs and cattle during the winter months and turning under the residue for the improvement of the soil.

No well-established system of crop rotation is followed. It is a general custom to change the crops of the fields as often as possible, but there are some fields that have been continuously planted to cotton for many years. However, the value of crop rotation is being recognized more and more. In a crop rotation for this county there should be at least one legume, such as cowpeas or velvet beans, to add organic matter to the soil.

Practically all farmers of the county use commercial fertilizers, and the expenditure for fertilizers has increased annually. In 1919, 1,050 farms of the 1,236 in the county reported an expenditure of \$197,045. The greater part of the fertilizer is applied to cotton. The formulas of mixtures used for this crop contain from 8 to 12 per cent phos-

phoric acid, 2 to 4 per cent nitrogen, and 2 to 4 per cent potash. In the experience of the leading farmers of the county a 9-3-3 mixture has been the most satisfactory. Fertilizer of this formula is used in quantities ranging from 400 to 800 pounds per acre by those farmers who, before the advent of the boll weevil, produced approximately three-fourths to 1 bale of cotton per acre. Many of the tenant farmers use smaller quantities of lower grades with less satisfactory results, such as 200 pounds of 8-2-2 or 200 pounds of 10-2-2. The same fertilizers are used for corn as for cotton. The quantity applied is somewhat less, but no difference is made by those farmers who pride themselves on obtaining large yields of corn. Nitrate of soda or sulphate of ammonia is quite generally used as a top dressing on corn. The value of commercial fertilizers for small grains is not generally recognized. Much of the oats is sown without any fertilizer, resulting in low yields, but the better farmers use from 200 to 300 pounds of about the same mixtures as they use for cotton. Other farmers who use no commercial fertilizer at the time of sowing the oats or wheat apply about 100 pounds of nitrate of soda in the spring, just before the crop begins to shoot.

A relatively small number of the farmers of the county reported to the census an expenditure for labor in 1919 amounting to \$29,246. Labor is both white and colored, and is employed by the day, month, or year. Labor by the month receives from \$15 to \$20 and an allowance for subsistence. Cotton is usually picked at a standard rate per hundred pounds of seed cotton.

The census of 1920 reports 1,236 farms in the county, the majority ranging in size from 20 to 100 acres. There are no farms within the county containing as much as 1,000 acres. The average-size farm contains 60.1 acres,² of which 36.6 acres are classified as improved.

The proportion of farms operated by owners has decreased from 50.6 per cent in 1880 to 30.2 per cent in 1920. Nearly half of the tenant farms are rented under a share plan, in which the landlord furnishes the necessary stock, feed, implements, and half the fertilizer, and sometimes half or all of the seed for the different crops; the tenant furnishes the labor and one-half the fertilizer; and all crops are equally divided. Land is also leased for cash, for a standing rental or fixed quantity of cotton or corn, and for one-third of the cotton and one-fourth of the corn.

Land values range from \$20 to \$100 an acre, depending upon location and improvements.

The agriculture of the county to-day is in a transitional stage. The boll weevil made its first appearance, with local damage, in 1920, and in 1921 its damage was felt by every farmer in the county. With the real menace of the boll weevil before them the farmers are in an undecided state. It is expected that the acreage devoted to cotton will be materially reduced, and that the acreages of corn, peanuts, sweet potatoes, and other food crops will be increased. As yet there is no one cash crop established to take the place of cotton. An effort is being made to combat the boll weevil according to methods recommended by the Government. Agricultural leaders and business men state that they are not able to forecast the direction which the agriculture of the county will take within the next few years. It

²In the census each tenancy is enumerated as a farm.

may be along the line of combating the boll weevil or that of taking up other cash crops, or both.

The soils of Rockdale County, judging from the results of chemical analyses of similar soils in near-by counties,³ are relatively low in certain of the plant-food elements essential for profitable crop yields. Methods of increasing the productive power of these soils, as recommended by college and Government agencies, are here given briefly.

The first great need of the soils is organic matter, which should be supplied by stable manure or the turning under of green-manure crops, preferably legumes. Cowpeas or velvet beans should be grown at least once in three years and turned under to help supply the much-needed organic matter. The increase of organic matter in all the soils will help to prevent erosion, help to hold moisture from one rain to another, and increase the returns from fertilizer applications.

