Series 1926

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF CHEMISTRY AND SOILS
In Cooperation with the Georgia State College of Agriculture

SOIL SURVEY
OF
BARTOW COUNTY, GEORGIA

BY

G. L. FULLER, in Charge, and H. H. SHORES
Georgia State College of Agriculture

Beginning with the 1923 Series, Soil Survey Reports have been issued separately. These reports of the individual areas are sent to libraries as soon as they are available and should be filed, preserved, and ultimately bound to take the place of the bound volumes of the Field Operations which were formerly supplied by the department. The reports for each year are consecutively numbered, the last report for a particular year bearing the conspicuous notice: "This number is the last Soil Survey Report for the Year 192–."

For sale by the Superintendent of Documents, Washington, D. C. - - - Price, 25 cents

BUREAU OF CHEMISTRY AND SOILS

HENRY G. KNIGHT, *Chief*
A. G. McCALL, *Chief, Soil Investigations*
SYDNEY FRISSELL, *Editor in Chief*

SOIL SURVEY

CURTIS F. MARBUT, *in Charge*
W. E. HEARN, *Inspector, District 2*

COOPERATION

GEORGIA STATE COLLEGE OF AGRICULTURE

ANDREW M. SOULE, *President*
L. M. CARTER, *Head, Division Agricultural Chemistry*

CONTENTS

SOIL SURVEY OF BARTOW COUNTY, GA.

By G. L. FULLER, in Charge, and H. H. SHORES, Georgia State College of Agriculture

COUNTY SURVEYED

Bartow County is in the northwest part of Georgia. Cartersville, the county seat, is about 57 miles south of the Tennessee State line and 35 miles east of the Alabama State line. The southwest corner of the county is about 30 miles northwest of Atlanta. The county is irregular in outline but is roughly square, the maximum north-south and east-west dimensions being about 23 miles. The included land area is 460 square miles or 294,400 acres.

Bartow County lies in parts of three physiographic divisions of the eastern part of the United States. About 75 per cent of it is in the Coosa Valley section of the Great Appalachian Valley; about 15 per cent is in the Appalachian Mountain region; and about 10 per cent is in the northwestern edge of the piedmont plateau. The Coosa Valley, or western part of the county, consists of a rolling plateau lying at about 900 feet elevation and dissected by the larger river valleys. The greater part of the area is a plain of denudation in a late stage of topographic development. A few low, isolated hills standing on the plateau have the following elevations: Walker Mountain, 1,050 feet; Sproull Mountain, 1,200 feet; Quarry Mountain, 1,050 feet, and Mullinax Mountain, 1,100 feet above sea level. On the east, this plateau is separated from the mountains commonly by a hilly belt of lower-lying shale or by soft limestone. The general direction of both the plateau belt and the shale ridges is northeast-southwest.

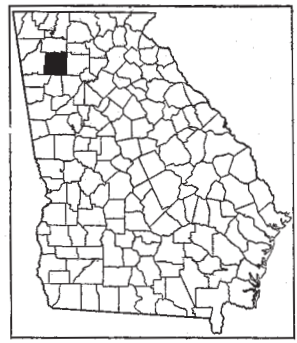


FIGURE 1.—Sketch map showing location of Bartow County, Ga.

The Appalachian Mountain part of the county lies east and southeast of the plateau. The mountains enter the county at the northeast corner and extend in an irregular south-southwesterly direction across it. They consist of steep ridges and knobs. The highest elevation, 2,000 feet, in the mountain section is on Pinelog Mountain at the eastern county line. Elevations gradually decrease toward the south, the highest point on Little Pinelog Mountain being 1,620 feet, on Brushy Knob 1,527 feet, on Pine Mountain 1,552 feet, and on Signal Mountain 1,300 feet. Very few of the schistose ridges to the south exceed 1,000 feet in elevation.

The piedmont plateau section of the county begins about midway of the eastern county line and includes a roughly semicircular area in the southeast corner. It is characterized by narrow valleys between steep hills which reach elevations of 1,100 feet. The rough-

62430—30——1

ness of the surface gradually decreases, and the elevations become somewhat lower toward the southeast. The surface is rolling near the southeast corner of the county where the elevation slightly exceeds 900 feet.

About four-fifths of the county is drained by Etowah River and its tributaries. The extreme northern part is drained by Oothkalooga, Cedar, Little Pinelog, Pinelog, and Sallacoa Creeks.

Bartow County was created by legislative act on December 3, 1832. The territory involved had been recently vacated by the Cherokee Indians, from whom the land was obtained by treaty. The county was taken from Cherokee County and originally included part of Gordon County. At first it was called Cass County, but owing to public sentiment the name was changed to Bartow County on December 3, 1861. Cassville, in the central part of the county, was the original county seat. Two colleges were established there in 1854, and the population at that time is reported to have been about 2,000. After the town was burned by Sherman's army in 1864, in the advance on Atlanta, the county seat was removed to Cartersville, the present location.

The high agricultural value of the terrace lands in the Etowah River Valley was early recognized, and some terrace areas were acquired by the early settlers through treaty with the Indians. Early settlers came from other parts of Georgia and, following the Revolutionary War, from States farther north. The mining possibilities, which were also early recognized, have aided materially in developing the county.

The population of the county was reported by the census of 1920 as 24,527, of which 82.3 per cent was rural. The census of 1925 showed a decrease in the number of farms from 3,091 in 1920 to 2,644 in 1925. There were 2,296 white farmers and 348 colored farmers in 1925. The rural population is densest in the southwestern and west-central parts of the county and is most scattered through the mountain and northern piedmont regions.

In 1920 Cartersville had 4,350 inhabitants. This city is located in the south-central part of the county and has excellent railroad and highway facilities. Atco has a population of about 1,000; Adairsville, which is the principal peach-loading station in the county, of 814; and Kingston and Cassville of about 500 each.

Bartow County has good railroad transportation facilities. The main line of the Nashville, Chattanooga & St. Louis Railway crosses the county. The Louisville & Nashville Railroad runs from Cartersville to Knoxville, Tenn. The Seaboard Air Line system operates a branch line from Cartersville to Rockmart, Polk County, where it connects with the main line from Atlanta to Birmingham, Ala.

The Dixie Highway is the main highway in the county. Other good highways extend north, southwest, and west from Cartersville. Although none of these roads are paved, they are all surfaced and are usually kept in good condition. All other public roads are in fair condition. In the mountainous section of the county the roads are fewest and poorest.

In addition to the schools and churches in Cartersville and other towns, country schools and churches are scattered throughout the county. Telephone service reaches most of the rural sections, except those in the mountains, and practically all parts of the county have

rural free delivery of mail. A power line of the Georgia Railway & Power Co. furnishes power for many of the mining industries, as well as for lighting purposes. Because of the large number of laborers employed in the mines and factories, Cartersville provides good markets for local produce. In addition to this market, Atlanta, Rome, Chattanooga, and other cities absorb a wide variety of products.

Land values as well as personal incomes in Bartow County are influenced, to a great extent, by mining and mining possibilities. Although there are several large mining companies in the county, much mining for iron and manganese is carried on by small operators, many of them being farmers who operate their mines when labor is not required for handling the crops. At present all ore is shipped to outside markets, but at one time iron was smelted at the Cooper Iron Works on Etowah River east of Cartersville. This plant was destroyed during the Civil War and was never rebuilt. At one time, iron and manganiferous iron were extensively mined near the mountains, but present operations are in small scattered pits. Barite, which occurs under the Decatur and Hartsells soils east of Cartersville, is the most abundant and most valuable mineral mined. More than 45 per cent of the barite mined in the United States was obtained here in 1919, when the output was valued at $722,891. Ocher and umber are also extensively mined in this vicinity. Slate is quarried in the northeastern part of the county at Flexatile. At Adairsville, shale is used in the making of bricks. Manganese is mined in a belt near the mountains, extending from a point east of Rydal to Emerson. A few large mines and many small deposits have been worked. A large limestone quarry is operated west of Cartersville at Quarry Mountain. This quarry supplies very finely ground limestone for agricultural use at a nominal cost. Graphite has been mined in the Talladega and Ranger soil areas through the mountainous section of the county. Gold was at one time mined in the ferromagnesian slate underlying the Iredell soils in the piedmont section. Bauxite was once extensively mined and is still obtained to a small extent throughout the northwest part of the county, principally under some of the areas of the Clarksville soils. Tripolite is found near the west side of the county as is also considerable agate, although neither is commercially important at present. During the Civil War saltpeter was obtained from a cave south of Bests Station.

CLIMATE

The climate of Bartow County is characterized by long, hot summers and short winters. The winters are usually mild, but during occasional cold spells of several days' duration the temperature is below freezing. Occasionally a little snow falls.

April 10 is the average date of the last killing frost, but killing frosts have occurred as late as April 24. The average date of the first killing frost is October 28, and the earliest one recorded was on October 11. The average frost-free season is 200 days. In some of the narrow valleys, one end of which is heavily wooded or otherwise obstructed, the air drainage is so imperfect that crops sometimes suffer from frost unusually and unnecessarily early.

The annual rainfall is moderately heavy and is well distributed throughout the year. The least rainfall normally occurs during the harvest months of September, October, and November. The moderately heavy rainfall is conducive to good crop growth but is also conducive to excessive soil erosion unless means are adopted to check it. The distribution of the summer rainfall varies in different parts of the county. During 1924 and 1925 sufficient rainfall occurred in the Etowah River Valley to insure fair crops, whereas areas in the northern part of the county suffered from severe drought.

Table 1 gives the normal monthly, seasonal, and annual temperature and precipitation as recorded by the Weather Bureau station at Adairsville in the northwest part of the county.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Adairsville*

[Elevation, 772 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1896)	Total amount for the wettest year (1920)	Snow, average depth
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
December	42.2	74	5	4.92	1.23	9.00	0.3
January	41.8	74	−1	4.52	3.64	7.54	.7
February	42.7	81	−8	5.43	3.67	5.02	1.2
Winter	42.2	81	−8	14.87	8.54	21.56	2.2
March	52.4	86	6	5.36	2.66	5.40	.1
April	59.8	92	26	3.94	1.58	10.00	Trace.
May	69.2	96	34	3.69	3.18	6.31	0
Spring	60.5	96	6	12.99	7.42	21.71	.1
June	75.9	102	41	4.03	1.33	3.98	0
July	78.2	102	54	5.39	6.16	9.85	0
August	77.7	104	49	4.48	2.36	10.63	0
Summer	77.3	104	41	13.90	9.85	24.46	0
September	72.7	97	38	3.13	4.73	2.16	0
October	61.6	93	22	2.50	1.04	.57	Trace.
November	50.3	83	13	2.68	4.34	3.55	.2
Fall	61.5	97	13	8.31	10.11	6.28	.2
Year	60.4	104	−8	50.07	35.92	74.01	2.5

AGRICULTURE

Early agriculture in Bartow County was of necessity similar to that in other remote inland pioneer settlements. Mixed farming, which provided food and clothing for home use, was followed, and a variety of livestock was kept. As the population increased and transportation facilities improved so that it became possible not only to market any excess produce but to purchase food and clothing, the type of farming gradually changed to include the production of more crops which could be sold or exchanged. Cash crops became especially important following the Civil War.

Table 2 gives the data relative to the land and farm areas of Bartow County and is indicative of the development of the county between 1880 and 1925.

TABLE 2.—*Land and farm areas in Bartow County, Ga., in census years*

Year	Farms	Land in farms			Improved land	
		Total	Percentage of county area	Per farm	Percentage of farm area	Per farm
	Number	*Acres*	*Per cent*	*Acres*	*Per cent*	*Acres*
1880	1,850	222,624	73.9	120.0	41.0	49.4
1890	2,034	205,425	68.1	101.0	46.9	47.3
1900	2,134	208,602	69.2	97.8	52.6	51.4
1910	2,873	220,842	73.3	76.9	54.8	42.1
1920	3,091	220,980	73.3	71.5	55.7	39.9
1925	2,644	197,786	65.6	74.8	53.3	39.4

The increase in the number of farms between 1880 and 1920 was owing to the division of the larger farms into smaller holdings, but some farms were abandoned by 1925. Large estates, however, were never so common in Bartow County as in many other Georgia counties. The abandoned farms occur mainly in rough areas in the piedmont section near the mountains, in some areas of Clarksville soils, in some areas of shale loam soils, and to a small extent in areas of Talladega soils, where very little land has been cleared. Some of the farms have been abandoned on account of erosion and others on account of their inaccessibility, rough surface, and low productivity. When prices were high, especially during and following the World War, much land was farmed which did not prove profitable after prices dropped.

Only 2 of the 3,091 farms reported in 1920 comprised as much as 1,000 acres. The greater number of farms range between 20 and 49 acres in size. The largest percentage of improved land occurs on the farms in the Etowah River Valley, many of which report nearly 100 per cent improved. A high percentage of the Decatur and Dewey soils and of the soils in the southeast corner of the county in the piedmont section is improved. The lowest percentage of improved land lies in the rougher sections of the piedmont plateau, among Christian and Conasauga shale loam soils, among mountain soils, and in some areas of Clarksville soils.

The census of 1920 reported an average value of all farm property as $3,659 a farm. Of this total 64.8 per cent was invested in land, 16.7 per cent in buildings, 4.6 per cent in implements and machinery, and 13.9 per cent in livestock. The average value of farm land was $33.17 an acre. The highest-priced farm land includes the terrace soils in the Etowah River Valley, some of the Decatur soils, and the areas devoted to peach orchards in the northwest part of the county. In 1925 land values of the above-mentioned soils ranged from $75 to more than $100 an acre, whereas that of adjacent Clarksville soils ranged from $15 to $40 an acre. Dewey loam and Dewey silt loam are high-priced soils, and the Fullerton soils, where used for peach production, are valued higher than the Clarksville soils.

The value of land near the mountains is influenced to a large extent by its mining possibilities.

Only 27.1 per cent of the farms were operated by owners in 1920. This is a decrease from 45 per cent in 1880. More than 95 per cent of the farmers purchased fertilizers in 1919, when the average expenditure was $105.29 a farm. The farms in some sections of the county are nearly self-sustaining, and efforts are being made to induce more farmers to produce their own feedstuffs. Feed was purchased by 28.4 per cent of the farmers in the county in 1919.

Stock raising is not an important industry in Bartow County, but a few farmers are successfully engaged in beef production and dairying. Most of the work animals are mules. Most of the 5,027 cattle in the county in 1925 were dairy animals. There were only 3,151 hogs in 1925, and these were raised mainly for home consumption. The number of all livestock in 1925 was slightly less than in 1920. The census of 1920 reported 84,630 chickens and 1,747 hives of bees. Considerable interest is evidenced in poultry raising. Good markets and good transportation facilities encourage this industry. In 1919, 82,801 dozens of eggs and 20,445 chickens were sold for $44,533. In the same year, 26,361 gallons of milk, 1,665 pounds of butterfat, and 74,311 pounds of butter were sold for $40,740.

Certain sections of the county suffer from a 1-crop system of farming. In the piedmont section, especially, cotton is grown to the exclusion of most other crops, and few farmers produce enough corn or other food to supply home needs. Cotton occupies a larger area than any other crop grown in Bartow County. In 1879, 21,969 acres were grown, producing 10,111 bales. The area devoted to this crop increased uniformly and rapidly until 1920, when 55,357 acres were planted, producing 25,717 bales, but by 1925 the area had decreased to 35,624 acres, yielding 13,947 bales.

Corn occupies nearly as large an area as cotton, and the acreage planted to it has remained fairly uniform since 1879. The largest acreage reported was in 1919, when 32,371 acres were planted for grain, yielding 480,884 bushels, and 2,424 acres were planted for forage. In 1925, only 25,299 acres of corn were harvested for grain. Although corn is grown on all upland, terrace, and bottom-land soils throughout the county, the largest yields are usually obtained from the well-drained first-bottom soils.

Wheat was an important crop in the county until about 1900. The 1880 census reported 15,265 acres, yielding 131,935 bushels in 1879. Three thousand one hundred and three acres were reported for 1919, but in 1924 only 618 acres were reported. Wheat production is carried on mainly on the terrace soils in Etowah River Valley and on the clay loam and loam types of the shale soils in the northern part of the county.

In 1879, 9,852 acres of oats were reported, but by 1919 only 566 acres, yielding 17.3 bushels to the acre, were reported, and in 1924 oats from only 141 acres were threshed. A larger acreage was grown and cut green for hay. Rye is grown to a small extent throughout the county, but mainly on the shale soils and on the Talladega soils.

Sweetpotatoes are grown in small areas both for home use and for local markets. In 1919, 425 acres were reported. A few acres were in potatoes. The 589 acres in peas produced 2,543 bushels of dry peas. At one time tobacco was grown, but practically none is grown at

present. Vegetables consisting chiefly of cabbage, snap beans, Lima beans, tomatoes, carrots, peas, beets, squash, and sweet corn, are grown for the local markets. Watermelons are also grown on nearly all the lighter-textured soils for the local markets, but the best melons are produced on the Huntington and Congaree fine sandy loams. Sorghum is grown both for sirup and for forage. In 1919, 341 acres were grown for sirup, producing 17,041 gallons. In the same year, 3,951 acres were reported in coarse forage cops, whch consisted largely of sorghum.

Peanuts have been grown to a slight extent, 81 acres being reported in 1919. The Clarksville soils are said to produce the best-quality peanuts, but the gravel occurring on and through these soils interferes with gathering the crop. When grown on the red soils, the peanut hulls have a reddish cast or stain, and harvesting is more difficult than on the gravelly soils.

A variety of hay crops is grown. Efforts are being made to encourage the growth of alfalfa on the Decatur, Dewey, Cumberland, and Etowah soils. Four or five cuttings of hay may be obtained, and at the same time the roots will loosen and improve the structure of the soil and will add nitrogen in which all the soils of Bartow County are deficient. Cowpeas and soybeans are grown in small areas both alone and intercropped with corn, especially in the southwest quarter of the county. These legumes are valuable not only for hay but for soil-improvement crops when plowed under as green manure.

Apples have been grown to a slight extent in the county for some time. They are grown in all sections, but the best location for orchards is in the mountain sections and in the northern piedmont sections near the mountains. Rome Beauty, Yates, and Shockley have proved successful varieties. Few pears are grown, but the trees seem to thrive, especially on the terrace soils.

The number of peach orchards set out increased rapidly between 1890 and 1910. About 250 or 300 carloads of peaches were shipped each year for several years, but as the supply exceeded the quantity that could be profitably marketed by the methods in use at that time, many orchards were destroyed or abandoned. Recently, marketing facilities have been improved, providing better distribution for the crop, and a standard pack has been adopted. A better quality of fruit is obtained since the farmers have learned to take better care of the trees. Because of these changes and because of the damage done to the cotton crop by the boll weevil, forcing the farmers to seek another cash crop, interest in peach production has been renewed. Some old orchards have been reclaimed, and new ones are being set out. In 1925, 110,212 trees were reported in the county, and in 1924 109 carloads of peaches were shipped, principally from Adairsville and Halls, to both northern and southern markets. Although peaches can be successfully grown throughout the western half of the county, most of the producing peach orchards are in the northwest part. Most of the orchards are located on Fullerton gravelly loam; some are on Clarksville gravelly loam, Dewey gravelly loam, and Decatur clay loam; and a few are on Armuchee shale loam and Conasauga shale loam. Orchards on Fullerton gravelly loam are reported to produce larger and better-colored fruit than those on any other soil. The Elberta is the most profitable market variety, but several other varieties are grown. About half

of the crop is sold f. o. b. at the local shipping points, and a large part is sold through the Georgia Fruit Exchange, a State-wide cooperative organization.

Fertilizing practices in orchards vary considerably. One large orchardist uses an application of 3 pounds of a fertilizer consisting of about one third nitrate of soda and two-thirds of a 3–9–3 [1] mixture to each tree. This fertilizer is applied in May after the new growth has started and is worked into the soil around each tree. Sometimes when the trees are in poor condition a second application of fertilizer similar to the first is applied at about the time the seed forms. After the fruit is gathered, some orchardists remove dropped fruit and broken limbs from the orchard, which is then plowed. Other orchardists allow weeds and grass to grow to serve as a winter cover crop. Vetch is also used as a cover crop. In October, usually, carbon bisulphide is applied around the base of the tree trunk to kill borers.