Practically all the organic matter originally in the soils has been lost through years of growing cotton, corn, and other clean-cultivated crops. The Cecil sandy loam and Appling sandy loam types are deficient in organic material not only because of cultural treatment they have received but because the sandy surface is naturally loose and not very retentive of humus. The supply should be replenished with a green-manure crop at intervals of not exceeding three years, and crop residues of all kinds should be turned under at all times. Organic matter also will improve the Cecil sandy clay loam and clay loam types, especially in helping to keep the soil from running together shortly after plowing.

The phosphoric-acid content of all the upland soils is low, as the rocks from which the soils are derived are naturally low in this constituent. This element occurs in the native rocks only as microscopic, needlelike crystals in the form of the mineral apatite. The necessary phosphoric acid for profitable yields of crops should, therefore, be supplied either in the form of acid phosphate or in some other available form. From three to four times as much phosphoric acid as potash or nitrogen is required for these soils.

While the native rocks giving rise to the soils of Rockdale County contain from 4 to 6 per cent potash, this element of plant food occurs in an insoluble form and becomes available slowly. Actual experience

³ Percentage of nitrogen, phosphoric acid, and potash in representative soils.

Soil type.	Nitrogen.	Phosphoric acid.	Potash.
Cecil sandy loam, Dekalb County:			
Soil.....	<i>Per cent.</i> 0.0355	<i>Per cent.</i> 0.0599	<i>Per cent.</i> 1.1765
Subsoil.....	.0239	.0506	.9047
Cecil clay loam, Dekalb County:			
Soil.....	.0610	.0508	.7334
Subsoil.....	.0342	.0583	.8244
Cecil sandy clay loam, Meriwether County:			
Soil.....	.0251	.0412	.8007
Subsoil.....	.0192	.0654	1.0513
Appling sandy loam, Dekalb County:			
Soil.....	.0307	.0268	4.7109
Subsoil.....	.0235	.0217	4.0624

The high potash content of the Appling sandy loam in the samples examined may be due to the fact that the soil sample contained a large proportion of the parent or virgin rock material, and it is probable that the Appling sandy loam of Rockdale County, where considerable leaching and weathering has taken place, would not be as high in potash. This is the element, however, with which the soils in general are fairly well supplied.

of the farmers and experimental investigation have demonstrated the necessity of using potash in fertilizers.

The nitrogen content of all the soils of the county is low. Nitrogen must be supplied in liberal quantities, especially where crops of cowpeas and velvet beans are not turned under.

A common practice of farmers on these soils is to use a 9-3-3 fertilizer for cotton, corn, and general farm crops. This fertilizer meets the soil deficiencies profitably, as is shown by fertilizer experiments on these soils.

Erosion of the land in the more rolling parts of the county is a serious menace, and proper terracing to prevent erosion should be practiced. The problem of utilizing the terraces has been solved by one farmer of the county, who grows strawberries in the matted-row system on them.

The land should be plowed deeper in order that a deeper feeding zone for the roots of the crops may be established. A gradual increase in the depth of plowing will also prevent the formation of a plowpan.

Rotation of crops should be more general throughout the county to assist in the efficient handling of the soil.

SOILS.

The soils of Rockdale County range in color from light gray and gray to red. There are two distinct classes of soils in this area with respect to the color of the subsoil. There are no black or dark-gray soils in the county, as the conditions have not favored the accumulation of organic matter in the soils, because this area was formerly forested with hardwoods, and under a forest cover there is little chance for such accumulation in the soil.

All the soils have undergone a great deal of leaching, and much of the soluble material and plant food is constantly being washed out. The rainfall is heavy and the temperature is sufficiently warm to prevent freezing to any extent, and thus soil leaching goes on practically throughout the year. Only in a few places have cover crops been grown during the winter months, and so the soils are subject to loss by surface erosion in addition to the loss of soluble plant food by leaching.

The original rocks from which the soils of this area have been derived contain a low percentage of lime, and through weathering and leaching there has been left only a small quantity of lime in these soils, and no free carbonates have accumulated in the soil or subsoil. According to the chemical analyses of similar soils in some of the adjacent and other not far distant counties of Georgia, the soils of Rockdale County are either practically neutral or slightly acid in character. The lime requirement is therefore small. If large quantities of green-manure crops have been turned under, a liberal application of lime would probably be beneficial in hastening decay of the organic matter and in preventing the accumulation of acids.