Erosion is a menace to orchards located on hillsides, and its prevention is a problem. Terraces, unless reenforced with rock or gravel, have not proved generally successful on the steep hillsides. Winter cover crops not only lessen the danger of erosion in the orchards but, when they are plowed under in the spring, also supply the soil with needed organic matter.

A system of cropping which has proved financially successful and at the same time has conserved the soil on one Bartow County farm and which can well be adopted with minor variations for the same purposes throughout the county is as follows: Cotton is planted for 2 or 3 years and is followed by oats and beans, peas, or corn for 1 year. Oats are followed by corn and beans or by peas. The corn on the upland, which is cut for silage, is followed by wheat. The best bottom land along the creek is planted to corn for 5 or 6 years and is then followed by Arctic grass for hay, 1 year. Alfalfa is grown for 4 or 5 years, followed by corn 1 year and then by wheat. The Arctic grass is cut for hay before maturing, as otherwise it becomes too tough for feeding. It is easy to cure, and yields 4 or 5 tons to the acre. Wannamaker-Cleveland cotton is grown and produces excellent yields, but the staple is shorter than that of many other varieties. Whippoorwill cowpeas are grown for hay. Laredo and Otootan soybeans are grown. Fulghum oats are preferred as they mature early and yield heavily. After threshing, the straw is baled and used for feed and bedding. A semiprolific variety of corn is grown, and ears for seed are selected each year at husking time. For silage purposes, usually two rows of corn and one row of sorghum are planted. Cattle prefer the corn alone, but sorghum increases the acre yield.

The yield of cotton averages between one-half and three-fourths bale to the acre, but yields of 1½ bales are obtained in some years. Corn yields average between 40 and 50 bushels to the acre, and as much as 75 bushels has been obtained. Wheat averages about 14 bushels to the acre, with a maximum of 30 bushels, and oats 30 bushels, with a maximum of 50 bushels. Soybeans average about 1,500 pounds to the acre but occasionally produce 1 ton. Seed oats and seed wheat are sold.

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

Most of the forested land of the county has been cut over, although a few small sawmills are still being operated, mostly in the mountain and upper piedmont sections. Post, chestnut, white, and red oaks are being cut for railroad crossties. Much land in the rougher sections of the county is well adapted to forest production, but at present it supports a sparse growth. Owing to frequent forest fires there are few young trees in the cut-over areas. Some areas support a coppice growth of hardwoods which produce such a shade that pine seedlings can not grow. It is recommended by the Division of Forestry at the Georgia State College of Agriculture that the growth of loblolly and shortleaf pine on those areas not desired for agriculture at the present time be encouraged. Loblolly pine grows fast and reproduces well, but the lumber is not so desirable as that of the shortleaf pine. Shortleaf pine produces high-quality lumber but is slow of growth and does not reproduce so well as the loblolly pine. Longleaf pine grows in the southwest part of the county on Talladega and Clarksville soils. This pine produces excellent lumber, but it is of slow growth and does not reproduce so well in this county as the other pines. The scrub pine is a fast-growing pine and reproduces well. It is found chiefly on the shale soils in the northern part of the county. It produces poor lumber which is of little commercial value at present, but as a check to soil erosion it is valuable.

SOILS

Bartow County is in the northwestern part of Georgia. Most of it lies in the Coosa Valley section of the Great Appalachian Valley, but part lies in the lower or southern end of the Appalachian Mountain region and part in the higher or northwestern edge of the Piedmont Plateau region. The virgin soils were forested with pines with an admixture of hardwoods. This vegetation, combined with a mean annual precipitation of 50 inches, has prevented the accumulation of a large quantity of organic matter in the soils. A layer of partly disintegrated organic material, in few places more than 1 inch thick, occurs on the surface. Therefore, the variations in the structure of the various layers of the different soils are owing not to the influence of organic matter but to the influence of the parent materials from which the various soils are derived, to the conditions under which they have been developed, and to the stage of development or degree of maturity to which the individual soils have arrived.

The warm temperature and the heavy rainfall are not only conducive to active weathering and breaking down of the soil particles but they also favor rapid leaching of the soluble soil constituents. Leaching nearly keeps pace with the decomposition of the organic and mineral constituents of these soils, and this probably explains the low percentage of available plant food and the small amount of organic matter present.

The same forces which favor active weathering and leaching are responsible for the movement of the finer-textured material from the surface soil to the subsoil. In the normally well-developed soils, the largest percentage of clay occurs in the subsoil where the largest amount of plant food also occurs. Surface or sheet erosion has been sufficiently active to entirely remove the surface layer from some soils, in places exposing the heavy subsoil layer. The clean cultivation

commonly practiced is responsible for much of this surface erosion. This statement applies particularly to the Decatur, Cumberland, Cecil, Armuchee, and Christian clay loams. Active leaching has also prevented the accumulation of lime carbonates in the soil, even in those soils derived from pure limestone. Soiltex acidity tests show varying acid reactions in both surface and subsoil layers of all the soils in Bartow County.

The most striking features of the texture profile of the normally well-developed soils in the county are: (1) A comparatively light-textured surface soil; (2) a heavier-textured subsoil; and (3) a substratum, the texture of which is intermediate between that of the surface soil and subsoil. This textural profile occurs in all the Clarksville, Fullerton, Dewey, Decatur, Guthrie, Cecil, Appling, Madison, Davidson, Iredell, Fannin, Cumberland, Etowah, and Holston soils and in some members of the Armuchee, Christian, Conasauga, Talladega, Ranger, Hartsells, and Hanceville series. The thickness of each layer varies widely among the different soil types and, to a slight degree, from place to place within a soil type. The surface layer varies in thickness from a few inches in the Cecil, Decatur, and Cumberland clay loams to 14 or 16 inches in Appling sandy loam. The thickness of the subsoil layer varies more widely than does that of either of the other layers. In those soils derived from and underlain by shale and schist, such as the Armuchee, Christian, Conasauga, Talladega, and Ranger soils, and also in the Iredell soils the subsoil, in many places, is less than 10 inches thick, whereas in the Decatur, Cecil, Davidson, and Cumberland soils it exceeds a thickness of 10 feet in many places. The thickness of the substratum varies from a very few inches under some of the Decatur and Hartsells soils to several feet under some of the shale soils.

The material of the substratum of the upland soils varies widely. That under the Davidson and Iredell soils is from ferromagnesian slates; under the Cecil and Appling soils, from granite and gneiss; under the Armuchee, Christian, and Conasauga soils, from shales; under the Fannin and Talladega soils, from sericitic schist; under the Ranger soils, from graphite schist; under the Madison soils, from mica schist; under the Decatur, Dewey, Clarksville, Fullerton, and Guthrie soils, from limestone; and under the Hartsells and Hanceville soils, from sandstone.

The soils of Bartow County are grouped in 26 soil series represented by 44 soil types and 16 phases of types. These soils can be grouped into 4 subgroups, (2 major groups and 2 minor groups), according to the color of the subsoil. The color of the subsoil layer is indicative of the drainage conditions under which the soil has developed. The only poorly drained upland soil in the county, Guthrie silt loam, has a light-gray subsoil whereas all the well-drained soils have red, brown, or yellow subsoils.

A close relationship exists between the color, texture, and structure of the subsoil in normally developed soils. In those soils having a red subsoil, this layer is heavy, slightly tough, and brittle clay or silty clay; in those with a yellow subsoil, it is lighter in texture and is more friable clay loam. Thus, the Decatur, Cecil, Cumberland, and Davidson soils have heavy red clay subsoils and the Clarksville and Hartsells soils have friable clay loam subsoils. Those soils having a brown subsoil, such as the Etowah and Dewey soils, are

intermediate in texture and structure between those with red and those with yellow subsoils, the one exception in this county being the Iredell soils which have brownish-yellow subsoils consisting of the heaviest-textured, most plastic, sticky, impervious clay seen in the county. Davidson clay loam, derived from the same parent material as the Iredell soil, has a red subsoil which is neither plastic, waxy, nor impervious, although it does have distinctive structural characteristics. In this county, the relationship of the Davidson and Iredell soils to their parent material may indicate that the soils with the red subsoils have arrived at the most advanced stage of development, whereas those with the yellow subsoils have reached the least advanced stage of development for mature soils. This evidence is strengthened by the character of the soils of two other series in the county, the Appling and the Fullerton, in both of which the surface soils and upper part of the subsoils are similar to those layers in members of the yellow-subsoil group, but the lower part of the subsoil resembles that of soils of the red-subsoil group.

Thus the soils of Bartow County may be grouped, according to the color of the subsoil, as follows: Red, brown, yellow, and gray. Each group contains at least two soils with normally well-developed and mature soil profiles, with the exception of the last group, in which poor drainage has prevented the formation of a mature profile but in which definite layers have developed. In addition to the mature soils in each group, there are several soil types in nearly every series represented which have not had a normal development owing to local inhibiting conditions such as a large content of quartz or other gravel or rocks, or, in the shale soils, to erosion which removes the soil material as fast as it weathers from the parent rock. There are also in each group soils of several series which are immature in their development owing to youth, mode of formation, drainage, or the character of the parent material.

The Decatur soils are typical of the red-subsoil group. They have dark-red heavy clay or silty clay subsoils. This clay breaks into irregular-sized lumps, and these can be crushed rather easily to smaller particles, the mass assuming a nutlike structure. The rock giving rise to this soil is comparatively pure limestone, much softer than that giving rise to the Clarksville, Fullerton, and Dewey soils. In many places near the mountains east of the vicinity of the Cartersville fault the limestone rock has completely weathered into the red clay and the soil material is underlain by widely varying, unrelated materials including deposits of iron, manganese, barite, and in places mica schist.

The subsoil of Cecil clay loam, hilly phase, differs from that of Decatur clay loam in that it is stiff and sticky when wet but hard and brittle when dry. In exposed cuts the soil remains in place and has a hard bricklike face which does not crack. The parent material consists of disintegrated granite and gneiss.

Davidson clay loam has a subsoil consisting of smooth, brittle heavy clay which breaks into irregular-sized and irregular-shaped granules which are pulverized with difficulty. Where exposed in cuts, the face of the subsoil layer becomes finely granular in sharp contrast with the hard bricklike face of the Cecil and Decatur subsoils. The soil is derived from ferromagnesian slate or some associated basic rock.

Armuchee clay loam and Christian clay loam are closely related red soils derived from shale and limestone. Limestone outcrops and areas of soil derived from limestone occur throughout these soils. From the chemical analyses made by the Georgia State College of Agriculture, it appears that Christian clay loam has a higher content of potash than any other upland soil in the county, but this element is largely insoluble. The red color and the structure of this soil are caused by the influence of limestone on the weathering of the shale material. The same shale material weathers into the Conasauga soils, which have a yellowish color when the limestone is absent or is replaced by sandstone material. Armuchee clay loam contains a much greater quantity of lime than Christian clay loam, as it is derived from closely interbedded shale and limestone.

The subsoil of Cumberland clay loam is more friable and not quite so heavy as that of Decatur clay loam. Rounded gravel may be scattered over the surface and throughout the soil and here and there are strata of rounded gravel and coarse sand.

Hanceville loam differs from Decatur clay loam in that its subsoil is red friable clay underlain, at a depth of 30 inches, by mottled red, yellow, and brown very friable material which overlies partly disintegrated sandstone.

The upper subsoil layer of Madison sandy loam is dark-red brittle clay having a nut structure. It has a slightly greasy feel when wet, owing to its content of finely divided mica. At a depth ranging from about 15 to 20 inches this layer grades into light-red, friable, highly micaceous clay which has a very greasy feel. The thin subsoil layer and, in places, an imperfectly developed soil profile distinguish the Madison soils from the Cecil.

The Fannin and Talladega soils are closely related. They belong to the group derived from mica schists. Fannin loam is a more mature soil and has a better profile development than Talladega loam, but it varies considerably owing to the influence of granitic material in some places. The subsoil of Fannin loam consists of friable, crumbly light-red clay, which, at a depth varying from 24 to 28 inches, grades into the substratum of reddish-yellow friable micaceous material underlain by disintegrated micaceous schist. The subsoil of Talladega loam consists of light-red micaceous clay loam which has a very greasy feel. The substratum consists of disintegrated sericitic schist of silver, green, purple, red, and brown colors. Analyses of this soil made by the Georgia State College of Agriculture show that it is very high in potash content.

The Fullerton and Appling soils are immature members of this group of soils. The Fullerton soils are derived from cherty and dolomitic limestone. They are reddish yellow in the upper part of the subsoil and light red in the lower part. This is a striking contrast to the yellow subsoils of the Clarksville soils with which these soils are closely associated. The Appling soils are derived from granite and gneiss and are closely associated with the Cecil soils. The upper part of the subsoil is reddish-yellow brittle clay which grades, at a depth ranging from about 25 to 30 inches, into streaked red, yellow, and white material overlying soft disintegrated granite.

Allen loam is an immature soil consisting of colluvial material washed from Hartsells and Hanceville soils of sandstone origin. The subsoil is a well-developed layer of brownish-red, very friable clay.

There are only two series representative of the second or brown-subsoil group of soils in the county. These are the Dewey and Etowah series. The Dewey soils have reddish-brown clay subsoils containing small black specks throughout. The material is friable, firm, and somewhat sticky when wet but is granular and brittle when dry. These soils are derived from limestone and cherty limestone. The Etowah soils have a profile similar to that of the Dewey soils, except that the subsoil is lighter in texture. These are terrace soils, derived mainly from materials washed from limestone soils.

The third group of soils, those having a yellow subsoil, are represented by soils of the Clarksville, Hartsells, Holston, Conasauga, Iredell, and Jefferson series. The Clarksville soils are derived from cherty limestone. The subsoils are friable clay loams or silty clay loams. The subsoils of the Hartsells soils are similar in color but they contain more fine sand than the corresponding layer in the Clarksville soils. The substratum is but slightly mottled and is very abruptly underlain by the sandstone from which the soil is derived. The profile of Holston fine sandy loam differs from that of Clarksville loam in that instead of chert a few rounded gravel are scattered throughout the soil and here and there strata of gravel and sand occur. This is a well-drained terrace soil derived mainly from material washed from sandstones and shales. The profile of Conasauga loam differs from that of Clarksville loam in that the subsoil is heavier, crumbly silty clay loam or clay which has a nut structure. Pockets of heavy clay occur, and many light-red mottles are present in this layer. The substratum consists of variegated disintegrated shale, much of which contains pyrite crystals and streaks of sandstone. The color of this shale may be red, purple, silver, yellow, green, or gray. Iredell gravelly loam is an immature soil in Bartow County, the depth to the parent material being very slight. Jefferson loam is a colluvial soil derived from sandstone and occurring at the base of mountain slopes. The surface and subsoil layers are well defined and contain rounded and subangular gravel throughout. The subsoil is bright-yellow friable clay loam.

The fourth group of soils, those with gray subsoils, is represented by Guthrie silt loam and Holly silt loam. Guthrie silt loam occurs in the limestone section of the county in sinklike depressions where it has developed under poor drainage conditions. Holly silt loam is a first-bottom soil in the limestone section of the county. It has a light-gray surface soil and a light-gray mottled with brown, plastic clay or silty clay subsoil.

Two extensive first-bottom soils which have no uniform layer development occur in the county. These are the Congaree and Huntington soils. The Congaree soils are brown and carry a high content of finely divided mica. Analyses by the Georgia State College of Agriculture show that Congaree silt loam carries a higher content of potash than any other soil in the county. The soil material is largely of piedmont derivation. The Huntington soils are brown, but they contain no mica and are mainly of limestone derivation.

A brief description of the 26 soil series mapped in Bartow County follows.

The Clarksville series includes soils having grayish-yellow or light-gray surface soils overlying friable, yellow clay loam subsoils which grade into mottled parent material derived from cherty and

dolomitic limestone. The gravelly loam, loam, and stony loam members of this series are mapped in Bartow County.

Soils of the Fullerton series have gray or grayish-yellow surface soils and subsoils consisting of reddish-yellow, friable clay loam overlying light-red brittle but friable clay. The subsoils grade into mottled parent material, overlying and derived from cherty and dolomitic limestone. The loam, fine sandy loam, and gravelly loam members of the Fullerton series are mapped.

The Dewey series includes soils having yellowish-brown or grayish-brown surface soils overlying brown, brittle but friable clay subsoils which grade into mottled parent material. The parent material overlies and is derived from cherty and dolomitic limestone. The loam, silt loam, and gravelly loam members of this series are mapped.

Soils of the Decatur series have red surface soils overlying dark-red clay subsoils which are very heavy, stiff but brittle and which, at a considerable depth, grade into the mottled limestone parent material. The clay loam, with a ridge phase and a gravelly phase, and the silt loam members of the Decatur series are mapped.

The Armuchee series includes soils having brown or reddish-brown surface soils overlying light-red, silty clay subsoils which are brittle and have a characteristic smooth feel. The subsoils grade into mottled reddish-brown and yellow parent material with a platy structure, overlying and derived from thinly interbedded shale and limestone. Members of the Armuchee series mapped in Bartow County are the shale loam, clay loam, and loam, together with a gravelly phase of the loam.

Soils of the Christian series have red or reddish-brown surface soils over light-red silty clay subsoils which are brittle and have a characteristic smooth feel. The subsoil grades into mottled light-red and yellow parent material with a platy structure which overlies and is derived from shale. Intermixed with the typical soil are small areas in which the soil is derived from limestone. In these included areas limestone outcrops in places. The shale loam, clay loam, and loam, together with a gravelly phase of the loam, are mapped in Bartow County.

Soils of the Conasauga series have yellowish-gray surface soils grading to pale yellow. The subsoils consist of friable, crumbly, yellow, or brownish-yellow clay, in some places mottled with red. This grades into brightly mottled parent material overlying and derived from shale, which is banded with sandstone in a few places. The shale loam, the loam, and a gravelly phase of the loam are mapped.

The Guthrie soils have gray or almost white surface soils and yellowish, very heavy silty clay subsoils which overlie limestone. Guthrie silt loam is mapped.

The Cecil series includes those soils which have surface soils varying in color from reddish brown to gray. They are underlain by red clay subsoils which are heavy, hard, and brittle when dry but stiff and sticky when wet. The subsoil grades into mottled parent material which overlies and is derived from partly disintegrated granite or gneiss. The hilly and stony phases of Cecil clay loam and a mixed phase of the sandy loam are the only representatives of the Cecil series in Bartow County.

Members of the Appling series have yellowish-gray surface soils and reddish-yellow subsurface soils. The subsoils consist of reddish-yellow, brittle but friable clay. This layer is abruptly underlain by mottled light-red, yellow, and white, compact, and brittle clay which grades into and is derived from partly disintegrated granite or gneiss. Appling sandy loam and a stony phase of this soil are mapped.

Soils of the Madison series have gray or brownish-gray surface soils overlying red heavy clay subsoils. The lower part of the subsoil is light-red clay which is very friable, owing to the high content of mica. It grades into the partly disintegrated mica schist and quartz mica schist parent material. Madison sandy loam and its gravelly phase are mapped.

The Davidson series includes those soils having dark-red surface soils overlying dark-red or maroon-red clay subsoils which are heavy, brittle, and smooth. At a considerable depth the subsoil grades into the mottled parent material, which is abruptly underlain by partly disintegrated, quartz-free, basic rocks. The clay loam is the only member of the Davidson series mapped in Bartow County.

The Iredell soils have grayish-brown surface soils overlying brownish-yellow sticky, waxy, impervious clay subsoils which grade at a comparatively slight depth into partly disintegrated, quartz-free, basic rocks. Iredell gravelly loam is mapped.

The Fannin series includes those soils having brownish-yellow surface soils overlying light-red friable and crumbly clay subsoils. The subsoils grade into very micaceous parent material overlying and derived from mica schist and gneiss. Fannin loam and a gravelly phase of the loam are mapped in Bartow County.

Soils of the Talladega series have reddish-yellow surface soils underlain by yellowish-red or red silty clay loam subsoils which have a very greasy feel and which are abruptly underlain by partly disintegrated sericitic schist. The loam, with a gravelly phase, and the slate loam members of the Talladega series are mapped.

The Ranger soils have slate-colored surface soils underlain by light slate-colored silty subsoils which rather abruptly give way to partly disintegrated, black, graphitic schist. The soil has a very greasy feel throughout. Only one member of the Ranger series, the gravelly loam, is mapped.

The Hartsells series includes those soils which have grayish-yellow surface soils overlying lemon-yellow, very friable, light sandy clay subsoils underlain by partly disintegrated sandstone. Hartsells loam and Hartsells stony loam are mapped in Bartow County.

Soils of the Hanceville series have grayish-yellow surface soils underlain by red, very friable sandy clay subsoils which grade into material derived from sandstone. Hanceville loam and Hanceville stony loam are mapped.

The Jefferson series includes those colluvial soils which have grayish-yellow surface soils overlying bright-yellow, very friable clay loam subsoils. These soils occur adjacent to the higher-lying Hartsells soils and overlie unrelated materials. The loam and a gravelly phase of the loam are mapped.

The Allen soils are colluvial soils having yellowish-brown surface soils and light-red, very friable clay loam subsoils. These soils occur adjacent to the higher-lying Hanceville soils. Only one member of the Allen series, Allen loam, is mapped.

The Cumberland series includes those terrace soils of limestone derivation which have red or reddish-brown surface soils underlain by dark-red, friable, heavy clay subsoils. In places small rounded gravel are scattered over the surface or occur in strata. Cumberland loam, with a gravelly phase, and Cumberland clay loam are mapped.

The Etowah series includes those terrace soils of limestone derivation which have brown or reddish-brown surface soils overlying reddish-brown, very friable clay loam subsoils through which small rounded gravel are scattered. The loam, with a gravelly phase, and fine sandy loam members of this series are mapped.

The Holston soils are terrace soils of sandstone origin, which have pale-yellow or light-brown surface soils underlain by yellow, very friable clay loam subsoils through which small rounded gravel are scattered or occur in strata. Holston fine sandy loam, together with its gravelly phase, is mapped.

The Huntington soils are first-bottom soils of limestone derivation. They have brown surface soils underlain by yellowish-brown friable subsoils. Huntington fine sandy loam and Huntington silt loam are mapped in Bartow County.

The Holly series includes those first-bottom soils which have been washed from areas of the Clarksville soils. They have dark-gray surface soils underlain by light-gray heavy and slightly plastic clay subsoils, mottled with yellow or rust brown. Holly silt loam is the only member of the Holly series mapped.

The Congaree series includes first-bottom soils washed mainly from soils of the piedmont plateau. These soils have brown surface soils carrying a high content of mica, underlain by light-brown silt loam or fine sandy loam subsoils which also contain considerable finely divided mica. Congaree fine sandy loam and Congaree silt loam are mapped.

In addition to the soils grouped in series, three miscellaneous classes of material, rough stony land, meadow, and mine wash are mapped.

In the following pages of this report the soils of Bartow County are described in detail and their relation to agriculture is discussed; their distribution is shown on the accompanying soil map; and their extent is shown in Table 3.

TABLE 3.—*Acreage and proportionate extent of the soils mapped in Bartow County, Ga.*

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Clarksville gravelly loam	49,728	16.9	Armuchee loam	2,304	1.3
Clarksville loam	1,472	.5	Gravelly phase	1,664	
Clarksville stony loam	6,144	2.1	Christian shale loam	10,240	3.5
Fullerton loam	1,600	.5	Christian clay loam	7,168	2.4
Fullerton fine sandy loam	1,920	.7	Christian loam	3,648	1.6
Fullerton gravelly loam	16,704	5.7	Gravelly phase	1,088	
Dewey loam	6,144	2.1	Conasauga shale loam	7,104	2.4
Dewey silt loam	3,136	1.1	Conasauga loam	5,056	2.4
Dewey gravelly loam	11,968	4.1	Gravelly phase	1,920	
Decatur clay loam	9,536	5.4	Guthrie silt loam	5,760	2.0
Ridge phase	3,392		Cecil clay loam, hilly phase	6,080	2.1
Gravelly phase	3,072		Cecil clay loam, stony phase	1,792	.6
Decatur silt loam	1,728	.6	Cecil sandy loam, mixed phase	2,112	.7
Armuchee shale loam	6,720	2.3	Appling sandy loam	5,632	2.8
Armuchee clay loam	4,416	1.5	Stony phase	2,688	

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Madison sandy loam	1,344	0.6	Cumberland loam	1,792	1.2
Gravelly phase	512		Gravelly phase	1,792	
Davidson clay loam	448	.1	Cumberland clay loam	1,984	.7
Iredell gravelly loam	2,112	.7	Etowah loam	5,248	5.3
Fannin loam	4,736	2.3	Gravelly phase	10,688	
Gravelly phase	2,048		Etowah fine sandy loam	1,088	.4
Talladega slate loam	11,392	3.9	Holston fine sandy loam	1,472	1.2
Talladega loam	1,472	2.1	Gravelly phase	1,920	
Gravelly phase	4,672		Huntington fine sandy loam	2,496	.8
Ranger gravelly loam	256	.1	Huntington silt loam	7,680	2.6
Hartsells loam	2,944	1.0	Holly silt loam	5,440	1.8
Hartsells stony loam	10,304	3.5	Congaree fine sandy loam	1,920	.7
Hanceville loam	768	.2	Congaree silt loam	1,344	.5
Hanceville stony loam	2,880	1.0	Rough stony land	1,344	.5
Jefferson loam	1,024	2.4	Meadow	2,432	.8
Gravelly phase	6,016		Mine wash	256	.1
Allen loam	640	.2			
			Total	294,400	

CLARKSVILLE GRAVELLY LOAM

The surface soil of virgin Clarksville gravelly loam, to a depth varying from 1 to 6 inches, consists of gray or yellowish-gray loam containing a large quantity of chert gravel. This is underlain, to a depth ranging from 8 to 16 inches, by pale-yellow very friable loam which contains less chert gravel than the overlying material. In cultivated fields the surface soil is gray or slightly yellowish. The subsoil, which continues to a depth varying from 30 to 60 inches, consists of crumbly, mellow, light-yellow, very friable clay loam containing scattered chert gravel throughout. The subsoil grades into incompletely weathered mottled yellow and gray, parent material containing a few spots of red and large quantities of chert. The gravel occurring on the surface consists of sharp angular chert fragments varying in diameter from one-fourth inch to 5 inches. A few larger fragments are seen, and bordering stony areas the larger fragments predominate. In places the surface is so completely covered with the coarser gravel that cultivation is very difficult or impossible.

This soil is remarkably uniform throughout the county, but in a few places sandstone material is mixed with the cherty dolomitic limestone from which the soil is derived. Such areas have a brownish-yellow subsoil which is heavier and more brittle than that in typical areas. Such areas occur west and southwest of Barnsley near the county line, west of Pettit School, and near the county line in the northwest corner of the county. Some of these areas have a sandy loam surface soil from 6 to 10 inches thick. Another variation occurs along some of the valleys within the Clarksville gravelly loam areas, especially along Ashpole Creek, where an accumulation of distinctly colluvial gravelly material has been washed from the bordering Clarksville soils. Such areas resemble Clarksville gravelly loam in color, but the gravel is subangular and the areas would have been mapped as Murrill gravelly loam had they been of sufficient extent. In areas 2 miles west of Atco and northeast of Wooleys rounded sandstone gravel is mixed with the angular chert. In the area east of Walker Mountain several small spots of Christian clay loam and Christian shale loam are included.

Clarksville gravelly loam is the most extensive soil in Bartow County. The largest area, which resembles a plateau, extends from the Adairsville-Folsom road southwestward to Etowah River.

The land ranges from rolling to steep and hilly, and surface drainage is good. Internal drainage is good or excessive, and crops suffer early from drought over most areas of the soil. Approximately 20 per cent of the land is cultivated. The remainder is in cut over forests which are periodically burned over. In the southwest part of the county the tree growth includes longleaf pine and thereby differs from that seen elsewhere. Much of the original growth was longleaf pine, but at present only scattered second-growth trees occur. Shortleaf pine, loblolly pine, blackjack, black, Spanish, and post oak, white hickory, and scattered hardwoods of other varieties also occur. On areas unsuited to cultivation, profitable forests can be maintained by cutting out the hardwoods and encouraging the growth of loblolly pine and longleaf pine. It is important that fires, which at present kill most of the pine seedlings, should be kept out. Small patches of soil, which support good native pasture grasses, are scattered through the more gravelly areas.

Cotton and corn are the principal crops, and small grains and peaches are grown less extensively. Peach trees grow well and produce well where properly fertilized, pruned, trimmed, and cultivated. Excellent cotton is produced by using an application of nitrate of soda at planting time and an additional application at the last cultivation. When properly fertilized, cotton fruits heavily and yields well, during average seasons. Prevalent tillage practices cause crops to suffer severely and sometimes die before maturing in time of drought.

The greatest needs of this soil are an increased supply of organic matter incorporated in the surface soil and deeper plowing, which will aid in conserving moisture and thus carry the crop through the dry periods of summer. The deep plowing improves the physical condition of the soil, so that greater benefit is derived from the fertilizers used. On most farms the cheapest source of organic matter is a green-manure crop, preferably a legume, to be plowed under. Analyses made of similar soil in Floyd County, Ga., show that Clarksville gravelly loam lacks phosphorus also. Therefore a cotton fertilizer should carry 5 per cent or more nitrogen, about 10 per cent phosphoric acid, and 3 or 4 per cent potash. The areas which are not too gravelly or too rough can easily be tilled and will produce good yields if properly fertilized. Fruit could be grown much more extensively than at present.

CLARKSVILLE LOAM

The surface soil of virgin Clarksville loam consists of gray loam, from 2 to 4 inches thick. In places this layer is rather silty. The subsurface soil, to a depth ranging from 8 to 15 inches, is pale-yellow, very friable loam. In cultivated fields the surface soil is light-gray or grayish-yellow loam. The subsoil consists of very friable, crumbly, mellow, light-yellow clay loam, continuous to a depth ranging from 30 to 60 or more inches. The parent material is similar to that under Clarksville gravelly loam.

Clarksville loam is one of the less extensive soils in the county. It occurs only in the western part near the Floyd County line. No large areas are mapped, but two small areas lie northwest of Taylorsville, four south of Barnsley School, and several more northwest, west, and southwest of Snow Springs Church and in the northwest corner of the county north of Cunningham School. This land is nearly level or gently undulating and is associated in many places with Guthrie silt loam. Drainage is adequate throughout.

Approximately 60 or 70 per cent of this soil is cultivated. The remainder supports a forest growth similar to that on Clarksville gravelly loam, and this soil can be reforested to loblolly pine in a similar manner. In many places the natural reproduction of loblolly pine is too thick, and a selective thinning of the young trees is necessary.

Corn and cotton are the principal crops grown, but small acreages are planted to small grains, sweetpotatoes, and other crops. Crop yields vary widely, depending on fertilization, the season, and cultural methods.

The needs of this kind of soil and the methods of remedying its deficiencies are similar to those described for Clarksville gravelly loam.

CLARKSVILLE STONY LOAM

Clarksville stony loam resembles Clarksville gravelly loam, except that cherty limestone and dolomitic bowlders are distributed over the surface and through the soil to such an extent that cultivation is impossible. The bowlders range in diameter from 5 inches to more than 5 feet. In a variation from typical Clarksville stony loam the lower part of the subsoil is light red. Had such areas been more extensive and more uniform, they would have been mapped as Fullerton stony loam. Such areas occur 1¾ miles northeast of Reynolds Bridge, east of Ford, 1 mile north of Malbone, three-fourths mile southeast of Snow Springs Church, three-fourths mile east of Stoner, and 1½ miles southwest of Reynolds School.

Clarksville stony loam is rather extensive in the west-central part of the county, and small areas occur throughout the gravelly loam member of this series. The largest area is northeast of Kingston, and other important areas are on Perry Mountain, Mullinax Mountain, and Yellow Jacket Mountain, southwest and northwest of Wooleys, north of Kingston, and along the Floyd County line northwest of Dry Creek School.

This soil generally occupies the crests of hills and ridges and is adapted only to pasture and reforestation.

FULLERTON LOAM

In virgin areas, the surface soil of Fullerton loam consists of grayish-yellow or light-brown loam from 3 to 8 inches thick, which is underlain by reddish-yellow or, in many places, by brownish-yellow loam. This layer, which continues to a depth varying from 8 to 14 inches, generally carries considerable silt. In cultivated fields, the surface soil consists of grayish-yellow or light-gray loam, and the subsoil, to a depth ranging from 18 to 26 inches, is reddish-yellow, very friable clay loam containing considerable silt. It is underlain

by light-red brittle but friable clay which readily crumbles to a fine granular structure. This layer continues to a depth ranging from 40 to 60 inches before grading into mottled red and yellow parent material and broken chert.

Fullerton loam is one of the least extensive soils of the county, occurring in small and scattered areas throughout the western half. The principal areas are 2 miles and 3½ miles northwest of Euharlee, 1½ miles northwest and 1¼ miles west of Cunningham School, 2 miles northwest of Wooleys, three-fourths mile south of Oakdale School, one-half mile south of Gore Spring Church, 1 mile southwest of Ligon School, at Crossroads Church, 1½ miles north of Sproull Mountain, and 1½ miles east of Cass Station.

Areas of this soil are undulating or rolling, and drainage is excellent. The land is productive, and nearly all of it is cultivated to cotton and corn. It is adapted to a wide range of crops, and all the general crops grown in this region as well as certain fruit crops, especially peaches, produce well. Much larger crop yields could be obtained if organic matter were incorporated with the surface soil. A complete fertilizer analyzing not less than 5–8–4 should be used for cotton.

FULLERTON FINE SANDY LOAM

The surface soil of Fullerton fine sandy loam consists of grayish-yellow or brownish-gray fine sandy loam, from 4 to 10 inches thick. Most of the surface is free from gravel, although angular chert and rounded sandstone, rarely exceeding 4 inches in diameter, occur in some places in varying quantities. Underlying the surface layer is reddish-yellow loam which continues to a depth varying from 12 to 18 inches. The subsoil consists of finely granular, friable, crumbly, light-red clay, which carries considerable silt. This layer continues to a depth ranging from 26 to 45 inches and grades into mottled red and yellow parent material which, in many places, contains fragments of partly weathered limestone and chert. In a variation from the typical soil occurring 3 miles west of Euharlee the subsoil consists of bright-yellow, very friable fine sandy clay, which passes, at a depth ranging from 20 to 25 inches, into light-red or in places brownish-red friable clay.

Fullerton fine sandy loam is inextensive in Bartow County, but it constitutes a considerable proportion of the soils in the southwest corner. The largest areas are 3 miles west of Euharlee and 2 miles north and northwest of Taylorsville. The land occupies comparatively high, undulating or rolling areas, and drainage is excellent throughout. This soil is productive, easily tilled, and comparatively smooth. Practically all of it is under cultivation to the general crops of the county, mainly cotton and corn, but a small acreage is in other crops, including sweetpotatoes, melons, and small grains.

The surface soil is seriously deficient in organic matter, and in places terracing is necessary to prevent the formation of gullies. All the general crops which can be grown in this part of the State, as well as peaches and other fruits, can be successfully grown on this soil. Complete fertilizers should be used on cotton.

FULLERTON GRAVELLY LOAM

The surface soil of virgin Fullerton gravelly loam is grayish yellow or brownish-gray loam, from 2 to 7 inches thick, which contains a large quantity of chert fragments on the surface and throughout the layer. This layer is underlain, to a depth ranging from 8 to 14 inches, by brownish-yellow loam containing less chert gravel than the surface layer. In many places the surface layer contains considerable fine sand, and the underlying layer may carry a high content of silt. On some cultivated slopes the soil is yellowish brown and in places where erosion has exposed the subsoil red spots occur. The subsoil, consisting of reddish-yellow very friable clay loam which commonly carries considerable silt, continues to a depth ranging from 16 to 24 inches and is underlain by light-red silty clay. Below a depth ranging from 28 to 60 inches is mottled red and yellow parent material containing many embedded chert fragments. The quantity of chert fragments is usually less in the subsoil than in either the surface soil or the parent material, but in some areas the red clay subsoil carries a very large content of partly disintegrated cherty rocks and dolomitic bowlders. The gravel occurring on and throughout the soil is sharp angular chert, varying from fine gravel about one-fourth inch in diameter to coarse fragments 8 or more inches in diameter. Most of the gravel ranges from one-half inch to about 4 inches in diameter. In a few small areas the quantity present is sufficient to interfere seriously with cultivation. A few areas carry very little gravel over the surface but have a high percentage in the subsoil, and in other areas there are but few gravel throughout.

Included with mapped areas of Fullerton gravelly loam are some spots of the Decatur and Dewey soils too small to be shown on the map. Such areas lie 2 miles east of Cass Station. In an area 1 mile west of Adairsville, numerous angular sandstone fragments are on the surface, and the surface soil is more sandy than typical to a depth of 8 or 10 inches. Between Etowah River and the Rome-Cartersville highway from Euharlee northwest to Ford, and north of Sproull Mountain, the surface soil of Fullerton gravelly loam carries a variable but noticeable quantity of rounded quartz and sandstone gravel, from 1 to 4 inches in diameter, intermixed with the angular chert gravel. In many places throughout this part of the county the surface soil, to a depth of 6 or 8 inches, has a high sand content and in places is fine sandy loam. The underlying soil layers are typical, however, of Fullerton gravelly loam. Included with mapped areas of this soil south and east of Walker Mountain are several small areas of Christian shale loam and Christian clay loam.

Fullerton gravelly loam is one of the more extensive soils of Bartow County. It is closely associated with the Clarksville soils in the western half of the county. The largest areas occur east of Reynolds Bridge, between Ford and Euharlee, and 2 miles east of Adairsville extending from the Gordon County line southward toward the Dixie Highway. Numerous small areas occur in the northwest corner of the county.

The land varies in relief from strongly rolling to steeply sloping. Surface drainage is likely to be excessive, thus rendering the surface

soil subject to serious erosion where cleared unless it is adequately protected. Internal drainage is free. About 60 per cent of the land is cultivated, and the remainder supports a scattered forest growth similar to that on the Clarksville soils. If protected from fire, a profitable stand of loblolly pine can be obtained by cutting out the hardwoods and allowing the pines to reseed themselves. Reforestation is the best use for the steep slopes except where erosion can be checked and they can be put in orchards.

The smoother areas of Fullerton gravelly loam are used for the production of the general crops of the county, especially corn and cotton, and for the production of peaches. This soil is generally preferred for peaches, and a considerable acreage is used for that crop, especially in the vicinity of Adairsville and Halls. Peaches produced on this soil are said to have a better color, and the trees, if properly pruned, cultivated, and fertilized, produce well. The slopes characteristic of this soil can best be protected from erosion by terracing. The prevention of erosion is one of the main problems in the utilization of most of this soil.

This soil is very deficient in organic matter and nitrogen. A complete fertilizer analyzing 5–8–3 or higher should be used for cotton. The plowing under of green-manure crops supplies organic matter and nitrogen and tends to conserve the moisture and render the fertilizers used more beneficial. A much larger acreage of this soil could be used in the production of peaches, but many of the steep slopes should not be used for other cultivated crops. The growing of winter cover crops and adequate terracing are essential for the successful cultivation of the slopes. The smoother areas are well adapted to a much wider range of crops than is now common.

DEWEY LOAM

The surface soil of Dewey loam consists of yellowish-brown mellow loam, from 6 to 14 inches thick, which is very dark when moist. In most virgin areas there is a thin covering of leaf mold on the surface. The subsoil, to a depth ranging from 20 to 30 inches, consists of friable brown clay or reddish-brown clay with black specks, which has a nut structure. Beneath this is light-brown clay streaked and blotched with brownish yellow. This clay is brittle and friable and breaks into nutlike particles. This layer continues to a depth of 60 or more inches.

Mapped with this soil are small areas of brown or grayish-brown fine sandy loam. One area of fine sandy loam texture occurs 1 mile northwest of Adairsville, another 1 mile west of Cunningham School, and another 1 mile north of Bethlehem Church, and numerous small spots are in the southwest quarter of the county. Considerable variation also occurs in mapped areas of this soil, owing to their intricate association with other soil types in some places. For instance, about 1 mile southwest of Oak Grove Church, spots of Decatur clay loam and Clarksville gravelly loam, too small to be shown on the small-scale map, are included with Dewey loam. In many small areas the surface layer is very shallow or is entirely missing, owing to surface erosion.