The upland soils of Rockdale County are similar in structure and arrangement of the horizons or layers composing the soil section. With regard to the colors of the various horizons they fall into three distinct classes. In the central-western and northwestern parts of the county there prevails a light-gray sandy soil, which has a sub-

surface layer of yellow or reddish-yellow material between it and the yellowish-red or streaked red and yellow subsoil. This class of land represents the lightest colored soil and is termed locally "light sandy land." In the eastern part of the county and also in a few areas in the southern part a second class of soils is encountered, in which the surface soil is brownish gray to light brown, and the subsoil is a bright-red clay. This class of land is readily distinguished from the others by the red color of the subsoil and the prevailing brownish tinge of the surface soil. The third main group of soils is developed in the southern end of the county. Here the surface soils are red to reddish brown for the most part and have red clay subsoils. These soils represent the "red lands" of the county.

Narrow strips of alluvial material are developed in the first bottoms along the streams.

In the northern half of the county, and also along the western side, light-colored granite and gneiss rock occur. The granite, or granitic gneiss, seems to prevail, and the weathering of these rocks has given rise to the Appling sandy loam and Cecil sandy loam. Outcrops of these rocks are of common occurrence, and large, bare ledges of rock are numerous throughout the northeastern part of the county. On some of the slopes the disintegrated rock is reached within the 3-foot section. In the southern part of the county the formations are more mixed and variable, highly metamorphosed, twisted, and folded, and consist of interbedded granitic gneiss, hornblende schist, mica schist, and quartz-mica schist. These rocks are cut by many narrow veins of quartz, and the breaking up of this quartz is responsible for the occurrence of the fragments on the surface. These rocks evidently contain more iron than the light-colored rocks toward the northern end of the county and hence produce redder soils. The rocks are also finer textured than those farther north, and this results in soils of heavier texture and slightly more compact structure. These rocks give rise to the Cecil sandy clay loam and Cecil clay loam.

Soils that are similar in origin, color, and structure are grouped in series. Each series is divided into soil types which differ from one another in the texture of the surface soil. The type is the unit of soil classification and mapping. Only three soil series are represented in this county—the Appling, Cecil, and Congaree.

The Appling series includes types with light-gray to yellowish-gray surface soils and yellow to reddish-yellow subsurface material. The subsoil is a reddish-yellow or streaked light-red and yellow, firm, but fairly brittle clay. These types are derived from light-colored granite or granitic gneiss. Only one type, the Appling sandy loam, is mapped in the present survey.

The Cecil series embraces types with red to gray surface soils and a bright-red, stiff but brittle, clay subsoil. The more sandy members of the series have the light-colored or gray to brown surface soils, and the heavier types have red or reddish-brown surface soils. The Cecil sandy loam owes its origin to the weathering of granite and granitic gneiss, whereas the clay loam and sandy clay loam for the most part are derived from interbedded gneiss, hornblende schist, and mica schist, and in places from granite. The Cecil sandy loam, sandy clay loam, and clay loam are mapped in Rockdale County.

The Congaree series is developed on the flood plains or first bottoms of the streams. In this county the Congaree material is so

variable in texture that it could not be separated into types, and therefore the land has been classified as Meadow (Congaree material).

Rock outcrop includes the exposures of bare rock which occur in sufficiently large spots to be shown on the soil map.

The distribution of the soils is shown on the accompanying soil map. Their actual and relative extent are given in the following table:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil sandy clay loam	28,544	34.3	Cecil clay loam	1,344	1.6
Appling sandy loam	24,448	29.4	Rock outcrop	1,216	1.5
Cecil sandy loam	22,144	26.6			
Meadow (Congaree material)	5,504	6.6	Total	83,200

APPLING SANDY LOAM.

The Appling sandy loam, locally known as the "light sandy land," consists of a light-gray or yellowish-gray to gray loamy sand passing at about 6 inches into pale-yellow to reddish-yellow or salmon-colored light sandy loam or loamy sand, which extends to a depth of 12 to 15 inches. This soil when dry in some places is almost white. In the wooded areas the first inch or two of the soil is brown or grayish-brown, owing to the accumulation of a small quantity of organic matter in this upper layer, but below this it is a pale-yellow loamy sand. When land of this type is cleared and mixed by plowing, and the organic matter decays and is leached out, the soil assumes a light-gray color.