Dewey loam occurs in small areas in the western half of Bartow County. The largest areas are west, 1 mile northwest, and 2 miles

southwest of Euharlee; 2 miles northeast and 3 miles north of Taylorsville; in the vicinity of Cass Station; 1½ miles northwest of Atco; 1½ miles southwest of Ford; west of Kingston; northeast and northwest of Crossroads Church; 1 mile northeast of Bethlehem Church; one-half mile north and three-fourths mile southwest of Cunningham School; along the Adairsville-Folsom road; and one-half mile southwest of Emerson.

Areas of this soil have an undulating or gently sloping relief, and drainage is excellent. This is one of the most productive soils in the county, and practically all of it is under cultivation. Corn, cotton, and small grains are the principal crops, but the land is well suited to a much wider range of crops. It is better adapted to small grains and hay crops than are most of the other upland soils of the county and is equally suited to the production of cotton, corn, and the other general crops grown in this region. Clover and alfalfa should do well. Terraces are needed to prevent further erosion, as the surface soil has become seriously eroded in a few fields.

One of the chief requirements of this soil is increased organic matter in the surface soil. Chemical analyses made in Polk County, Ga., indicate that the soil is moderately well supplied with potash but is low in nitrogen and phosphorus. A complete fertilizer analyzing at least 4–10–3 should be used for cotton. For small grains, a profitable fertilizer application would be from 400 to 600 pounds of superphosphate to the acre at planting time in the fall and an application of nitrate of soda as a top-dressing in the spring. For corn, an application of nitrogenous fertilizer alone will give profitable results. Lime should be applied to the soil which is to be planted in cowpeas, clovers, or alfalfa.

DEWEY SILT LOAM

The surface soil of virgin Dewey silt loam consists of very friable, mellow dark-brown silt loam, from 6 to 12 inches thick. In cultivated fields the surface soil is somewhat lighter in color than in virgin areas. The subsoil consists of brittle reddish-brown clay which when moist is friable and slightly sticky. Small black specks occur throughout this layer, which continues to a depth ranging from 25 to 40 inches below the surface. Underlying this layer is a heavy and rather sticky, brownish-yellow clay layer containing scattered black specks and continuing to a depth of 60 or more inches.

Owing to the intricate intrusions of other soil types, many variations from typical occur. An area of Dewey silt loam 1 mile southwest of Cassville includes a few small spots of Guthrie silt loam. In some places small spots of Christian and Armuchee soils appear in mapped areas of Dewey silt loam. The areas in the western part of the county, remote from shale soils, comprise the most uniformly developed areas of this soil.

Dewey silt loam occurs only in small areas, many of which occur throughout the county from the foot of the mountains westward. The largest areas are west and 1 mile north of Adairsville, south of Cunningham School, 1 mile northwest of Snow Springs School, east of Mullinax Mountain, south of Kingston, north and southwest of Cassville, east and southeast of Bests Station, 3½ miles west of Atco, and 1½ miles south of Dewey. This soil occupies undulating areas

in valley situations. Surface drainage is adequate, and internal drainage is good.

Practically all this land is cultivated, as it is inherently one of the most productive soils in the county. Cotton and corn are the principal crops grown, but any field crop which can be grown in this region thrives.

The crop adaptations and fertilizer requirements for this soil are very similar to those for Dewey loam. For best results lime should be used for alfalfa, clover, or cowpeas, and a green-manure crop, plowed under in a definite crop rotation, would not only increase the nitrogen content but would also assist in securing better results from the commercial fertilizers used.

DEWEY GRAVELLY LOAM

The surface soil of virgin Dewey gravelly loam consists of dark-brown or, in many places, brownish-yellow loam from 6 to 12 inches thick. Over the surface and through the soil are angular chert gravel varying from about one-fourth inch to 4 inches in diameter. A few larger fragments are present. In cultivated fields the surface soil consists of grayish-yellow or brownish-yellow loam over which the angular chert gravel is conspicuous but insufficient in quantity to interfere with cultivation. The subsoil consists of reddish-brown clay, which is friable and brittle when dry. It continues to a depth ranging from 20 to 35 inches below the surface, where it grades into brittle, friable yellowish-brown clay streaked with brownish yellow. The subsoil layers are similar to those of Dewey loam, except that they lie closer to the surface. Most of the chert gravel occurs on the surface, although small amounts occur throughout the soil. Like Dewey loam and Dewey silt loam, the most uniformly developed areas of Dewey gravelly loam occur in the western part of the county in the Etowah River Valley.

Considerable variation in the soil profile occurs, and many inclusions are made in mapped areas of this soil along the western front of the mountains and in the river valley. Over the surface of a small area north of Pinelog there are numerous subangular sandstone fragments. Through the central part of the county, small spots of Conasauga, Christian, and Decatur soils are included with mapped areas of this soil. Within an area 3 miles north of Cartersville a few shaly spots intrude, but the predominating soil is Dewey gravelly loam. Areas occurring in the valley of Etowah River are closely associated with the river-terrace soils, and some of them have a shallow veneer of terrace material. At Browns and southeast of that place are some ridge areas of this soil which include small spots of Decatur and Fullerton soils, and at Browns there is also a small included spot on the crest of the ridge, which consists of Etowah loam, gravelly phase, to a depth of several feet. Small scattered deposits of high-grade iron ore occur in these ridges. Part of the surface gravel is rounded and part is angular, and in places from 2 to 4 inches of Holston fine sand occurs on the surface. An area northeast of Euharlee occupies an unusually level terracelike position and consists of Dewey gravelly loam cut by numerous narrow strips of Dewey silt loam. South of Sproull Mountain the surface soil contains more sand than typical, and numerous rounded gravel are intermixed with the angular chert on the surface. In-

cluded also are a few small areas, shown by stone symbols, in which large bowlders are scattered over the surface. Such areas are suited only to reforestation.

Dewey gravelly loam is more extensive than any other soil of the Dewey series, yet it occupies a comparatively small proportion of the area of the county. The largest areas occur in the vicinity of Ligon School, near Barnsley and Snow Springs School, west and north of Wooleys, southwest and west of Halls, west of Kingston, southeast of Euharlee, along the west side of Cartersville, and 3 miles west of Atco. The relief is rolling or rather steeply sloping, but it is less steep and hilly than that which characterizes areas of Fullerton gravelly loam. Drainage is good throughout. About 80 per cent of the land is cleared and has been farmed, but, owing to erosion, a small percentage has been abandoned. The tree growth is similar to that on Clarksville gravelly loam. Unfarmed areas should be reforested to loblolly pine.

The cultivated areas are in cotton and corn principally, but this soil could be profitably used in the production of peaches and other fruits and of general crops common to this region. The soil is productive. The greatest problems in its profitable utilization are adequate terracing and increasing the supply of organic matter in the surface soil. On account of lack of terracing several fields have been ruined by erosion. The recommendations given for the improvement of Dewey loam apply equally well to this soil.

DECATUR CLAY LOAM

In virgin areas the surface soil of Decatur clay loam consists of dark-red loam, from 1 to 3 inches thick, underlain by friable, heavy red clay loam which continues to a depth varying from 5 to 10 inches. In cultivated fields, the surface soil is red heavy clay loam. The subsoil is very heavy, stiff but brittle, dark-red clay or silty clay, which breaks to a nut structure and which contains black specks throughout. The depth of this layer varies greatly, in few places being less than 4 feet and in places as much as 30 feet. This layer grades into the mottled red and yellow parent material throughout which are black accretions and streaks, probably of manganese and iron. A few limestone and cherty fragments occur in this layer. In an area of this soil northeast of Rydal the dark-red clay loam surface soil is underlain by a gritty, tenacious, and slightly sticky dark purplish-red clay subsoil. In areas occurring within a few miles of the western front of the mountains the material underlying the upper subsoil layer varies widely. At an old mine site 3 miles north of Cartersville the upper layer of the red clay subsoil continues to a depth of 2 feet in places and in other places to 30 feet. Underneath this layer are shale material and iron deposits. Considerable iron and manganese have been mined in areas of this soil near the foot of the mountain.

Decatur clay loam is one of the more extensive soils in the county. It occurs in a few comparatively large areas and in many small areas throughout that part of the county lying west of the mountains. The largest areas occur at Emerson, at Bartow, east and northeast of Cartersville, south and northeast of Rydal, west of Flexatile, east and southeast of Bolivar, north of the Adairsville-Folsom road,

northwest of Adairsville, and south of Reynolds School. This soil occupies gently rolling or moderately sloping positions often occurring in valleys at the base of steep slopes. Surface drainage is everywhere free and in some places is excessive. Internal drainage is adequate but slow. About 90 per cent of the land has been cleared for cultivation but, owing to erosion and other causes, some fields have been abandoned.

Cotton is the principal crop grown and smaller acreages are in corn and small-grain crops. Many farmers do not consider this soil so good as the lighter-textured Clarksville, Fullerton, and Dewey soils. This is owing largely to the greater difficulty in tillage, as many farmers do not have adequate power or machinery to properly prepare this soil for crops. Decatur clay loam is inherently one of the most productive soils in Bartow County but it requires deeper plowing and more thorough harrowing than the lighter-textured soils. When this soil is plowed to only a slight depth, as is customary, all the moisture is soon lost by evaporation during a dry season and the crops suffer unusually early from drought. During heavy rains, such areas also suffer excessively from erosion, in many places losing practically all the surface soil. If these same fields were plowed deep, tilled well, and terraced adequately, they would hold moisture better during dry seasons, would withstand drought better than the light-textured soils, and would not erode so badly during heavy rains. On those areas which are plowed to a slight depth crop yields are low, whereas excellent yields are obtained from the deep-plowed, well-tilled, properly fertilized areas. One of the greatest needs of 75 per cent of this soil is adequate protection from erosion. Broad terraces which do not interfere with cultivation can be used in most places. Another important aid to obtaining maximum results from this soil is the planting, in the regular crop rotation, of deep-rooted crops, preferably legumes, to be plowed under for green manure. This would not only supply nitrogen for plant food but would put both surface soil and subsoil in better physical condition and would induce greater results from the fertilizers applied. Chemical analyses made in Floyd, Polk, and Chattooga Counties, Ga., show this soil to be better balanced in plant-food constituents than most of the soils occurring in Bartow County. It is, however, somewhat poor in nitrogen and phosphorus. Cotton should receive a complete fertilizer of not less than 4–8–4 analysis. For small grains, superphosphate in the fall with nitrate of soda as a top-dressing in the spring, and for corn an application of nitrogen alone would probably prove most practical and profitable. This soil, if properly handled, could be used for the production of a wide range of general farm crops, as well as peaches and other fruits. Alfalfa, clover, and cowpeas should do well and at the same time would greatly improve the soil. An application of lime should be used to obtain best results from these legumes.

Decatur clay loam, ridge phase.—Areas of Decatur clay loam, ridge phase, differ from typical Decatur clay loam mainly in that they occupy the crests of high ridges where the soil is not so uniform in its development. This soil occurs principally near the mountains southwest and north of Emerson and east and northeast of Cartersville, although one rather large area lies north of Barnsley and a few small areas are scattered throughout the western half of the county. In the areas near Cartersville and Emerson, deposits of barites,

ocher, umber, iron, manganese, and manganiferous iron occur at varying depths beneath the subsoil. In some spots a few sandstone fragments and bowlders are strewn on the surface. The very stony areas are marked by stone symbols. Mica schist also occurs at a slight depth in some places. However, the overlying soil material is usually well-developed Decatur clay loam of variable thickness. An area south of the city reservoir east of Cartersville has a distinct purplish color both in the surface soil and subsoil. Small fragments of rock, carrying iron and manganiferous iron, are common on the surface throughout areas of this soil. A small area west of Rogers is very gravelly and has a dark reddish-brown light clay loam surface soil from 8 to 14 inches thick. Three miles northeast of Cartersville, the clay loam subsoil extends to a depth ranging from 3 to 10 feet below the surface, where it is underlain by sandstone material intermixed with iron and manganese deposits.

Most of the soil of this phase occupies comparatively smooth areas on the top of high ridges, although a few areas, on account of erosion or mining operations, are rough and nonagricultural. In some places steep slopes bordering the high ridge areas of Decatur clay loam, ridge phase, consist of the same soil and are included with it, and in other areas the slopes consist of Fullerton or other soils. About 70 per cent of this land has been cleared for farming and is used mainly in the production of peaches and cotton. Like typical Decatur clay loam, the smoother areas of this soil are productive and desirable. Their only disadvantage is that they are difficult of access. In crop adaptations and soil requirements the ridge phase is similar to the typical soil. Areas which are too steep or too inaccessible to be farmed can be reforested to loblolly and shortleaf pines by protecting them from fires, cutting out the hardwoods, and allowing the pines to reseed themselves.

Decatur clay loam, gravelly phase.—This gravelly soil differs from typical Decatur clay loam in that it is lighter in color and texture and in that a large quantity of angular gravel is on the surface and some is through the subsoil. Little of the gravel exceeds 4 or 5 inches in diameter, and the quantity is not sufficient to interfere with cultivation. In areas bordering the Clarksville, Fullerton, and Dewey soils, the gravel consists of angular chert similar to that on those soils. About 1 mile northeast of Cass Station, 1 mile northeast of White, and along the western front of Little Pinelog Mountain the surface is covered with subangular or rounded sandstone fragments. In an area 3½ miles north of Cartersville west of Pettit Creek are a few small shale areas, and numerous iron and manganese pits have been opened. Here the surface gravel shows a high content of iron and manganese.

Decatur clay loam, gravelly phase, is an inextensive soil in Bartow County. The largest areas are near and 1½ miles northeast of Ligon School, northeast of Barnsley, north of Cunningham School, west of Sproull Mountain, north and south of Quarry Mountain, 3 miles north of Cartersville, 1 mile southeast of White, and south of the Cartersville Poor Farm. Small areas are scattered throughout the western half of the county. Crop adaptations, cultural practices, and soil requirements are similar to those on Decatur clay loam.

DECATUR SILT LOAM

Decatur silt loam has a mellow, friable surface soil consisting of dark reddish-brown heavy silt loam from 4 to 12 inches thick. It is shallow on the slight ridges and deep in the intervening depressions. The subsoil consists of heavy, brittle, and slightly friable, dark-red clay which breaks into irregular-sized and irregular-shaped particles. Many small black accretions and streaks occur throughout the subsoil, which continues to a depth ranging from 5 to more than 10 feet. The friable consistence and mellowness of the surface soil readily distinguish this soil from the heavy, stiff Decatur clay loam.

Decatur silt loam occurs in small areas. The largest is 2 miles east of Adairsville; smaller ones are 1½ miles north of that place, west of Cunningham School, southwest of Flexatile, south of Gum Springs, and 1 mile southwest of Rydal; and numerous areas lie along the Nashville, Chattanooga & St. Louis Railway between Bests Station and Cass Station. Many small areas occur throughout the western half of the county.

Areas of Decatur silt loam occupy undulating or nearly level positions on flat-topped ridges and in valleys. Drainage is adequate but slow. This is one of the most productive soils in the county, and practically all of it is under cultivation. Although deep tillage is important to insure the best results, this soil is much easier to till than Decatur clay loam and is not so subject to erosion. Crop yields are as high as on that soil, and this soil is adapted to as wide a range of crops with similar tillage and fertilizer requirements. Alfalfa, clover, cowpeas, and other hay crops, as well as corn, cotton, and all other general crops, thrive. Fertilizers similar to those used on Decatur clay loam are needed. Lime should be used for best results with alfalfa and clover.

ARMUCHEE SHALE LOAM

The surface soil of virgin Armuchee shale loam, to a depth ranging from 8 to 18 inches, consists of light reddish-brown loam containing a large quantity of reddish shale fragments. This grades into partly disintegrated thinly interbedded reddish shale and limestone rock. This soil normally carries considerably more loam in the surface soil than Christian shale loam or Conasauga shale loam, but from 75 to 90 per cent of the surface layer consists of small thin shale fragments.

Armuchee shale loam is one of the important soils in the northwestern quarter of the county. It comprises a large percentage of the soils in the central part between Cass Station and Crow Springs Church and in the northwestern part between Halls and Adairsville. It occupies knobby, choppy, hilly positions. The parallel ridges of shale loam are separated by narrow strips of Armuchee loam, Armuchee clay loam, Decatur soils, or Hagerstown soils in areas too narrow to be shown on the map. The tops of the ridges are very uneven, in many places resembling a series of knolls. The range in relief on Armuchee shale loam is less than that on Christian shale loam and markedly less than that on Conasauga shale loam.

Surface drainage is free, and internal drainage is excessive. Consequently crops suffer early from droughts. About 40 per cent of

this soil is cultivated. The original forest growth consisted mainly of shortleaf pine, but the present growth is shortleaf pine with scattered loblolly pine, Spanish oak, post oak, hickory, white elm, and a few other hardwoods in some places, whereas in other places there is an excellent second growth of almost pure loblolly pine. The areas unsuited to or not desired for crop production could be profitably reforested to loblolly pine by cutting out the merchantable pines and hardwoods and cutting the hardwood fuel, leaving from one to three loblolly pines to the acre for reseeding. The hardwood undergrowth should be kept cut and the pine seedlings protected from fires and livestock.

The principal crops grown on this soil are corn, cotton, and small grains. A small acreage is in peach orchards. The peach industry here is in a more or less experimental stage, but the trees appeared thrifty. If these trees prove profitable much of this soil could be used for peach orchards. Bermuda grass for hay has been tried on this soil, and if it proves successful it will be more profitable than most other crops. Yields on this soil are usually lighter than on the other Armuchee soils or on the limestone soils, but Armuchee shale loam is more productive than Christian shale loam or Conasauga shale loam.

ARMUCHEE CLAY LOAM

The surface soil of virgin Armuchee clay loam, to a depth of about 2 inches, consists of brown loam in most places covered with small reddish shale fragments. This is underlain by reddish-brown clay loam, commonly high in silt content, which extends to a depth ranging from 4 to 10 inches. In cultivated fields, the surface soil is reddish-brown light clay loam. The subsoil is brittle, rather tough, light-red silty clay, which has a characteristic smooth feel and shows a nut structure. This layer extends to a depth varying from 20 to 60 inches and grades into mottled reddish-brown and yellow partly decomposed shale showing a platy structure. This lower subsoil layer is from 8 to 24 inches thick and is underlain by thinly interbedded shale and limestone rocks. Most of the limestone is decomposed, whereas the shale is partly disintegrated. This soil can be readily distinguished from Decatur clay loam by the smooth feel and more brittle, tough subsoil. This soil includes small areas of Armuchee shale loam and Armuchee loam too small to be separated on the map.

Armuchee clay loam occurs only in the central part of Bartow County between Cartersville, Bests Station, and Five Forks School, and in the northwestern part between Halls and the Gordon County line north of Adairsville. A few areas are mapped in the vicinity of Cassville and Adairsville, but most of the soil occurs as small patches intermixed with Armuchee shale loam areas.

This soil occupies moderately sloping or gently rolling areas and valleys. Internal drainage is adequate, and surface drainage is excessive in some places. About 50 per cent of the land is cultivated. Part of the remainder has been cleared but later abandoned, mainly on account of erosion. The original forest was principally of shortleaf pine, but an admixture of loblolly pine and scattered hardwoods appears with the shortleaf pine in the second growth. Areas which

are not suited for cultivation can be reforested in the same manner as areas of Armuchee shale loam.

The crops grown are mainly wheat, oats, corn, and cotton. Armuchee clay loam and Armuchee loam are considered the best wheat soils in the county, and much of the wheat is grown on these soils. In areas where the underlying shale does not lie too close to the surface and where the surface soil has not been removed by erosion, this soil is productive. Its greatest need is proper terracing, as it erodes easily. Another urgent need is an increased organic-matter supply in the surface soil, not only to furnish nitrogen in which the soil is deficient but also to improve the structure and thus check erosion. If erosion is checked, better results will be obtained from the fertilizer used. Many of the slopes could be advantageously put in grass for pasture. Cowpeas, vetch, and clover, all of which are soil-improving crops, could be grown on this soil. Complete fertilizers, analyzing 4–10–4 or higher, should be used for cotton. For wheat and oats, an application of superphosphate at planting time and nitrate of soda in the spring will give good results. Nitrogen alone usually proves best for corn. Deeper plowing is also essential for the proper utilization of this soil, as it suffers early from drought Working the soil frequently in order to maintain a loose surface mulch will conserve soil moisture. These better cultural practices also tend to preserve the slopes from serious damage done by heavy rains.

ARMUCHEE LOAM

The surface soil of Armuchee loam in virgin areas is brown loam from 8 to 12 inches thick, which contains a noticeable amount of fine platy reddish shale fragments. In cultivated fields the surface soil is light-brown loam. The subsoil consists of yellowish-brown or reddish-brown clay, with a high silt content, which continues to a depth ranging from 18 to 24 inches. This layer is underlain by slightly tough but brittle light-red silty clay which has a characteristic smooth feel. Below a depth varying from 30 to 60 inches is mottled reddish-brown and yellow partly decomposed slate which has a platy structure.

This soil is more variable than Armuchee clay loam and represents an intermediate stage between the well-weathered clay loam and the slightly weathered shale loam soils of the Armuchee series. In many places the subsoil layers are very thin, and the underlying shale material is near the surface. West of Atco, patches of Decatur silt loam and Shackleton silt loam are included in mapping, and north of Atco small areas of Dewey silt loam and Decatur silt loam are included.

Armuchee loam is very inextensive in Bartow County. The largest areas are in the vicinity of Atco, between Cass Station and Cassville, west of Stoner School, and 1 mile northeast of Adairsville, and many small patches occur in the central and northwestern parts of the county. This soil occupies valleys and depressions between Armuchee shale loam and Armuchee clay loam areas. The surface is undulating or rolling and drainage is adequate.

Nearly all the land is cultivated, principally to corn, cotton, wheat, and oats. It is a productive soil, the well-developed areas comparing favorably with Dewey loam. With proper soil management

a wide range of crops producing excellent yields may be grown. The soil is well adapted to cowpeas, clover, and alfalfa, any of which should be grown in a crop rotation not only for hay but also as a green-manure crop to be plowed under, thereby increasing the supply of nitrogen in which this soil is deficient. The production of potatoes, sweetpotatoes, vetch, rye, and many other crops, which are not commonly grown is also recommended. The variation in the depth of the subsoil material overlying the disintegrated shale and limestone tends to make the vegetation or cropped areas spotted. Fertilizers used should be similar to those used on Armuchee clay loam.

Armuchee loam, gravelly phase.—Armuchee loam, gravelly phase, differs from typical Armuchee loam in the presence of a large quantity of angular white quartz gravel over the surface and to some extent through the soil. Most of the gravel is small, varying from one-fourth inch to 3 inches in diameter. Here and there larger fragments are noticeable. In many places the surface soil of this gravelly soil is not so deep as that of the typical soil, and spots of clay loam are included.

Armuchee loam, gravelly phase, occupies a small acreage, mainly in the central part of the county west and northwest of Cassville and near Pettit School. A few patches occur in close association with other Armuchee soils in this part of the county as well as between Halls and Adairsville. About 75 per cent of this gravelly soil is farmed. The forest growth is similar to that on Armuchee shale loam, and reforestation methods are also similar. The crops raised, crop adaptations, cultural practices, and fertilizer requirements are similar to those for Armuchee loam.

CHRISTIAN SHALE LOAM

In virgin areas the surface soil of Christian shale loam consists of light reddish-brown loam, from 8 to 18 inches thick, which contains a very high percentage, almost 90 per cent, of thin, reddish shale fragments. This layer is underlain by partly disintegrated red, yellow, and gray shale, or in some places by limestone which ordinarily is present at a greater depth from the surface.

Christian shale loam is one of the more extensive soils of the county. With the exception of one area in the southwest corner about 2 miles north of Taylorsville, it occurs only in the north-central part. Comparatively large areas extend from Five Forks School northward to the county line between Folsom and Flexatile. It occupies hills of greater relief than does Armuchee shale loam, and the intervening strips of the other Christian soils are fewer and narrower than in areas of Armuchee shale loam. Drainage is so excessively free that crops suffer severely during droughts.

Less than 10 per cent of this soil is cultivated. The remainder is cut-over land. In some places the forest cover is very scant, and in other places excellent reproduction to loblolly pine has taken place. All the cut-over areas could be profitably reforested to loblolly pine by cutting out all the hardwoods and merchantable pines, leaving from 1 to 3 loblolly pines to the acre for reseeding. If fires and livestock are kept out, loblolly pine reproduction will be so thick in most places that selective thinning will be necessary to induce the

best growth of the trees. Virginia pine is valuable in stopping active erosion, as it is of rapid growth and will start where other pines will not.

Christian shale loam is cropped principally to corn and cotton. A smaller acreage is in small grains. Crop yields are low. The best utilization of this soil is reforestation.

CHRISTIAN CLAY LOAM

In the virgin areas, the surface soil of Christian clay loam consists of red, very silty clay loam, from 3 to 8 inches thick. In cultivated fields the surface soil is somewhat lighter red in color. The subsoil, to a depth ranging from 18 to 45 inches, is light-red, slightly tough silty clay having a smooth feel. This grades into mottled light-red and yellow partly decomposed shale which has a platy structure. This layer ranges from 20 to 30 inches in thickness and is underlain by partly disintegrated, banded, platy, red, yellow, and gray shale.

In some places the color of the surface soil is yellowish red and in a few places it is very dark reddish brown. In places the subsoil layers are very thin, and the underlying shale material lies within 12 inches of the surface. Most of the shallow areas occur on the crests of knolls. Christian clay loam is readily distinguished from Decatur clay loam by the characteristic smooth velvety or soapy feel of the subsoil, throughout which there are a few yellowish streaks. The subsoil of Christian clay loam is slightly tougher and more brittle than that of Decatur clay loam. Small spots of Decatur clay loam are included with this soil in mapping. Along the western base of Little Pinelog Mountain, sandstone gravel occur over the surface and the surface soil is lighter in texture than typical.

Christian clay loam, although not very extensive, occupies a rather large proportion of the restricted area in which it occurs. It is mapped almost exclusively in the north-central part of the county between Pinelog, Dewey, Grassdale, and White; south and 1½ miles west of Flexatile; north and south of Gum Springs; north of Five Forks School; and east of Folsom. A small area is in the southwest corner, 2 miles north of Taylorsville, and another lies south of Barnsley. The surface ranges from gently rolling to steeply sloping. Internal drainage is adequate, but surface drainage is likely to be excessive.

Approximately 80 per cent of this soil is cultivated, principally to cotton and corn. Smaller acreages are in small grains. Yields are extremely variable, depending largely on the cultural methods employed, but good yields are obtained where the soil is adequately prepared and properly fertilized.

The surface soil of Christian clay loam is heavier than that of other soils in Bartow County. More labor is required to make a mellow seed bed than on Decatur clay loam.

Especial care must be taken not to plow or to till this soil when too wet, as clods will be formed which will not readily crumble. Under the prevalent methods of handling this soil, crops suffer during dry seasons. Deep plowing, terracing, and the incorporation of organic matter are recommended for the improvement of this soil. Cotton fertilizers analyzing at least 5–10–3 should be used. Rather heavy applications of superphosphate at planting time and of nitrate

of soda in the spring will give good results on small grains. Legumes should be grown in a regular crop rotation, not only for hay but to be plowed under for green manure. Cowpeas, vetch, and clover could be grown on this soil, but lime should be applied for best results. Peaches and other fruits could also be grown.

CHRISTIAN LOAM

In virgin areas the surface soil of Christian loam consists of friable, very mellow, reddish-brown loam from 4 to 10 inches thick. In cultivated fields the surface soil is light reddish-brown or light-brown loam. The subsoil consists of light-red or dark-red friable, brittle silty clay which has a characteristic smooth feel. Here and there are veins of apparently undisturbed quartz which lie at varying angles to the surface. The subsoil extends to a depth varying from 20 to 60 inches, where it is underlain by mottled light-red and yellow partly decomposed shale.

In many places, the upper subsoil layer is very thin, the underlying partly decomposed shale coming within 14 inches of the surface. The color of the upper subsoil layer apparently varies with the amount or influence of the limestone material. It is lighter red where the shale predominates and dark red where limestone is approached. In a few places, small areas of Decatur clay loam and Decatur silt loam are included with mapped areas of Christian loam. Small spots of Christian clay loam and Christian shale loam are also included.

Christian loam, with the exception of two small areas north of Barnsley and in the southwest corner of the county, occurs almost exclusively in the north-central part in the vicinity of Grassdale, Pinelog, Gum Springs, Folsom, and Mostellers Mill. It occupies undulating or rolling areas in valleys and ordinarily occurs close to areas of Christian shale loam. Surface drainage is good, and internal drainage is good except in spots where the underlying shale lies near the surface. In such spots, internal drainage is excessively free, and crops suffer unduly early from drought.

Tree growth is similar to that on Christian shale loam, and areas to be reforested can be handled in the same manner as similar areas of that soil. Nearly all the land is cultivated, principally to cotton and corn. Some small grain is grown. This soil is productive, and good crop yields are obtained. It is comparable to Armuchee loam in crop adaptation, and many areas resemble Dewey loam in productivity. One of the principal requirements is an increased organic-matter content in the surface soil. Legumes, such as cowpeas, vetch, clover, or alfalfa, should be grown both for hay and for green manure to be plowed under. For best results with these crops, lime should be applied to the soil. Fertilizers for cotton should analyze about 5–10–3, and small grain should receive superphosphate in the fall and nitrate of soda in the spring.

Christian loam, gravelly phase.—Christian loam, gravelly phase, differs from typical Christian loam in the presence of a large quantity of angular quartz gravel over the surface and, to a less extent, throughout the soil. Most of the gravel varies from one-fourth to 3 inches in diameter, but a few larger fragments are scattered here and

there. The quantity of gravel is nowhere sufficient to interfere with the cultivation of most crops. In some places, a noticeable quantity of small thin shale fragments is mixed with the quartz. In the area north of Barnsley angular chert fragments also occur over the surface. This area includes gravelly spots, too small to be shown on the map, of Christian clay loam and Christian shale loam.

Christian loam, gravelly phase, occurs principally in the north-central part of the county 2 miles east of Dewey, north of Pinelog in Calico Valley, north and south of Folsom, and near Barnsley. This land occupies valleys, and areas are rolling. About 80 per cent of the gravelly soil is cultivated. The forest cover, crop adaptations, and fertilizer requirements are similar to those for typical Christian loam.

CONASAUGA SHALE LOAM

In virgin areas the surface soil of Conasauga shale loam consists of gray or brownish-gray loam, from 8 to 18 inches thick, containing a very high percentage of varicolored shale fragments. This layer is underlain by partly disintegrated multicolored shale, which assumes a light-green color at a depth ranging from 5 to 30 feet. More than 90 per cent of the surface layer consists of shale fragments. Most of these are thin and from 1 to 4 inches in length, but in places they are thick and blocky. The fragments on the surface are coarser than those on Armuchee shale loam and Christian shale loam and are of dull shades of green, brown, silver, and purplish, whereas the underlying shale material is of bright-colored shades of green, silver, red, purple, and brown. From a distance, the surface appears to have a greenish or brownish-green cast. In places, as in areas west and southwest of McCallie, an admixture of angular sandstone fragments is present.

Conasauga shale loam is fairly extensive, occupying large areas in the north-central part of the county between Folsom and Flexatile and on the west side of the Louisville & Nashville Railroad from McCallie north to the county line. A large area lies south of Folsom, and smaller areas are north and west of Mostellers Mill. Some conspicuous small areas are south and 1½ miles east of Snow Springs Church and north of Adairsville.

This soil occupies hilly and rolling positions and has the greatest relief of any of the shale soils in Bartow County. Many of the areas consist of wide, high, steep ridges with a narrow uneven crest. Drainage is excessive, but the character of the soil material is such that it does not erode so seriously as the heavier soils.

In places, especially in the extreme northern part of the county, the soil supports an almost pure stand of Virginia pine and some scattered loblolly pines which have grown up in abandoned fields. Other areas support a mixed growth of shortleaf pine, Virginia pine, loblolly pine, and various oaks, with a thick growth of hickories in some places. The land has been cut over and is frequently burned over, but some lumber is still being cut in restricted areas. If given a chance the loblolly pine will rapidly reclaim this land.

Less than 10 per cent of the land is cultivated. Cotton and corn are the principal crops, and a few peaches are grown. Yields of general crops are low and uncertain, and the production of peaches is more or less experimental. Cleared areas should be protected by

a winter cover crop to prevent the fine material in the surface soil from being washed away.

CONASAUGA LOAM

In virgin areas the surface soil of Conasauga loam consists of gray mellow loam from 4 to 7 inches thick. It contains scattered shale and sandstone particles and most of it contains a comparatively high percentage of very fine sand. It is underlain by mellow, pale-yellow loam which carries considerable silt. Rust-brown specks and streaks occur throughout this layer, which continues to a depth ranging from 10 to 16 inches below the surface. In cultivated fields the surface soil is gray or yellowish-gray loam. A few yellow and brownish-yellow areas, where the surface has been eroded, are noticeable. Some fields present a very spotted appearance, containing grayish-brown, yellowish-brown, reddish-brown, and some purplish-colored spots scattered through the predominant gray soil. The subsoil consists of clay, which is yellow or brownish yellow and spotted with light-red and a few black specks. The material generally is friable and crumby, but pockets of heavy clay or silty clay occur in places. This layer extends to a depth ranging from 24 to 40 inches, where it grades into mottled yellowish and light-gray partly disintegrated shale. The underlying shale fragments are varicolored on their surfaces, showing shades of silver, brown, green, red, and purple over a light-green interior.

There is considerable variation in the depth to the subsoil layers, and in places the underlying shale material is present at a depth of 12 inches below the surface. Included with mapped areas of this soil are a few small areas of fine sandy loam and silt loam. Such areas are north of Pinelog Mountain and between McCallie and White. Other included areas lie near Adairsville, southwest of Stoner School, north of Halls, northeast of Cassville, north of Mostellers Mill, southeast of Glade Church, south of Rydal, west of Atco, and north of Cartersville. An included area 1 mile south of Pettit School has a surface soil of brownish-yellow clay loam from 4 to 7 inches thick and a subsoil of heavy, slightly plastic, tough, rather tenacious, yellowish-brown or yellow clay.

Conasauga loam is one of the less extensive soils in the county, although large areas occur along the Tennessee road between Cartersville and White and south of Grassdale. Many small areas occur throughout the north-central part of the county between Adairsville and Flexatile. This soil occurs in valley situations, and the surface is undulating or rolling. Drainage is good throughout. About 85 per cent of the land is cultivated, principally to cotton and corn. The yields obtained depend on fertilization practices and cultural methods, but good yields can be obtained.

Chemical analyses made in other counties in Georgia indicate that this soil is fairly well supplied with potash but is very deficient in nitrogen and phosphoric acid. Cowpeas or clover plowed under will not only improve the physical condition of the soil but will also furnish much-needed nitrogen. For best results with legumes, lime should be applied. A fertilizer for cotton should analyze not less than 5–10–3. Small grains should receive an application of superphosphate at planting time and nitrate of soda in the spring.

Conasauga loam, gravelly phase.—This gravelly soil differs from typical Conasauga loam in the presence of a large quantity of angular gravel over the surface and to some extent throughout the soil. However, the quantity is not sufficient to interfere with cultivation. The gravel, which range in diameter from one-fourth inch to 3 inches, are mainly quartz with some sandstone, although sandstone gravel predominate in some places as in the area 3 miles north of Cartersville. Included in mapping are a few small gravelly areas which have a brownish-yellow clay loam surface soil and a yellowish-brown or yellow heavy, tough clay subsoil.

This gravelly soil is inextensive in the county, the largest areas occurring in and 2 miles north of Cartersville, 1 mile south and 1 mile southwest of McCallie, 1½ miles north of Grassdale, and 3 miles south of Folsom. The surface relief is similar to that of Conasauga loam. About 70 per cent of the land is cultivated. Cultural methods and fertilizer requirements are similar to those described for the typical soil.

GUTHRIE SILT LOAM

The surface soil of Guthrie silt loam consists of gray silt loam from 2 to 5 inches thick. This is underlain, to a depth ranging from 7 to 12 inches, by very light-gray silt loam which when dry is almost white. The soil is very mellow and friable and is of single-grain structure. The soil particles run together when wet. The subsoil consists of very light-gray, heavy, slightly sticky silty clay streaked and blotched with yellowish brown. This layer continues to a depth varying from 36 to 60 inches. It is underlain in some places by light-gray or almost white silty clay containing fragments of sandstone and chert.

A variation from the typical soil occurs in areas south of Sproull Mountain and 1 mile south of Harden Bridge where the surface soil consists of brown silt loam 6 or 8 inches thick. Some areas which contain angular chert gravel are indicated on the map by gravel symbols. Spots of red silt loam occur in depressions in the vicinity of Shellman, 1 mile west of Malbone, and north of Pettit School. Where sufficiently drained these included areas have a higher agricultural value than typical Guthrie silt loam.

Guthrie silt loam occurs in several large areas and in many small ones throughout the western half of the county in depressions and flats, some of which are apparently limestone sinks, and in former stream channels and depressions within the second-bottom soils. In many areas slow drainage channels either extend through or arise in this soil. In some areas are ponds, some of which are intermittent. No areas of typical Guthrie silt loam are cultivated at present, although a few have been cleared and were cultivated at one time. However, numerous patches in which the surface soil is better than typical and which have been adequately drained are cultivated, mainly to corn. The soil in its original condition is best adapted to pasture and to forest. Most of the areas make excellent summer pastures. Some areas support an exceptionally fine growth of loblolly pine, with a small admixture of shortleaf pine.

CECIL CLAY LOAM, HILLY PHASE

In virgin areas the surface soil of Cecil clay loam, hilly phase, consists of brown or reddish-brown loam from 1 to 3 inches thick. This is underlain by friable and crumbly red clay loam which continues to a depth varying from 5 to 8 inches. In places light-brown sandy loam 2 or 3 inches thick lies on the surface, and in other places the surface soil has been entirely eroded, exposing the heavy red clay. The subsoil, to a depth varying from 3 to 8 feet, is heavy red clay, stiff and brittle when dry but sticky when wet. The subsoil grades into a layer, from 8 to 15 inches thick, of yellowish-red friable but brittle material mottled with yellow and white. This is underlain by disintegrated coarse-grained granite. A few bowlders and small fragments of rock are scattered over the surface. In cultivated fields the surface soil is in most places light-red or brownish-red clay loam. The soil is locally known as red-clay land.

About 1½ miles southeast and 3 miles east of Allatoona the red subsoil grades, at a depth varying from 36 to 60 inches, into light-red or yellowish-red very micaceous material which is specked with whitish and yellowish spots.

Cecil clay loam, hilly phase, is one of the most extensive soils in the piedmont section of the county. Large areas extend from Stamp Creek south to Corbin and southeast of Corbin. Others lie between Stamp Creek and the Cherokee County line; east, south, and southwest of Double Springs; across the river southeast of Cooper Furnace; and elsewhere in this part of the county.

Near the mountains and over the greater part of this soil the surface is hilly and steeply sloping and in many places is badly gullied. A few comparatively smooth areas 1 mile northeast of Cooper Furnace, 1½ miles south of Wolfpen Gap, 1 mile north of Webster Ferry, 1½ miles southeast of Allatoona, and 1½ miles southeast of Rock Hill School are suitable for farming purposes. About 30 per cent of the land is cleared for cultivation; the rest is in cut-over forest. The rough, hilly areas are adapted only to forestry. Some cleared areas in which the surface is so steep that it is impossible to prevent erosion should be reforested. The present forest growth consists of loblolly pine with considerable black oak and scattered chestnut, hickory, shortleaf pine, and chestnut oak trees. The reproduction of loblolly pine under natural conditions is excellent.

The crops commonly grown on this soil are cotton and corn, but the land is suited to a wider range of crops, including oats, clover, velvet beans, cowpeas, and some other crops. Peaches are successfully grown on this soil elsewhere in the State. Best results are obtained by deep plowing in the fall and the incorporation of organic matter. Most of the land under cultivation is in need of adequate terracing. Hillside ditches have been used in a few places to prevent erosion, but well-formed terraces close enough together to prevent washing are more satisfactory. Some fields have been ruined by hillside ditches which have developed into gullies that can not be checked. Fertilizer with a high percentage of phosphoric acid and nitrogen should be used.

CECIL CLAY LOAM, STONY PHASE

Cecil clay loam, stony phase, differs from Cecil clay loam, hilly phase, mainly in that a large number of bowlders, ranging from 3 to 30 feet in diameter, and large fragments of angular, hard, coarse-grained granite, from 8 inches to 3 feet in diameter, are scattered over the surface and through the soil. In places the rock from which the soil is derived is near the surface, so that the thickness of the heavy red clay subsoil is slight.