The subsoil is a reddish-yellow or a streaked light-red and yellow, firm but brittle clay, which may extend to a depth of 3 feet, or may be underlain by granite or gneiss rock at varying depths within the 3-foot section. These rocks outcrop in places. Many of these have been indicated on the map by rock-outcrop symbols. In a few places the subsoil is a yellow firm but brittle clay, such spots representing soil that has been mapped in other parts of the State as the Durham sandy loam. There are also included small areas where the subsoil is a light-red clay.

This type is the second largest in the county. Its greatest development is in the western and northwestern parts of the county. The largest unbroken area is in the vicinity of Conyers, extending thence westward for a distance of about 4 miles. Another large area lies in the southwestern part of the county, northwest of Richardson. Throughout the northern and northwestern parts of the county the areas are broken more or less by small areas of Cecil sandy loam and of Meadow (Congaree material).

Over the greater part of the Appling sandy loam the surface is gently rolling to rolling. Some of the areas, particularly those on the slopes bordering the larger streams, have a strongly rolling to sloping surface, while some of the hillsides are comparatively smooth. About 2 miles west of Conyers, in the vicinity of Rockdale Church, the surface is almost level to undulating, and upon this broad interstream area is found the smoothest surface anywhere in the county. Erosion is noticeable on the slopes, and many terraces have been constructed to prevent serious washing and gullyng.

The natural surface drainage of this type is excellent, with the exception of an occasional acre or two lying adjacent to the head of a stream or an intermittent drainage way. Many small streams head in this soil type.

Probably 60 to 75 per cent of the Appling sandy loam has been cleared and is either in cultivation or is used for pasture. Old-field pine, red oak, white oak, and post oak, with some hickory and poplar, and a few dogwood and sourwood trees, constitute the forest growth on the rest of this type.

Corn, cotton, oats, wheat, sweet potatoes, and cowpeas are the principal crops grown. The yield of corn ranges from 8 to 20 bushels per acre. Cotton yielded about two-fifths bale before the boll weevil invaded the region, but is now extremely light and uncertain. Wheat yields 6 to 8 bushels and oats 8 to 20 bushels per acre. Larger yields of all these crops are obtained by using heavy applications of commercial fertilizers or barnyard manure. Sweet potatoes yield 100 to 300 bushels per acre. This is an excellent sweet potato soil and when properly fertilized or manured the yields are heavy. Cowpeas do fairly well. Early truck crops and garden vegetables give excellent returns when fertilized.

The Appling sandy loam is decidedly deficient in organic matter, as indicated by the extremely light color of the soil and the low nitrogen content. Perhaps the best method of improving this land is to incorporate vegetable matter by turning under green-manure crops such as cowpeas, soy beans, bur clover, vetch, or rye.

The soil responds readily to the application of commercial fertilizer. Where large quantities of vegetable matter are incorporated with the soil, lime would probably prove beneficial. In North Carolina and Virginia an excellent grade of bright tobacco is produced on this soil and peanuts also do well. There is every reason to believe that these two crops can be profitably grown upon this soil in Rockdale County. Sorghum produces good sirup, but the yield is slightly lower than upon some of the better grades of the Cecil soils.

CECIL SANDY LOAM.

The Cecil sandy loam is locally known as "sandy land with red clay subsoil." In cultivated fields the surface soil to a depth of about 6 inches is a light-brown to brownish-gray loamy sand to light sandy loam. Where the surface soil is more than 6 inches deep there is usually a yellow or reddish-yellow heavy sandy loam subsurface layer, 2 to 4 inches thick, overlying the subsoil. In forested areas the first inch or two is a brown loamy sand, passing into a yellow loamy sand or light sandy loam, and this extends to a depth of 6 or 8 inches, where the red clay is reached. In a few places, particularly near areas of the sandy clay loam and also where surface erosion has been active, the surface soil is a reddish-brown sandy loam, ranging in depth from 5 to 7 inches. Included with this type are small patches of brown to red sandy clay loam. Such spots have been developed by the partial removal of the sandy covering or by deep plowing, and the consequent mixing of the heavy red clay or clay loam subsoil with the sandy surface. Throughout the Cecil sandy loam are spots of Appling sandy loam which could not be shown on a map of the scale used. Fragments of angular quartz and quartz

gravel and also a few fragments of granite and gneiss are found here and there on the surface.