The largest area of this soil is southwest of Stamp Creek. Other rather large areas are around Corbin, north of Cooper Furnace, and 1 mile southeast of Webster Ferry. Smaller areas are scattered throughout the piedmont section of the county. The soil is mainly nonagricultural and its best use is for pasture and the production of loblolly pine.

CECIL SANDY LOAM, MIXED PHASE

Cecil sandy loam, mixed phase, consists of small spots of gray or grayish-yellow light sandy loam and reddish-brown or red clay loam so intricately mixed that no certain texture predominates. The subsoil consists of heavy stiff but brittle red clay which grades into friable and brittle yellowish-red material mottled with yellow and white. This layer grades into the partly decomposed and disintegrated coarse-grained granite rock. In cultivated fields the spotted appearance of the surface soil is more pronounced than in virgin areas.

A gravelly phase of this soil is shown on the soil map by gravel symbols. The surface soil contains a large quantity of angular white quartz fragments varying from one-fourth inch to 3 or more inches in diameter. In a few places thin veins of quartz are scattered throughout the soil. The largest area of this gravelly soil lies along the Cherokee County line southeast of Rock Hill School and a few smaller areas are scattered through that section of the county. Nearly all this gravelly land is cultivated, and its utilization and tillage methods are similar to those employed on Cecil sandy loam, mixed phase. A few small areas which would have been mapped as Cecil sandy loam had they been of greater extent have also been included with this soil in mapping.

Cecil sandy loam, mixed phase, is one of the less extensive soils in the piedmont section of the county but it is one of the more important agricultural soils. A large area lies 1½ miles south of Wolfpen Gap, and other areas are east of Pine Mountain, 1 mile west of Double Springs, and 1 mile south of Rowland Spring. Smaller areas are scattered through the southeast part of the county.

The surface of Cecil sandy loam, mixed phase, is smoothly or roughly hilly, and some small areas are subject to severe erosion. The smoother areas are successfully farmed where terraced. Drainage is good throughout.

Probably 60 or 70 per cent of this soil is cultivated. Cotton and corn are practically the only crops grown, but a much wider range of crops, including oats, wheat, sorghum, cowpeas, and forage crops could be raised on the smoother areas. The soil lacks nitrogen, and a legume grown and plowed under as green manure would be very beneficial both as a source of nitrogen and to improve the physical

condition of the soil. From 200 to 300 pounds to the acre of a 3-9-3 fertilizer is used for cotton, and heavier applications could profitably be used. The steepest areas should be forested.

APPLING SANDY LOAM

The surface soil of virgin Appling sandy loam consists of gray sandy loam from 5 to 8 inches thick. Grayish-brown leaf mold an inch thick may occur on the surface in areas that have not been frequently burned. The subsurface layer, continuing to a depth of about 12 or 15 inches, is brownish-yellow or slightly reddish-yellow heavy sandy loam. The subsoil, to a depth ranging from 20 to 30 inches, is reddish-yellow or yellowish-red brittle and friable clay which breaks into irregular-sized lumps. Underlying this layer is mottled light-red, yellow, and white compact but brittle clay which, within a few inches, grades into the soft disintegrated granite and gneiss parent material. In cultivated fields the surface soil is light gray or grayish yellow and is low in organic-matter content. This soil is locally known as gray land.

Included with mapped areas of this soil are a few small areas in which the surface soil is fine sandy loam. A few bowlders occur here and there throughout the soil. Some small areas having a yellow friable clay subsoil, which would have been classed as Durham soil had they been of greater extent, are also included in mapping. Another important variation occurs where the subsoil is brownish yellow or mottled yellowish brown and whitish heavy tough clay resembling the subsoil of the Wilkes soils mapped in other piedmont counties. Such areas are not so well drained internally as typical Appling sandy loam. Crop yields are considerably lower and altogether the soil is not so desirable.

Appling sandy loam occurs in the southeast part of the county along the Cherokee County line east of Corbin, about 1 mile west of Corbin, 1 mile northwest of Rock Hill School, near Bethany School, and 2 miles southeast of Allatoona.

Appling sandy loam has a rolling surface which becomes hilly and broken in many places. Drainage is good throughout. About 50 per cent of the land has been cleared for cultivation. Although part of the area in forest is suitable for cultivation, the steeper and more broken areas should be left in forest. Reproduction is mainly to loblolly pine with a few short-leaf pine and considerable black oak in places. A few chestnut, hickory, chestnut oak, and other oaks occur in some places.

The crops commonly grown on this soil are cotton and corn. The yields vary widely, according to the quantity and kind of fertilizer used, tillage methods, and climatic conditions. This soil has been successfully used in other counties of Georgia for the production of truck crops, such as melons, asparagus, tomatoes, and potatoes; for bright tobacco; and for peanuts, cowpeas, oats, and all general farm crops. The rougher areas could be utilized for pasture as well as for timber. If properly cared for, certain varieties of apples do well on some of the higher areas. The most common fertilizer used on cotton is a 3–9–3 mixture applied at a rate ranging from 200 to 400 pounds to the acre. This soil is deficient in nitrogen and organic matter, and most of it is low in available potash and phosphoric acid. The

nitrogen can best be secured by plowing under green-manure crops, preferably legumes, and by plowing under rather than burning all crop residues. All available manure should be plowed under. About 400 or 500 pounds to the acre of a fertilizer analyzing at least 4–10–4 should be used for cotton.

Appling sandy loam, stony phase.—This stony soil differs from typical Appling sandy loam in the presence of a larger number of bowlders of coarse-grained granite, varying from 6 inches to more than 10 feet in diameter, scattered over the surface and through the soil in quantities so great as to prevent cultivation. The land is suited to use as pasture and forest land, loblolly pine being recommended for reforestation. The largest areas of this stony soil are north, east, and south of Holly Spring, south of Wolfpen Gap, about 1 mile southeast of Rowland Spring, and southwest of Bethany School. Smaller areas are scattered throughout the piedmont section of the county. This stony soil occurs closer to the mountains than the sandy loam and is of rougher relief.

MADISON SANDY LOAM

In virgin areas, the surface soil of Madison sandy loam consists of light-gray or dark-gray loamy sand 1 or 2 inches thick, which contains considerable coarse sand and fine angular quartz gravel. This is underlain by pale-yellow sandy loam or coarse sandy loam which continues to a depth ranging from 6 to 10 inches. In cultivated fields the surface soil is gray sandy loam. The upper part of the subsoil is reddish-yellow friable and gritty sandy loam containing coarse sand particles. Mica particles are present through this layer, which extends to a depth varying from 12 to 18 inches below the surface, where it is underlain by somewhat brittle, friable red clay. At a depth ranging from 24 to 30 inches below the surface this layer grades into light-red or yellowish-red very friable clay which has a high mica content, giving the material a very greasy or soapy feel. At a depth varying from 36 to 80 inches this grades into mottled or speckled yellow, brown, red, and white material consisting of partly decomposed and disintegrated quartz mica schist. Here and there veins of quartz run through the soil at varying angles. This soil resembles Appling sandy loam in color but the lower part of the subsoil, in many places within 18 inches of the surface, carries such a high mica content that it is very friable and crumbly and has a greasy feel. In areas where the red clay subsoil lies near the surface, the soil resembles Cecil sandy loam.

This soil occurs exclusively in the southeast corner of the county in only a few small areas. The surface is undulating or rolling and is cut by deep stream channels. However, it is much smoother than that of most of the soils in the piedmont section of the county. Drainage is good throughout. About 85 per cent of the land is cultivated, principally to cotton and corn, with small acreages in beans and other crops. Cotton produces well when fertilized with from 200 to 400 pounds of a 3–9–3 mixture. Yields of corn are low.

The greatest need of this soil is an increased supply of organic matter, which may be obtained by plowing under a green-manure crop in a regular crop rotation. The soil is well suited to a much

wider range of crops than is now grown and legumes such as cowpeas or vetch should be used in the crop rotation both for hay and for green manure. Winter cover crops also should be used to a greater extent. Heavier applications of a higher grade of fertilizer than commonly used would undoubtedly give better results.

Madison sandy loam, gravelly phase.—This gravelly phase of soil differs from typical Madison sandy loam in the presence of a large quantity of angular quartz gravel, ranging from 1 inch to 5 inches in diameter, over the surface and through the surface layer, with a small amount through the subsoil. In most places the quantity of gravel is not sufficient to interfere with cultivation.

This soil occurs in small areas exclusively in the southeast corner of the county. The largest areas are about 1 and 2 miles south of Rock Hill School and northeast of Allatoona, and a few small areas are scattered near the Cobb County line. The surface is in general more sloping or hilly than that of Madison sandy loam, but the soil is similar to the typical soil in crop adaptations, cultural methods, and fertilizer requirements.

DAVIDSON CLAY LOAM

The surface soil of Davidson clay loam consists of dark-red or brownish-red friable mellow clay loam from 5 to 8 inches thick. The subsoil, which continues to a depth ranging from 20 to 60 inches, is dark-red or maroon-red smooth, heavy but brittle clay which breaks into irregular-sized lumps. This material is very sticky when wet but on exposure to air it breaks into fine granules which give it a velvety appearance and feel. Scattered through this layer are a few very small black specks of iron, manganese, or other dark-colored mineral. The subsoil grades into the soft yellow disintegrated rock which breaks along cleavage lines, showing stains of red. Davidson clay loam is locally called "push land," owing to its peculiarity of sticking to the plowshare, especially if plowed when wet. This soil is the most readily distinguished among the upland soils of the piedmont plateau section of the county, because of its brownish-red or dark-red color. Considerable white, sharp, angular quartz gravel is scattered over the surface of an area 2½ miles east of Allatoona. A few stony areas are shown on the map by stone symbols. Such areas are difficult to cultivate.

Davidson clay loam is one of the less extensive soils of Bartow County, occurring only in the vicinity of Rock Hill School. The surface is undulating or gently sloping, and drainage is adequate. This is one of the most productive soils in the county and is all under cultivation principally to cotton and corn. It is suited to small grains, clover, and alfalfa. Elsewhere in the State it is used for the production of peaches.

The common fertilizer application ranges from about 200 to 400 pounds of a 3–9–3 mixture to the acre for cotton. From 300 to 500 pounds of a 3–8–5 mixture would be more suitable for cotton. However, by plowing under green-manure crops and manure the nitrogen content of the fertilizer could be lessened and only potash and phosphoric acid would be needed. Tillage methods have a greater influence on the productivity of Davidson clay loam than on most of the other soils in the county, because of the tendency of this soil

to puddle or run together and bake if plowed or worked when too wet. Deep fall plowing, especially if green-manure crops are plowed under, gives best results. Heavy tillage implements are required for the successful cultivation of this land.

IREDELL GRAVELLY LOAM

The surface soil of Iredell gravelly loam, to a depth of about 5 inches, consists of grayish-brown or brown loam underlain by grayish-yellow loam which continues to a depth of about 8 inches. The subsoil, to a depth varying from 10 to 15 inches, is brownish-yellow heavy, sticky, waxy clay. This grades into disintegrated greenish slate. A large quantity of small angular quartz gravel is on the surface and mixed with the soil.

Two important variations from the typical soil occur. In the first of these, the brownish-yellow, sticky, waxy clay extends to a depth ranging from 20 to 30 inches and the surface soil contains only a small amount of gravel. Such spots would have been mapped as Iredell loam had they been sufficiently extensive. In the second variation, the surface soil is brown loam about 6 or 8 inches thick, which is underlain by disintegrated greenish slate or ferromagnesian slate. On the surface of such areas is a large amount of platy and angular greenish slate rock. In a few spots the broken slate rock outcrops on the knolls and ridges. Such spots are valuable only as timberland.

This soil occurs in two parallel ridges, the first of which extends from the Cherokee County line east of Rock Hill School southwest past Allatoona along the south side of Pumpkinvine Creek to within one-half mile of the Paulding County line. The second ridge, which lies about one-half mile farther south, is separated from the first ridge mainly by Fannin and Talladega soils and by the first bottoms of Clark and Allatoona Creeks.

Typical Iredell gravelly loam occupies ridges and gentle slopes. In a few places the surface is almost level and in other places it is rather steep, with a few knobs where the slate outcrops. Surface drainage is good, except on the flat areas. Internal drainage is slow throughout all areas of this soil, especially in the more level areas where the subsoil is heaviest and deepest.

Probably 70 per cent of this soil is farmed, and the rest supports a growth of shortleaf pine, loblolly pine, blackjack oak, and a few other hardwoods. Cotton is the principal crop grown, and yields vary widely according to the season and the fertilizer used. A small acreage is planted to corn. This soil gives best returns in rather dry seasons. The flatter areas are well suited for pasture, and the areas thickly strewn with slate rock are best suited to forestry. The nitrogen supply of this soil can be maintained and the tilth improved by plowing under green-manure crops. If this practice is adopted, the principal fertilizer requirements will be potash, phosphoric acid, and lime. A fertilizer for cotton should carry 10 or 12 per cent of phosphoric acid and 4 or 5 per cent of potash.

FANNIN LOAM

The surface soil of virgin Fannin loam, to a depth ranging from 1 to 3 inches, consists of grayish-brown or yellowish-brown loam over the surface of which are scattered a few small quartz gravel. This is underlain by a very silty, mellow, brownish-yellow loam containing a few fragments of schist and quartz and extending to a depth varying from 7 to 10 inches. The brown color of the surface layer is partly owing to accumulated organic matter and varies with the extent and frequency with which the area is burned over. The subsoil consists of light-red, crumbly, finely granular, friable clay, which continues to a depth ranging from 20 to 30 inches, at which depth it grades into a layer of reddish-yellow, friable, micaceous material from 8 to 20 inches thick, overlying disintegrated micaceous schist. The friable, crumbly, finely granular structure of the subsoil distinguishes Fannin loam from the Cecil and Talladega soils with which it is closely associated. In cultivated fields, the surface soil consists of yellowish-brown or light reddish-yellow mellow loam, which is noticeably silty in many places. This soil varies considerably.

Fannin loam is not an extensive soil in Bartow County. The largest area is southeast of Wolfpen Gap, extending east Stamp Creek nearly to the Cherokee County line. Other large areas are in the northeast corner of the county near Chigger Hill School, 1½ miles north of Webster Ferry, along Allatoona Creek south of Cooper Furnace, and 1 mile south of Allatoona. The surface of the soil is smoothly or roughly hilly, and drainage is good. Approximately 40 per cent of the land is under cultivation, the rest being in cut-over land which is becoming reforested with a second growth of shortleaf pine together with a very few loblolly pine, blackjack, Spanish, chestnut, and post oak, black gum, sumac, and other trees. A profitable stand of loblolly pine can be obtained on areas too steep or too eroded and gullied for farming.

Owing to the friability and crumbly structure of the lower subsoil layer and the micaceous underlying material which occurs on the steep slopes, Fannin loam is especially susceptible to erosion. Much of the land cleared for cultivation was too steep or terracing has been neglected, with the result that the surface has become badly eroded and gullied. This is naturally a productive soil and cotton, corn, oats, and wheat are raised. Winter cover crops will aid in preventing surface washing, and if these crops are plowed under they will also improve the physical condition of the soil as well as provide needed organic matter.

Fannin loam, gravelly phase.—This gravelly soil differs from typical Fannin loam in the presence on the surface of numerous angular white quartz fragments varying in diameter from one-fourth inch to more than 3 inches but averaging between 1 and 2 inches. Numerous parallel thin veins of quartz, lying at varying angles, extend through the surface soil and subsoil. The largest area of this gravelly soil lies along the Cherokee County line 2 miles north of Etowah River. Smaller areas are 2 miles east of Wolfpen Gap, 1 mile northwest of Double Springs, 1½ miles south of Rowland Spring, and elsewhere

throughout the piedmont section of the county. Very little of this land is cultivated, owing rather to the rough surface features than to the presence of gravel. It is best suited to forestry.

TALLADEGA SLATE LOAM

The surface soil of Talladega slate loam, to a depth of about 1 inch, consists of brown loam. This is underlain, to a depth varying from 5 to 15 inches, by reddish-yellow loam with a very greasy feel, beneath which is disintegrated silver, green, red, purplish, and brown sericitic schist. The brown color of the surface soil is owing partly to accumulated organic matter. In most places the disintegrated schist lies at a depth of less than 12 inches from the surface. Many small spots of black graphitic schist outcrop throughout areas of Talladega slate loam. Had these areas been large enough, they would have been called Ranger slate loam. These small included areas are prevalent north of Etowah River near the Cherokee County line and south of Pumpkinvine Creek south of Cartersville.

Talladega slate loam is fairly extensive in the county. A large area extends along the Paulding County line from Raccoon Creek to Pumpkinvine Creek, thence northeast beyond Allatoona to the Cherokee County line north of Etowah River. Smaller areas are north of Signal Mountain, around Johnson Mountain, and in the northeast corner of the county. This soil occupies high, steep, roughly broken hills and ridges, which are almost mountainous in places. Surface drainage varies from free to excessive, and internal drainage is good. Practically none of the land is cultivated, and it is suitable only for pasture and forestry. The roughness of the surface makes lumbering operations difficult. The original forest on Talladega slate loam south of Etowah River and Pumpkinvine Creek consisted largely of longleaf pine with an admixture of shortleaf pine. Second growth consists of shortleaf, loblolly, and longleaf pine, Virginia pine on some slopes toward the river valley, and a scant growth of black, chestnut, and Spanish oak and hickory trees. North of Etowah River in the eastern part of the county, the original forest was predominantly shortleaf pine. The Division of Forestry at the Georgia State College of Agriculture recommends reforestation to loblolly pine or loblolly and longleaf pines together, in those areas where longleaf pine formerly grew. To establish a profitable stand of loblolly pine it is recommended that all the merchantable timber be cut, leaving one or two loblolly pines to the acre, where possible, for reseeding purposes. All undergrowth should be cut for firewood so that the young pine seedlings may have a chance to grow. Fires should be kept out, especially after logging. Some older stands of loblolly pine need thinning out, by cutting out the forked-top and crooked trees first.

TALLADEGA LOAM

In virgin areas the surface soil of Talladega loam, to a depth of about 1 inch, consists of brown loam underlain by very silty reddish yellow loam which continues to a depth varying from 4 to 7 inches. The brown color of the surface soil is owing largely to the presence of organic matter. Here and there small white quartz fragments

occur over the surface. The subsoil, continuing to a depth of about 18 inches, is light-red or yellowish-red very friable silty clay loam with a very greasy feel. The subsoil layer varies greatly in thickness, being absent in places where the schist comes close to the surface and extending to a depth of 30 inches in other places. It grades into varicolored, disintegrated sericitic schist, the predominating colors of which are silver, greenish, red, purplish, and brown. In cultivated fields, if erosion has not taken place, the surface soil is reddish-yellow silty loam.

No large areas of Talladega loam occur in Bartow County. The soil occurs mainly on flat tops of high ridges where the surface has not been eroded. A few areas lie at the base of Talladega slate loam slopes. One of the largest areas is 1 mile northeast of Flexatile. Another area is mapped where Sallacoa Creek crosses the Cherokee County line, and still another is along the ridge 1 mile south of Etowah River between Ward Creek and Pyle Creek. Numerous smaller areas are mapped in association with Talladega slate loam. The surface is smoothly hilly or rolling, and drainage is good. Very little of this soil is cultivated, as there are no uniformly large level areas and as soon as a slope is cleared, excessive erosion takes place. Small patches of cotton and corn are cultivated and fairly good yields are obtained, but the soil as a whole is best suited to pasture and forest. The original forest growth and the methods recommended for reforestation are similar to those on Talladega slate loam.

Talladega loam, gravelly phase.—Talladega loam, gravelly phase, differs from typical Talladega loam only in the presence of a large quantity of gravel on the surface. The gravel consists of white angular quartz fragments varying in diameter from one-half inch to more than 4 inches but averaging between 1 and 2 inches. Over an area of this soil lying along the south side of Johnson Mountain sandstone fragments, varying in diameter from 1 to more than 8 inches, have rolled from the mountain. Close to the mountain, this gravelly soil includes spots of Jefferson gravelly loam which are too small, scattered, and indefinite to be shown on the map.

The largest areas of Talladega loam, gravelly phase, occur along the Paulding County line south and southwest of Cartersville, north of Flexatile, and midway between Bethany School and Rock Hill School. Most of this gravelly soil is nonagricultural, but like Talladega slate loam it is suitable for pasture and forestry.

RANGER GRAVELLY LOAM

Ranger gravelly loam has a surface soil of bluish-gray or slate-colored silt loam about 3 inches thick. Many angular white quartz fragments and fragments of black graphitic schist are scattered over the surface. The subsoil, to a depth ranging from 12 to 20 inches, is light slate-colored silt loam having a greasy feel. It is underlain by disintegrated black graphitic schist which also has a very greasy feel.

Ranger gravelly loam is very inextensive, occurring only in small areas northeast of Flexatile, in the extreme northeast corner of the county, on the east side of Johnson Mountain, 1 mile northeast of Webster Ferry, 1½ miles south of Bartow, and on the east side of

Ward Creek near the Paulding County line. The surface varies from rolling to steeply sloping, and drainage is good or excessive. A small acreage of this soil was cleared for cultivation at one time, but most of it has been abandoned. Several areas have been mined for graphite, but no mines are now in operation. This soil is best adapted to pasture and reforestation to loblolly pine.

HARTSELLS LOAM

Virgin Hartsells loam has a surface soil of dark-gray loam 1 or 2 inches thick, which is underlain by grayish-yellow loam continuing to a depth varying from 7 to 10 inches. The subsoil consists of lemon-yellow or yellow very friable clay loam or sandy clay extending to a depth ranging from 36 inches to 5 or more feet, at which depth the material rests on coarse-grained sandstone that is partly disintegrated in places. The dark color of the surface soil is owing to an accumulation of leaf mold and organic matter. In cultivated fields the surface soil is gray or grayish-yellow loam which in places is noticeably sandy. A variable quantity of small angular sandstone or slate fragments and a few bowlders occur on the surface and throughout the soil.

Hartsells loam is inextensive in Bartow County, but it occurs in several large, well-developed areas. One is southeast of Johnson Mountain along the Cherokee County line and another is 2 miles northeast of Sugar Hill. Small areas occur south of Pinelog Mountain, 1½ miles north and 1 mile east of Stamp Creek, and along the ridge extending northeast from Cass Station. The surface relief varies from rolling or sloping in the smaller areas to hilly in the larger ones, and drainage is good throughout. A very small percentage of this soil is cultivated, owing largely to the inaccessibility of the areas. Cotton and corn are grown on the cultivated areas. The forest growth consists of shortleaf pine, post, chestnut, white and red oak, pignut hickory, blackjack oak, Spanish oak, and black gum. Where the land can not be cultivated it can be used for pasture and the production of loblolly pine. Some of the areas support an exceptionally fine growth of native grasses, which renders them well suited for pasture.

HARTSELLS STONY LOAM

The surface soil of Hartsells stony loam consists of a 1-inch layer of dark-gray loam overlying grayish-yellow loam, which continues to a depth ranging from 6 to 9 inches. This layer is underlain by lemon-yellow very friable clay loam or sandy clay which varies greatly in thickness, the underlying sandstone rock occurring close to the surface in some places and in others lying from 30 to 50 inches below the surface. The dark color of the surface soil is caused by an accumulation of organic matter. Numerous sandstone rocks and bowlders, ranging from 1 to more than 8 feet in diameter, occur over the surface and throughout the soil to such an extent that cultivation is impossible except in small and isolated patches. Small areas of rough stony land are included with this soil in mapping.

Hartsells stony loam is fairly extensive. It occupies a ridge which extends from Signal Mountain northward to Etowah River, then turns northwest past Pine Mountain where this soil becomes inter-

mixed with other soils. Northwest of Holly Spring, the ridge gradually widens out as it extends northeast to the Cherokee County line. Smaller areas occur on Johnson Mountain and two small parallel ridges lie about 1 mile northeast of Cass Station. Areas are rough and mountainous, occupying high ridges and steep broken slopes. The land is nonagricultural but is suitable for pasture and forest. The forestry growth consists of scattered shortleaf pine, pignut hickory, blackjack, Spanish, and red oak, and black gum. Reforestation of these areas, as far as possible, should be to shortleaf pine. Fairly good pasture which will allow limited grazing can be obtained, especially if a forest cover is left to prevent the soil from becoming too dry.

HANCEVILLE LOAM

In virgin areas, the surface soil of Hanceville loam consists of dark-gray loam from 1 to 3 inches thick, in which the dark color is owing to an accumulation of organic matter. This layer grades into grayish-yellow or brownish-yellow loam which continues to a depth varying from 7 to 15 inches. The subsoil is red, very friable sandy clay which extends to a depth ranging from 20 to 40 or more inches, at which depth it passes into mottled yellow, red, and brown friable material from 2 to 8 inches thick immediately overlying the partly disintegrated sandstone. In cultivated fields, the surface soil is yellowish-brown loam containing a few spots of red loam. On Johnson Mountain, a small area in which the surface soil is yellowish-brown fine sandy loam is included with this soil in mapping. In some places, the surface soil is brownish-red loam and the subsoil is deep-red, friable sandy clay.

Nearly all this soil is mapped on Johnson Mountain. The areas are rolling and sloping and are well drained throughout. About 50 per cent of the land is cultivated, principally to cotton and corn. The forest growth is mainly shortleaf pine with an admixture of hickory, Spanish, red, and blackjack oak, and other hardwoods. Areas too rough or inaccessible for cultivation can be reforested to shortleaf pine in the manner recommended for Hanceville stony loam.

This is the most productive mountain soil in Bartow County. It is well suited to the production of forage crops, sweetpotatoes, potatoes, melons, apples, and peaches, in addition to the crops now grown. On cultivation, newly cleared areas soon become deficient in nitrogen, and the soil is also low in other plant-food elements. The supply of nitrogen and organic matter can best be maintained by plowing under green-manure crops, especially legumes. Applications of 500 or 600 pounds to the acre of a complete fertilizer analyzing not less than 4–8–3 should be used for the general farm crops. Lime should also be applied in connection with the green-manure crops.

This land requires terracing to prevent erosion, which would seriously damage cleared fields. It is easily cultivated but deeper plowing than is commonly practiced is necessary. This, in connection with adequate terracing and the incorporation of green manure, will greatly improve the productivity of the soil.

HANCEVILLE STONY LOAM

Hanceville stony loam differs from Hanceville loam mainly in that angular bowlders and rocks, varying from 1 to more than 6 feet in diameter and present in most places in sufficient numbers to prevent cultivation, are over the surface and throughout the soil. On the crests of some ridges the soil resembles rough stony land and includes small spots of that material. In several places the surface soil is light red, especially where this soil joins areas of the Decatur soils. Hanceville stony loam lies above the Decatur soils and can readily be distinguished from them by the lighter texture and greater friability of the subsoil. This soil is not derived from ferruginous sandstone as it is in many other localities but comes from sandstone material similar to that giving rise to the Hartsells soils intermixed with iron deposits which cause the red color.

Hanceville stony loam is one of the principal mountain soils of the county. It occurs in scattered areas northwest of Emerson, east and northeast of Cartersville, east of McCallie, east of White, north of Wolfpen Gap, west and north of Sugar Hill, and on Johnson Mountain. It occurs on steep rough areas which are mainly non-agricultural, and the land is suited only to reforestation.

JEFFERSON LOAM

The surface soil of virgin Jefferson loam consists of gray or dark-gray loam from 1 to 3 inches thick. This is underlain by grayish-yellow loam which continues to a depth varying from 4 to 12 inches. The dark color of the surface layer is caused by an accumulation of organic matter. In cultivated fields the surface soil is grayish-yellow loam. The subsoil is bright-yellow very friable, crumbly, finely granular clay loam, which in many places between depths of 24 and 50 inches becomes slightly less friable and is spotted with brown.

Jefferson loam, a minor soil in the county, occurs as colluvial material at the foot of mountain slopes. The largest area is about 1 mile north of Pinelog Mountain near the county line. Other areas are near Sugar Hill, east of Brushy Knob, east of Wolfpen Gap, southwest of Rowland Spring, 1 mile north of Pine Mountain, and north of Bartow.

Areas of Jefferson loam are undulating or gently rolling, and drainage is good. Approximately 75 per cent of this soil is cultivated, principally to cotton and corn, and the rest supports a growth of shortleaf pine, and hickory, blackjack oak, red oak, black gum, and other hardwoods. On areas unsuited for agriculture, a profitable stand of loblolly pine can be obtained.

Although this soil contains little humus its productivity could be greatly improved by plowing under green-manure crops, preferably legumes. Not only would this practice increase the nitrogen content of the soil, but it would also improve the structure and fertilizer-retaining powers. For cotton a complete fertilizer which contains at least 4 per cent nitrogen, 8 per cent phosphoric acid, and 4 per cent potash is needed.

Jefferson loam, gravelly phase.—This gravelly soil differs from typical Jefferson loam in the presence of a large quantity of gravel on the surface and through the soil. The gravel, which range in

diameter from less than 1 inch to more than 10 inches, is principally subangular and rounded sandstone fragments with some small quartz fragments. In some places in the valley between White and Wolfpen Gap, this soil overlies a formation containing manganese and manganiferous iron in quantities sufficient to mine. In some patches at the east end of the valley a Hanceville subsoil occurs near the surface, and at the west end a Talladega subsoil is present in a few places. In Bartow County the depth of the Jefferson soil material varies from 18 inches to 10 feet.

This soil occupies narrow valleys between sandstone ridges, overlying limestone and shale material. It occurs at the base of the northwest slope of Little Pinelog Mountain, along the west slope of the mountains from White south to Pine Mountain, on the north side of Pinelog Mountain, and in a few small areas on the east side of the mountains between Grassy Hollow and Brushy Knob.

The surface of this gravelly soil is more variable than that of typical Jefferson loam, ranging from steeply sloping to gently rolling. Drainage is good throughout. Approximately 30 per cent of the land is cultivated to the crops grown on Jefferson loam, and the remainder supports much the same tree growth as that soil.

ALLEN LOAM

In the virgin condition, the surface soil of Allen loam consists of dark-gray loam from 1 to 3 inches thick, in which the dark color is owing to accumulated organic matter. Underlying this is yellowish-brown loam which continues to a depth ranging from 6 to 14 inches below the surface. In cultivated fields the surface soil is yellowish-brown loam with scattered spots of red and reddish-brown in places where the subsoil has been turned up. The subsoil, which extends to a depth varying from 2 to 6 feet, is light-red or brownish-red, friable, crumbly, finely granular clay.

Allen loam covers only a small acreage in the county. It is a colluvial soil occupying steeply or gently sloping areas and valley situations, and most of it is closely associated with the Hanceville soils. Drainage is good. From 50 to 60 per cent of the land is cultivated, mainly to cotton and corn, but some small grain is grown. The remainder supports a growth of shortleaf pine, and hickory, blackjack, red, and Spanish oak, and other hardwoods. On the steep, inaccessible, and stony areas a good stand of loblolly pine can be obtained by selective cutting and protection from fires.

The principal need of the areas which have been long under cultivation is an increased supply of humus. The soil is easily tilled and responds quickly to fertilization. A fertilizer analyzing 4–8–4 gives good results. A few areas under cultivation need terracing, but this soil does not erode seriously.

CUMBERLAND LOAM

Cumberland loam, in cultivated areas, has a surface soil consisting of very mellow reddish-brown loam from 5 to 14 inches thick. The subsoil is friable, heavy, crumbly red clay loam with a nut structure. It extends downward to a depth ranging from 30 to 60 inches,

where it grades into friable dark-red clay. This clay layer, which in many places continues to a depth greater than 10 feet, is slightly heavier than the overlying layer. Small rounded gravel occur here and there on the surface and through the soil, and many beds of gravel occur at varying depths. The color of the surface soil varies from brownish red to very dark reddish brown or chocolate. In many places the upper part of the subsoil is friable, heavy, crumbly, dark-red clay which becomes slightly sticky and heavier with depth. In areas southwest of Harden Bridge and 2 miles southwest of Kingston, brown or dark-brown fine sandy loam from 3 to 6 inches thick occurs on the slight ridges, and dark-red clay loam occupies the slopes. In a few places the surface soil has a high silt content, and in a few depressions the content of organic matter is high.

Cumberland loam is an inextensive soil occurring exclusively on terraces in Etowah River Valley. The largest areas lie in the bend of the river east of Euharlee, on both sides of the river at Malbone, in the bend of the river south of Wooleys, and near Browns. The surface is undulating or gently rolling, and drainage is excellent.

All the land is cultivated, principally to corn, cotton, wheat, and oats, but a wide variety of other crops are grown in a small way. This is one of the most productive and most valuable soils in Bartow County. It is very well suited to the production of peaches and other fruits, alfalfa, clover, cowpeas, hay crops, and general farm crops. It was one of the first soils in the county to be cultivated and is still valued at high prices.

Crop yields are rather high, although a few areas are in need of a small amount of terracing to prevent surface erosion which has already made serious inroads. If adequately tilled, this soil will give as great as if not greater returns from labor and fertilizer expended than any other soil in the county. The land is much easier to till than Cumberland clay loam and is hence more desirable. However, fertilizer requirements are similar to those of Cumberland clay loam. Deep fall plowing is essential for best results. Winter cover crops are grown to stop erosion in many areas and should be grown to a much greater extent. Probably the greatest need of the soil as a whole, with the possible exception of deeper plowing, is the adoption of a regular crop rotation including a green-manure crop, preferably a legume, to be plowed under regularly.

Cumberland loam, gravelly phase.—This gravelly soil differs from typical Cumberland loam in its lighter color and in the presence of a large quantity of rounded gravel on the surface and through the surface soil. The gravel ranges from one-half inch to 4 inches in diameter. The quantity present ranges from a scattering on the surface to a covering from 5 to 8 inches thick. Most of the gravel is quartz and quartzite, with some sandstone and chert. This soil, however, is less gravelly than the gravelly phase of Etowah loam.

Only 2.8 square miles of this soil is mapped. The largest area is about 1 mile northeast of Euharlee and other fairly large areas lie east and north of Browns, 1 mile east and 1½ miles southeast of Stilesboro, and 1 mile southeast of Harden Bridge. Small areas occur in Etowah River Valley in the southwest quarter of the county. The surface of this soil is in most places more rolling than that of typical Cumberland loam. Nearly all the land is cultivated. It is farmed much as is Cumberland loam.

CUMBERLAND CLAY LOAM

Virgin Cumberland clay loam has a surface soil consisting of reddish-brown heavy loam from 1 to 3 inches thick. This is underlain by friable, mealy, red clay loam which continues to a depth varying from 5 to 9 inches. In cultivated fields, the surface soil is friable red clay loam, and the subsoil is friable, crumbly, deep-red clay. This layer in most places varies in thickness from 20 to 40 feet. The surface soil is eroded in places. In a few depressions and small level spots, the surface soil is dark reddish-brown silty loam. Rounded gravel occur on a few knolls.

Cumberland clay loam occurs only on the terraces in Etowah River Valley between the Western & Atlantic Railroad trestle east of Cartersville and the Floyd County line. Most of the soil occurs south of Cartersville in more or less broken areas. It occupies undulating or rolling and, in some places, hilly areas, most of which lie at a high elevation. Internal drainage is adequate, but surface drainage is excessive in many places. Practically all the land has been cleared and cultivated at one time, but numerous areas have been abandoned on account of surface erosion.

Crops grown on this soil are mainly cotton, corn, and small grains. Cumberland clay loam is equally as productive as Cumberland loam, but crop yields commonly are not so high owing to the fact that the clay loam soil is harder to till. However, where the land has been plowed deeply, well worked, and properly fertilized, excellent yields are uniformly obtained over long periods of time.

Broad terraces should be constructed to adequately protect the soil from erosion. These broad terraces are the most practical as they are the most permanent, the easiest to maintain, and do not interfere with cultivation. Incorporation of organic matter, deep plowing in the fall, and thorough preparation of the soil in the spring greatly increase the yields and enable the soil to withstand droughts. Another great need is the adoption of a crop rotation including a legume, part of which is plowed under for green manure. Winter cover crops to protect the soil from winter erosion should also be grown. The land is well suited to the production of alfalfa, clovers, cowpeas, peaches, and all other crops which grow in this region. The quantity and kind of fertilizers used vary. For cotton, an application of 300 pounds of a 4–9–4 or 3–9–4 mixture at planting time and 100 pounds of nitrate of soda as a side application has given excellent results. Chemical analyses made on this soil in Floyd County, Ga., indicate that it is fairly well supplied with potash but deficient in nitrogen and phosphoric acid. A fertilizer for cotton should carry about 5 per cent nitrogen, 10 per cent phosphoric acid, and 4 per cent potash. Cumberland clay loam is well suited to small grains, which should receive an application of superphosphate at planting time and a top-dressing of nitrate of soda in the spring. Corn should receive considerable nitrogen. Better results could be obtained with legumes if the soil were limed.

ETOWAH LOAM

In virgin areas, the surface soil of Etowah loam is dark-brown loam from 2 to 4 inches thick, underlain by mellow, friable, reddish-brown loam which continues to a depth ranging from 8 to 20 inches.

In cultivated fields, the surface soil consists of mellow brown loam. The subsoil is reddish-brown or yellowish-brown friable clay loam which, in places, contains a few specks of soft, black, iron or manganese accretions. The subsoil extends to a depth ranging from 4 to 7 feet below the surface, where it grades into reddish-brown clay, spotted and streaked with grayish yellow. A few strata of rounded gravel are in the subsoil. In a few small areas in slight depressions the surface soil consists of dark-brown silt loam, whereas on the ridges it is grayish-brown fine sandy loam. The surface soil is thickest in depressions, in many places 20 inches thick, and is shallowest on the slight knolls.

Although Etowah loam is a minor soil in the county it comprises a considerable percentage of the terrace soils in Etowah River Valley between the Western & Atlantic Railroad trestle east of Cartersville and the Floyd County line and in the Euharlee Creek Valley from Taylorsville to Etowah River. A few fairly large areas lie between Nancy and Pettit Creeks, 1 mile northeast of Browns, south of Shellman, 1 mile north and 2 miles northeast of Taylorsville, and along the south side of Etowah River between Pumpkinvine Creek and the State highway bridge southeast of Cartersville.

Areas of this soil are slightly undulating, and drainage is excellent. All the areas lie above normal overflow. Practically all the land is cultivated, mainly to corn and cotton. A small acreage is in cowpeas, hay crops, small grains, and other crops commonly grown. This is one of the most productive and most valuable soils in the county. On one farm an average of three-fourths bale of cotton to the acre for a long term of years was grown by using 300 pounds of a 3–9–3 fertilizer to the acre. This is a desirable soil for the production of all crops common to the region.

Etowah loam, gravelly phase.—Etowah loam, gravelly phase, differs from typical Etowah loam in the presence of a large quantity of rounded gravel over the surface and to less extent through the soil. The average diameter of the gravel varies from place to place but in most places ranges from one-half to 3 inches, though in some areas it ranges from 3 to more than 6 inches. The quantity is not sufficient to interfere with cultivation over most of the soil, but in scattered areas gravel constitutes the greater part of the surface soil to a depth ranging from 6 to 14 inches. The gravel is mainly quartz and quartzite, with a few sandstone. Thick lenses and strata of gravel are common throughout the subsoil.

Where this soil borders the upland soils, the subsoil is residual in some areas. In the vicinity of Ford small areas of Cumberland clay loam, Cumberland loam, gravelly phase, and Holston fine sandy loam, gravelly phase, are included in mapping. In some places about 1 mile south of Harden Bridge, the surface soil resembles that of Holston fine sandy loam, gravelly phase, to a depth ranging from 10 to 14 inches.

Etowah loam, gravelly phase, is comparatively extensive, comprising a large proportion of the terraces of Etowah River and Euharlee Creek Valleys, as well as occurring near many of the creeks in the northern part of the county. The surface is undulating or gently rolling, the relief being greater than that of Etowah loam. The soil lies well above overflow, in places occupying the highest terraces in Etowah River Valley. Drainage is excellent. Nearly all this soil

is cultivated, but a few spots are too gravelly, too shallow, or too eroded for cultivation. Agricultural practices and requirements are the same as those mentioned for typical Etowah loam.