The subsoil of this type is a red to light-red, fairly stiff, but friable clay, which usually extends to a depth of 3 feet or more, but in many places the rotten bedrock, principally granite and gneiss, is reached within the 3-foot section, particularly on some of the slopes. In a few places the upper part of the subsoil is a yellowish-red heavy sandy clay; especially is this true where the surface soil is light colored and deep, and also where the type occurs in close association with the Appling sandy loam. In some places the boundary between the Cecil sandy loam and the Appling sandy loam is an arbitrary one, as the subsoils gradually merge into each other; that is, the red clay gradually grades into light red or streaked red and yellow clay.

The Cecil sandy loam is the third largest type in the county. It occurs in large areas in the northeastern, southeastern, and southern parts. The largest development is between Yellow River and Haynes Creek. Other large, typically developed bodies are situated in the vicinity of Oakland School and around Velta, and numerous spots are distributed throughout the county.

The surface varies from almost level or gently rolling to rolling and broken as the streams are approached. Practically all of this soil lies favorable for the use of modern farm machinery. The natural surface drainage is good, and in places, particularly on some of the steeper slopes, it is excessive. Terracing is practiced on the more rolling areas to prevent erosion.

Probably 70 per cent of this type is cleared and under cultivation, and the rest supports a growth of old-field and loblolly pine, with an admixture of oak, hickory, and sweet gum. This soil is considered one of the best in the county and is used in the production of the general farm crops. Corn yields from 8 to 25 bushels per acre; cotton, one-fifth to one-half bale; oats, ordinarily about 10 to 15 bushels; wheat, about 8 to 15 bushels; cowpea hay, about three-fourths to 1 ton per acre; and sweet potatoes, from 100 to 300 bushels per acre. Garden vegetables, truck crops, and also a few apples, peaches, and pears are grown around every well-established home. Considerably higher yields have been and can be obtained from this soil when it is heavily fertilized or manured and is given thorough preparation and cultivation.

The Cecil sandy loam is open and friable and easy to till, and crops will mature earlier on it than upon the sandy clay loam or the clay loam. The areas with the deeper and lighter surface soil are especially suited for the production of truck crops and sweet potatoes. A bright tobacco and peanuts are successfully grown on this kind of soil in the Carolinas and Virginia. Rye and vetch would do well and make excellent pasture crops. Upon the heavier variations of the type corn and small grains can be successfully grown. This soil, like the other types in the county, is deficient in organic matter; this can be supplied by growing and turning under green-manure crops, such as cowpeas, velvet beans, soy beans, and clovers. The best results are obtained on this soil in moderately dry seasons; heavy rains damage the crops, as the soil absorbs readily all the water, and the internal drainage is poor because the heavy subsoil retards the passage of water through it.

CECIL SANDY CLAY LOAM.

This soil mapped as the Cecil sandy clay loam is called locally "red land" or "spotted land." The spotted appearance of many of the fields is due to the occurrence of patches of brown to gray sandy loam and red or brownish-red clay loam or sandy clay loam. In many places these are so mixed that separation into types can not be made on a map of the scale used in this survey. In some places the soil is a heavy reddish-brown sandy loam 3 to 5 inches deep, and in other places it is a reddish-brown sandy clay loam to a depth of a few inches. Throughout much of the county the Cecil sandy clay loam simply comprises spots of Cecil sandy loam and Cecil clay loam, whereas in other places a fairly typical sandy clay loam occurs. In the southern part of the county and also south of Conyers a reddish-brown sandy clay loam prevails over a fairly large area. The knolls in the southeastern part of the county contain spots of reddish-brown heavy sandy loam, and of clay loam carrying a noticeable amount of mica both in soil and subsoil, the material here being derived from quartz-mica schist, fragments of which are present on the surface.

The subsoil consists of a bright-red, stiff, but brittle clay, commonly extending to a depth of 3 feet or more. In a few places, however, the disintegrated rock lies within 3 feet of the surface. Locally in the southern part of the county the subsoil is slightly more friable, owing to the presence of a noticeable quantity of fine mica scales. Narrow quartz veins are of frequent occurrence throughout the subsoil, and these evidently are the source of the fragments scattered over the surface of some areas.

The Cecil sandy clay loam is the most extensive type in Rockdale County. It occupies almost solidly the southern two-fifths of the area. In addition there are large bodies southeast and northeast of Conyers and in the extreme northeastern part in the vicinity of Summer Hill Church, Princeton, and Dial Mill.

This topography is gently rolling to rolling, and even strongly rolling and hilly in places. The more steeply rolling to broken hillsides are developed near some of the larger streams. To the south of Conyers and also in many localities in the southern part of the county the surface is gently sloping, becoming more rolling as the streams are approached. All this type is naturally well drained. Terraces are essential and are in common use throughout a large part of the area.

About 60 to 70 per cent of the Cecil sandy clay loam is under cultivation, and the remainder supports a growth of old-field and loblolly pine, red oak, white oak, post oak, some hickory, poplar, and sweet gum.

Cotton, corn, oats, and wheat are the principal crops. Corn yields from 10 to 30 bushels per acre. Cotton formerly yielded about one-half bale per acre, but returns are now uncertain and depend largely on the damage done by the boll weevil. Oats yield from 12 to 40 bushels; wheat, 8 to 20 bushels; and cowpea hay, from three-fourths to 1 ton per acre. On some of the better farms where the land has been manured and thoroughly plowed and commercial fertilizers used, much larger yields are obtained. Garden vegetables do well on this soil, particularly on the more sandy parts. Strawberries are of excellent quality, and are grown on a commercial scale on a few farms. Sweet potatoes do well on the lighter areas.

The soil of Cecil sandy clay loam is intermediate in texture and structure between the light surface soil of the Cecil sandy loam and the heavy surface soil of the Cecil clay. Containing a relatively large proportion of sand, as most of the type does, it is easier to cultivate than the clay. It is naturally a strong soil, and it can be built up to a high state of productiveness and maintained in that condition by growing and turning under legumes or by incorporating coarse manures. The soil responds readily to applications of commercial fertilizer, and lime is beneficial to clovers and peanuts.

CECIL CLAY LOAM.

The Cecil clay loam, the heaviest and reddest soil in the county, is locally known as "heavy red clay land." The surface soil, which has a depth of 5 to 8 inches, is a red to reddish-brown clay loam. The subsoil is a bright to rather dark red, heavy, stiff, but brittle clay extending to a depth of 3 feet or more. Included with this type are spots of reddish-brown sandy clay loam, and in places there may be an inch or two of reddish-brown heavy sandy loam overlying the heavy clay loam. On some of the slopes and knolls, where erosion has been active, the red heavy clay is exposed. A few fragments of gneiss and schist rock are found here and there on the surface.

This type occupies the smallest area of any of the upland soils. It occurs in a few rather small areas in the southern and western parts of the county. The largest areas are east of Oglesby Bridge, south of Sims Bridge, and on Honey Creek, about 1 mile north of Smyrna Church.

The Cecil clay loam is developed on slopes and knolls and generally has a rolling to strongly sloping surface. The surface drainage is good as the run-off is rapid. Most of the land lies favorable for agriculture.

Practically all this type is cleared and under cultivation. It requires strong work stock and heavy implements to plow the land properly. The soil is deficient in organic matter, and if this were supplied in the form of coarse manures, or by turning under green-manure crops, the physical condition would be improved and cultivation become less difficult. It is naturally a strong soil, and when plowed deeply, thoroughly pulverized, filled with humus, and limed excellent crops of grain, clover, and grasses may be expected. The crops grown are practically the same, and the yields are about the same as those upon the Cecil sandy clay loam.

MEADOW (CONGAREE MATERIAL).

Meadow (Congaree material) represents soil material so variable in texture and structure that no definite type name could be assigned to it. It includes spots of light-brown fine sand or fine sandy loam and strips of brown silt loam. On Big Haynes Creek there are a few spots of typical fine sandy loam. Fine mica scales are present in noticeable quantities throughout this material.