ETOWAH FINE SANDY LOAM

Etowah fine sandy loam, in cultivated areas, has a surface soil consisting of mellow light-brown fine sandy loam from 6 to 14 inches thick. In most places the subsoil, to a depth of 60 inches, is reddish-brown or yellowish-brown very friable and crumbly clay loam or clay, but in places brownish-yellow smooth, friable clay is present at a depth between 40 and 50 inches. In areas south of Browns and northwest and southwest of Stilesboro, the surface soil is light-gray fine sandy loam similar to the corresponding layer of Holston fine sandy loam. In a few places, the subsoil consists of reddish-brown friable fine sandy clay. Rounded gravel occur locally through the subsoil.

Etowah fine sandy loam is mapped on the terraces in Etowah River Valley and adjoining valleys in the southwest quarter of the county. Most areas occupy the lower terraces, closer to the streams than other terrace soils, but they are rarely inundated. The surface is commonly slightly undulating, although a few areas have a somewhat greater relief. Drainage is excellent.

All this soil is cultivated, principally to corn and cotton. Smaller acreages are in hay crops, small grains, and other crops. This is one of the most productive and most desirable agricultural soils in the county, as it is well suited for the production of all general crops, especially corn, and would make an excellent soil for a wide variety of truck crops.

HOLSTON FINE SANDY LOAM

In virgin areas, Holston fine sandy loam has a surface layer consisting of gray fine sandy loam from 3 to 5 inches thick. The gray color is largely owing to accumulated organic matter. This layer is underlain by the subsurface layer of pale-yellow fine sandy loam which extends to a depth ranging from 8 to 15 inches below the surface. In cultivated fields, the surface soil is light-gray fine sandy loam. The subsoil is very friable, mealy, crumbly yellow clay loam which extends to a depth varying from 30 to 60 or more inches, at which depth it grades into mottled yellow, whitish, purplish, and yellowish-brown brittle material. A few rounded sandstone gravel occur locally over the surface and through the surface soil and subsoil. In a few small areas, the surface soil consists of gray silt loam.

Included with mapped areas of this soil are a few small patches along Allatoona, Clark, Stamp, and Pumpkinvine Creeks, in the southeast part of the county, which would have been mapped as Altavista sandy loam had they been of greater extent.

Holston fine sandy loam covers a very small total acreage in Bartow County. It is a terrace soil occurring in small areas in most of the creek valleys and in Etowah River Valley. The largest areas are near Taylorsville, southeast of Browns, about 1½ miles west of Raccoon Creek, and near the mouth of Pumpkinvine Creek. Smaller areas are near Etowah River at the Cherokee County line and in the valleys of Pinelog, Pumpkinvine, Gudder, Euharlee, and Pettit Creeks. This

soil occurs in valleys and has an undulating surface. Drainage is excellent. A very small proportion of the land is subject to overflow during unusual flood seasons.

Practically all this land is cultivated, principally to cotton. Corn ranks next in importance, and small areas of cowpeas and other crops are grown. The soil is easily cultivated and responds readily to commercial fertilizers. Cotton yields well where it is fertilized with about 400 pounds of a 3–8–3 fertilizer to the acre, but corn yields are usually low.

Holston fine sandy loam, gravelly phase.—Holston fine sandy loam, gravelly phase, differs from typical Holston fine sandy loam in the presence of a large quantity of rounded sandstone, quartzite, and quartz gravel over the surface and to less extent through the soil. Here and there pockets of gravel occur in the subsoil. The gravel ranges from one-half inch to 5 inches in diameter, and the quantity varies from a scattering on the surface to a covering from 6 to 12 inches thick. However, over most of the soil the quantity is not sufficient to interfere with cultivation.

Holston fine sandy loam, gravelly phase, is inextensive, occupying terraces in Etowah River Valley and along most of the valleys of creeks flowing through or rising near the mountains. The surface shows greater relief than that of the typical soil, ranging from undulating to slightly rolling. The land lies well above overflow, and about 95 per cent of it is cultivated to crops similar to those grown on the typical soil.

HUNTINGTON FINE SANDY LOAM

Huntington fine sandy loam has a surface soil consisting of very friable, mellow light-brown or grayish-brown fine sandy loam from 8 to 16 inches thick. This is underlain by a yellowish-brown fine sandy loam subsoil of variable thickness, in many places extending to a depth of 60 or more inches but in places, between depths of 24 and 30 inches, giving way to yellowish-brown friable silt loam or silty clay loam. Locally yellowish fine sand in thin strata occurs in the subsoil. The texture of the surface soil is in places loamy fine sand to a depth varying from 6 to 10 inches. In areas along Etowah River through the central part of the county an admixture of material from the Talladega soils and from piedmont soils gives this soil a structure resembling that of the Congaree soils, and in many places the soil boundaries are arbitrary. Included with mapped areas of this soil are small patches of yellowish-brown or yellow fine sand continuous to a depth of 40 or more inches. Most of these patches occur as narrow natural levees close to the stream.

Huntington fine sandy loam is a first-bottom soil occurring principally in Etowah River Valley, west of the mountains. The surface is slightly more undulating than that of Huntington silt loam and is cut by high-water channels to a somewhat greater extent. This soil is subject to seasonal overflow, but it is well drained between inundations. Tree growth along Etowah River consists of river birch, water oak, willow oak, cottonwood, tulip poplar, black willow, boxelder, and sycamore.

About 95 per cent of the land is cultivated, principally to corn, and small acreages of other staple crops and of melons are grown. Crop yields are excellent except on small sandy areas. This soil

is especially desirable for corn and is excellent for watermelons. A small acreage is used for pasture land, but the soil is not so desirable for this purpose as Huntington silt loam.

HUNTINGTON SILT LOAM

The surface soil of virgin Huntington silt loam is very friable, mellow brown or dark-brown silt loam from 7 to 12 inches thick. In most cultivated fields it is slightly lighter in color. The subsoil, to a depth of 48 or more inches, is yellowish-brown friable silt loam, slightly heavier than the surface soil. In many areas little difference in texture or color exists throughout the entire soil, which may be brown throughout. Locally a thin layer of sand occurs in the subsoil, and in a few places a thin veneer of fine sand may occur on the surface. In some areas the subsoil is yellowish-brown silty clay and along Nancy Creek it is bright-yellow silty clay.

Huntington silt loam is a rather extensive soil in the first bottoms of that part of the county lying west of the mountains. It occurs along Euharlee, Pettit, Two Run, Oothkalooga, and Ballard Creeks, and to a small extent along Etowah River west of Harden Bridge. It occupies smooth, nearly level areas subject to frequent overflow. Along many of the creeks, it would be practical to reduce damage from overflow by deepening and straightening the stream channels.

About 90 per cent of the land is cultivated. This is one of the most productive soils in the county, giving especially high yields of corn. It is used to less extent for cotton, wheat, oats, cowpeas, and hay crops. Excellent yields of cowpeas and other hay crops are produced, and this is an ideal summer-pasture soil. Cotton tends to produce a very rank growth and to mature the bolls late in the season. This tendency can be counteracted somewhat by the application of superphosphate as a fertilizer.

Great care should be taken to till this soil only when moisture conditions are the best, in order to prevent the formation of clods and to obtain a fine, mellow seed bed. Sometimes a puddled condition develops in the immediate surface of tilled areas following inundation. The material dries out to a hard crust which curls and cracks and is not readily pulverized.

HOLLY SILT LOAM

The surface soil of Holly silt loam consists of dark-gray heavy silt loam from 6 to 18 inches thick. The dark color is owing to accumulated organic matter. The color of the dry soil is lighter, and in cultivated fields the surface soil is light-gray or almost white silt loam. The subsoil is light-gray, heavy, somewhat plastic clay which contains small brown stains. At a depth ranging from about 28 to 40 inches, this layer grades into mottled brown, gray, and yellowish somewhat plastic but slightly friable clay. Small rounded gravel and iron concretions are found locally in the subsoil. In a few places there is a surface covering, from 1 to 10 inches thick, of varicolored and varitextured alluvial material washed from the uplands.

Holly silt loam occurs throughout the western half of the county in the first bottoms of small creeks and near the headwaters of the

larger creeks. The largest areas are along the upper reaches of Nancy, Pettit, and Two Run Creeks. On account of its nearly level surface, this land is subject to frequent overflows. Internal drainage is inadequate, and surface drainage is slow. About 10 per cent of the land is cultivated and about 80 per cent is used for pasture, for which purpose it is ideal. The tree growth consists mainly of hardwoods, loblolly and shortleaf pines, cottonwood, tulip poplar, black willow, boxelder, and sycamore. This soil is not so productive nor so desirable for farming purposes as the Huntington soils. Fair yields of corn are obtained on the areas having brown surface soils.

CONGAREE FINE SANDY LOAM

The surface soil of Congaree fine sandy loam is from 9 to 20 inches thick and consists of brown fine sandy loam containing finely divided mica particles. It is underlain by light-brown or yellowish-brown fine sandy loam which also contains many small mica particles. The texture of the subsoil layer is varied, in some places being silt loam and, in a few places, friable silty clay loam.

In a few places, small areas of deep-brown fine sand are included with mapped areas of this soil. Most of these included areas occur as narrow natural levees bordering the streams. Included areas west of Grassy Hollow and along Sallacoa and Pinelog Creeks have grayish-brown fine sandy loam surface soils from 6 to 14 inches thick, overlying yellowish-brown friable fine sandy clay.

Congaree fine sandy loam occurs along the larger creeks in the southern and southeastern parts of the county and in a few small spots along Etowah River west of Cooper Furnace. The largest areas are along Pumpkinvine and Raccoon Creeks. The surface is level or slightly undulating, and the land is subject to seasonal overflow. Drainage is fair between inundations. The tree growth along the stream courses includes river birch, water oak, willow oak, cottonwood, tulip poplar, black willow, boxelder, and sycamore. Corn is the principal crop grown, and excellent yields are obtained. Watermelons of excellent quality and yield are grown on a small acreage, and hay crops yield well. Now and then a summer inundation destroys a crop. In some areas damage is caused by surface wash during flood seasons. This damage could be materially reduced in most places by planting hedges of native trees and bushes along the stream channel.

CONGAREE SILT LOAM

The surface soil of Congaree silt loam consists of mellow smooth brown silt loam containing many finely divided mica particles. It is from 8 to 20 inches thick and is underlain by light-brown fine sandy loam which also carries a large quantity of fine mica flakes. This underlying layer is variable in texture.

Congaree silt loam occurs in many of the larger first bottoms in the extreme southern and southeastern parts of the county; near the mouth of Pumpkinvine Creek; along Allatoona Creek near the Cobb County line; and along Richland, Floyd, and Hills Creeks. Smaller areas occur along Etowah River east of Cooper Furnace. This soil has a nearly level or very slightly undulating surface and is subject to seasonal overflow. Between inundation periods, drainage is only

fair over most of the land. Practically all the soil is cultivated, principally to corn which produces large yields. Hay crops are extensively grown, and a small amount of cotton is produced. This is one of the most productive soils in the county, the only drawback to its utilization being the danger from inundations which occasionally destroy a crop, especially along the smaller creeks.

ROUGH STONY LAND

Rough stony land is a miscellaneous classification including land so rough, broken, and rocky that it is of no agricultural value. In the areas throughout the piedmont section of the county the rocks consist of granite and gneiss, in the mountain section they are mainly sandstone, and in the areas west of the mountains they are mainly dolomitic limestone, usually containing a large amount of chert. The largest areas occur on the crest of Little Pinelog Mountain, at the west end of Pinelog Mountain, and on Sproull and Quarry Mountains west of Cartersville. Forestry operations would be difficult on this rough stony land, but scattered trees of good growth are produced. Nearly all the soil is forested with a scattered growth of shortleaf pine, and pignut hickory, blackjack oak, Spanish oak, red oak, black gum, and a few other hardwoods.

MEADOW

Meadow includes alluvial material, lying mainly along the smaller streams in the southeastern part of the county, which is so mixed and of such varied texture, structure, and color that it is impractical to separate it into soil types. It includes areas of sand, sandy loam, and silt loam. In some areas, part or all of the land may be farmed, but in others it may be too wet or too mixed in texture to be of any value except for pasture or for the production of hardwoods. A few areas, such as the one 1 mile northwest of Ligon School, are semiswampy and covered with marsh grasses. A small area of muck, lying about one-half mile north of Dry Creek School, is included in mapping. Meadow is subject to frequent overflow. Tree growth is similar to that on the Congaree soils. The principal use of this land is for summer pasture.

MINE WASH

Mine wash is a classification used to designate those areas in which the soil has been allowed to settle, in artificial ponds constructed for the purpose, from water used in washing mined ores. These areas, which vary in size from less than 5 to about 100 acres, occur adjacent to barite, iron, and manganese mines. The material from the barite washers consists of very plastic, sticky, tenacious brownish-yellow and reddish silty clay or clay, the surface of which cracks on drying. Such areas are nonproductive, except for certain willows, and are nonagricultural. The areas in which the material is derived from manganese and iron ores is somewhat more friable, owing to the presence of more fine sand and silt, but these areas also are nonagricultural until they have weathered for a time. It is probable that the areas derived from barite wash will continue to be nonagri-

cultural, not only on account of the texture and structure of the material but also on account of the presence of sufficient barium salts to inhibit the growth of most plants. The material derived from the iron and manganese wash will probably become productive in most areas after a sufficient period of exposure.

SUMMARY

Bartow County is in the northwest part of Georgia and includes a land area of 460 square miles. The surface of the county varies from almost level and gently rolling to steep and mountainous. The smoothest parts occur in Etowah River Valley in the southwest part, in the northwest corner, and in the piedmont region at the southeast corner, and the roughest areas are in the mountain section through the east-central part of the county.

Drainage, except in the northern part of the county which drains through numerous creeks into Oostanaula River, is westward through Etowah River and its tributaries.

The highest elevation in the county, 2,000 feet, is in the northeast part on Pinelog Mountain. The southeast corner has an elevation of about 900 feet, and the elevation where Etowah River leaves the county midway of the western side is about 600 feet. The county is well drained and has considerable potential water power, as yet undeveloped.

Cartersville is the county seat and the largest town. Roads are in good condition, but none are paved. The Dixie Highway is the principal highway.

The climate is characterized by long summers and mild winters. Rainfall is moderately heavy and well distributed throughout the year.

General farming is practiced by most farmers. Cotton is the principal crop, although corn occupies nearly as large an acreage. Peaches are becoming of greater importance after a lapse in the production of this crop for a decade. Dairying, beef production, and poultry raising are increasing in importance. Mining is an important industry and supplements agriculture on some farms.

The soils of Bartow County are extremely varied and mixed in their occurrence. They are grouped in 26 soil series, represented by 44 soil types and 16 phases of types, besides 3 miscellaneous classes of material. The limestone valley section of the county includes the Clarksville, Fullerton, Dewey, Decatur, and Guthrie soils, which are derived from dolomite and limestone; and the Armuchee, Christian, and Conasauga soils, which are derived principally from shale. Of these soils, the Decatur and Dewey are the most productive and the most valued for general farm crops, and the Fullerton are most valued for peaches.

In the piedmont region of the county, the Cecil, Appling, Madison, Davidson, Iredell, and Fannin soils are mapped. The Davidson are the most productive soils of this group, but good crop yields can be obtained on all these soils where the surface relief is favorable.

In the mountain section, the Talladega, Ranger, Hartsells, and Hanceville soils occur. The Hartsells and Hanceville soils are derived from sandstone and are productive in areas where the relief allows cultivation. The Talladega and Ranger soils are derived

from sericitic and graphitic schists, and most of the cleared areas are too subject to erosion to be desirable for farming. These soils support a good forest growth.

The Jefferson and Allen soils are colluvial soils derived from sandstone. They are productive where not too gravelly and where the surface features will allow cultivation.

The terrace or second-bottom soils, all of which are productive, are grouped in the Cumberland, Etowah, and Holston series. Of these soils the Cumberland are inherently the most productive but the hardest to till, and the Holston are inherently the least productive but the easiest to till. All these soils are among the most productive and the most valuable of the county.

The first-bottom soils are grouped in the Huntington, Holly, and Congaree series. The Huntington and Congaree soils are among the most productive soils for corn, and the Holly soils are better suited to pasture grasses.

To promote a better agriculture in Bartow County, the following recommendations are made: (1) Adequate terracing of the soils; (2) the production of soil-improvement crops, especially legumes for green manure; (3) the production of winter cover crops; (4) deeper plowing and better tilling; (5) the adoption of a livestock industry to use farm roughage and to utilize land better suited to pasture; (6) the adoption of a regular crop rotation to produce a wider range of crops on each farm, in order to procure a diversity of cash incomes and provide more sustenance crops for home use; and (7) the reforestation of areas not desired for farming.

○

[PUBLIC RESOLUTION—No. 9]

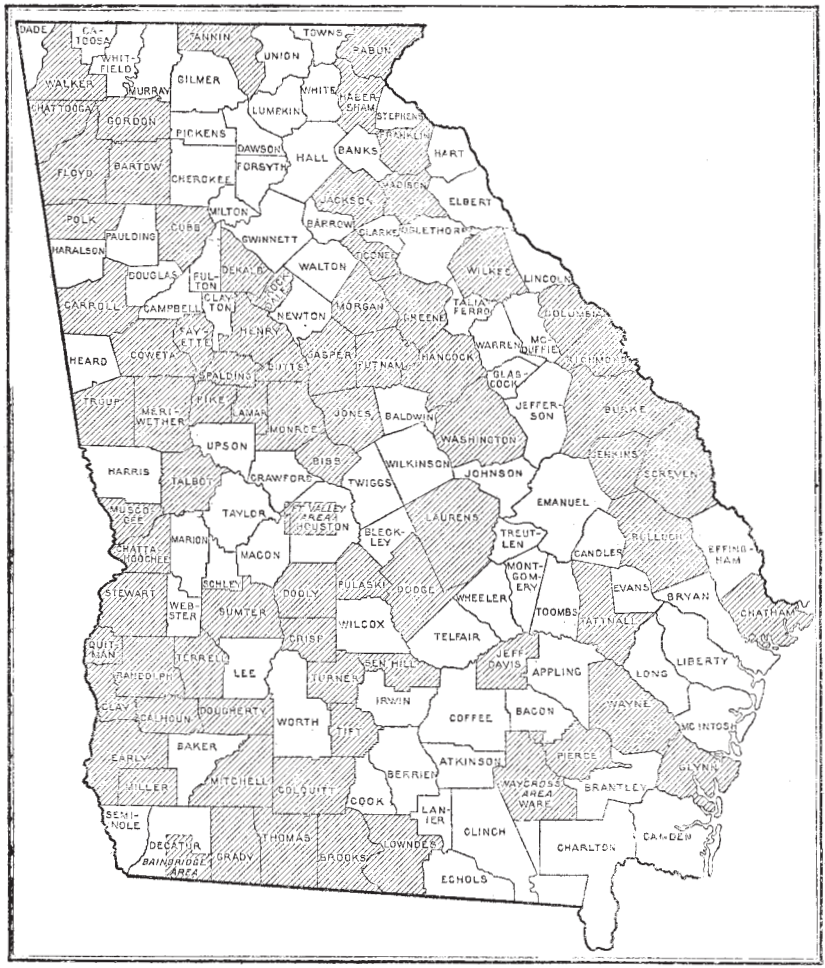
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture"

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

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

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]



Areas surveyed in Georgia, shown by shading

U. S. GOVERNMENT PRINTING OFFICE: 1930

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 (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 against its customers. If you believe you experienced discrimination when obtaining services from USDA, participating in a USDA program, or participating in a program that receives financial assistance from USDA, you may file a complaint with USDA. Information about how to file a discrimination complaint is available from the Office of the Assistant Secretary for Civil Rights. USDA prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex (including gender identity and expression), marital status, familial status, parental status, religion, sexual orientation, political beliefs, genetic information, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.)

To file a complaint of discrimination, complete, sign, and mail a program discrimination complaint form, available at any USDA office location or online at www.ascr.usda.gov, or write to:

USDA
Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, S.W.
Washington, DC 20250-9410

Or call toll free at (866) 632-9992 (voice) to obtain additional information, the appropriate office or to request documents. Individuals who are deaf, hard of hearing, or have speech disabilities may contact USDA through the Federal Relay service at (800) 877-8339 or (800) 845-6136 (in Spanish). USDA is an equal opportunity provider, employer, and lender.

Persons with disabilities who require alternative means for communication of program information (e.g., Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).