Meadow (Congaree material) occurs in narrow strips in the first bottoms along all the streams of the county. Some of the longest and widest areas are developed along Haynes Creek, Yellow River, and South River. All of it is subject to frequent overflows, and the

soil material is continually being changed by the deposition of new material washed from the adjacent uplands and by the removal of other materials by swift currents. Most of this land lies only a few feet above the normal water level of the streams. Some of it is in a swampy or semiswampy condition, particularly in the areas in the northeast part of the county along Little Haynes and Big Haynes Creeks. Such spots are shown on the map by swamp symbols. Some of the Meadow (Congaree material) can be drained and reclaimed by deepening and straightening the natural drainage ways.

Very little of this land is cleared, the greater part being forested with poplar, several varieties of oaks, including water oak, hickory, beech, gum, sycamore, willow, swamp pine, and some loblolly pine. Some of the sandy areas support a dense growth of alder and willow, with scattered ash and birch. Most of this soil is used for summer pasturage. Good grazing is afforded in the areas that have been cleared and in some uncleared areas in which the forest growth is not too thick.

Meadow (Congaree material) includes some of the most fertile soils of the county. It represents the accumulation of fine sediments which have been washed from the adjoining uplands and deposited along the streams. The silt loam and fine sandy loam areas of this material run high in potash, phosphoric acid, and lime, and are above the average of the upland soils in nitrogen.

Some of the heavy areas, such as the brown silty clay loam, have a high percentage of nitrogen. When such areas are drained and reclaimed, excellent yields of corn and grasses may be expected without the use of commercial fertilizer. Good summer pastures can be easily maintained, and the native grasses can be cut for hay.

ROCK OUTCROP.

Rock outcrop includes flat exposures slightly elevated above the surrounding soils on the ridges and protruding ledges on the slopes. The largest exposures of rock occur in the northeastern part of the county, 1 to 2 miles north of Milstead and $2\frac{1}{2}$ miles northeast of Milstead, the latter location being known as "The Rocks." Other exposures are in the eastern and northern parts of the county. In a few places on these flat rocks, or the slight depressions in them, where an inch or two of soil has accumulated, a few scrub oaks and pines, and also sphagnum mosses, lichens, deer's-tongue, huckleberry, and some grasses are growing.

Most of the Rock outcrop is granite, or in some places a granitic gneiss. The granite appears to be similar in its physical characteristics to that which is being quarried at Lithonia, at Stone Mountain, and at a few other places in this general region. Some granite is being quarried in Rockdale County. This rock is excellent building material.

SUMMARY.

Rockdale County, one of the smallest in the State, occupies a high position in the Piedmont Plateau, about 30 miles southeast of Atlanta. It has a smooth gently rolling to hilly topography, most of surface being favorable for farming. The natural drainage is excellent.

The climate is characterized by hot summers, mild winters, and abundant rainfall, and is favorable to the production of a rather wide range of crops.

The Georgia Railroad, from Atlanta to Augusta, passes through the county, affording convenient transportation facilities for almost all sections. Good to fair graded earth roads are found over the county.

The county has a population of 9,521, all classed as rural. The density is 80 persons per square mile, and settlement is rather evenly distributed.

More than 60 per cent of the total area of the county is improved land.

The agriculture consists mainly of the production of cotton and corn, with some wheat, oats, and forage. Since the invasion of the boll weevil the farmers are diversifying their crops and are looking for some crop or crops to take in part the place of cotton.

All soils of the county are fairly well supplied with potash, and when enriched with nitrogen, phosphoric acid, and organic matter they produce excellent yields.

The upland soils of the county are residual in origin, being derived from the rocks of the region though the processes of weathering.

The Appling sandy loam is the lightest colored and lightest textured soil in the county. It is used for the general crops but is especially suited for sweet potatoes and truck crops.

The Cecil sandy loam is an excellent soil. The surface soil is mellow and easily tilled and the subsoil is retentive of moisture and fertilizers.

The Cecil sandy clay loam, locally called "red land" or "spotted land," is the most extensive soil type in the county, and is considered a very desirable soil for the staple crops of the region.

The Cecil clay loam includes areas of Cecil soils from which the greater part of the sandy surface soil has been removed by erosion.

Meadow (Congaree material) includes alluvial soils of varying textures. It is largely in forest and affords some pasturage.

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