

# SOIL SURVEY OF BUTTS AND HENRY COUNTIES, GEORGIA.

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## DESCRIPTION OF THE AREA.

Butts and Henry Counties are situated northwest of the geographical center of the State of Georgia, lying between Atlanta and Macon. The northwestern corner of Henry County is approximately 13 miles from Atlanta, while Jackson, the county seat of Butts County, is midway between the two cities. The two counties form a very irregular area, with its greatest extent from northwest to southeast. The boundaries consist in part of natural features, the northeastern boundary of Henry County being formed by Camp Creek and South River and the eastern boundary of Butts County by the Ocmulgee River. The remaining boundaries are fixed by surveyed lines, which at the present time are rather indefinite, owing to the many changes made before the Civil War by the legislature which were not recorded or marked by definite surveys. Where the lines are in dispute they are shown on the map according to the tax returns. The area covered by the survey comprises 510 square miles, or 326,400 acres.

Henry and Butts Counties lie wholly within the Piedmont Plateau region—a broad physiographic division consisting of a thoroughly dissected plain, extending from northern New Jersey southwestward through Virginia, the Carolinas, and Georgia and terminating in the eastern part of Alabama. These counties are centrally located in this region as it crosses the State of Georgia, being nearly midway between the border of the Coastal Plain on the southeast and the Appalachian Mountains on the northwest.

The topography of Henry and Butts Counties is purely erosional. The outstanding features consist of broad, undulating to gently roll-

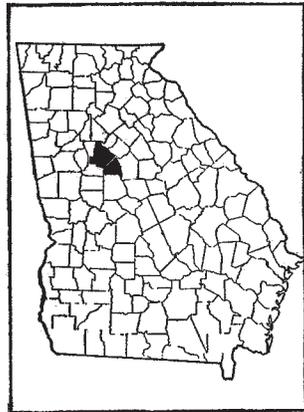


FIG. 17.—Sketch map showing location of the Butts and Henry Counties area, Georgia.

ing divides with long or short rounded slopes to the stream courses. The rivers have cut valleys which are from 100 to 200 feet below the crests of the main divides, and as these rivers are approached the topography becomes more rolling and hilly. The smaller streams are about 50 to 75 feet below the tops of the intervening ridges, and their valley slopes are usually longer, more rounded, and for the most part gentle. As a whole, the topography is smoother than that of the Piedmont region elsewhere in Georgia. It is such that improved farm machinery, including tractors, can be used over almost all of Henry County and over much of Butts County, exception being made of comparatively narrow belts along the streams. The more uneven parts of Henry County are in the northern part, along South River in the northeastern part, and along some of the larger creeks elsewhere in the county. In the eastern part of Butts County the topography becomes decidedly rolling, with steep slopes broken in many cases by heads of streams or gullies. This rolling to hilly country begins as a narrow area along South River in the northeastern part of the county and gradually widens toward the southern boundary. Near Pittman Ferry a belt of rolling topography extends west along Yellow Water Creek for about 3 or 4 miles, thence southwestward to a point about  $2\frac{1}{2}$  miles west of Indian Springs, and south to the Monroe County line. The area of more uneven surface probably does not exceed 15 per cent of the total area of Butts County.

Henry and Butts Counties are thoroughly drained by an intricate network of streams that reaches practically every farm in the area. The Ocmulgee River, which flows for a distance along the eastern border of Butts County and empties into the Atlantic Ocean, and South River, its chief tributary, which flows along the northeastern border of Henry and Butts Counties, carry the main part of the drainage of the area. Into South River flows Cotton River, which, with its branches, Cotton and Upton Creeks, drains the northern part of Henry County. Walnut Creek, another large tributary of South River, flows the entire width of Henry County and drains all of the central part. Tussahaw Creek, an important tributary of the Ocmulgee River, rises near McDonough and drains a part of eastern Henry County and northern Butts County. Yellow Water Creek, with Panther Fork, receives the drainage of the central part of Butts County, while Big Sandy and Little Sandy Creeks, with their tributaries, drain the southeastern part of Butts County. Towaliga River flows along the southern border of Henry County and through the southwestern part of Butts County into Monroe County, carrying the drainage of the southern part of Henry County and the southwestern part of Butts County. An area of about 20 square miles, comprising the western extension of Henry County, is drained by the headwaters of Bear Creek, which belongs to the Flint

River system, the waters of which empty into the Gulf of Mexico. The Central of Georgia Railroad is practically built on the divide between the Atlantic and Gulf drainage.

Henry County was organized in 1821 and comprised in its original area a large extent of territory since apportioned to other counties. The population of the county, according to the 1920 census, is 20,420, all of which is classed as rural. McDonough, a town of considerable importance and the county seat, has a population of 1,263. Hampton, in the southwestern part of the county, with a population of 927, and Locust Grove, in the southeastern part of the county, with 529, are the other important towns.

Butts County was formed in 1825 from parts of Henry and Monroe Counties. The 1920 census gives the population of the county as 12,327. The total population is classed as rural, there being no towns of 2,500 population. Jackson, with a population of 2,027, is the county seat and principal town. Flovilla, a trading point in the southeastern part of the county, has a population of 371. Indian Springs, a small town, but one of the most important summer resorts of the State, was formerly a reservation held by the Creek Indians. The population comprised in these counties was drawn chiefly from Virginia, the Carolinas, and other parts of Georgia shortly after the lands were opened for settlement by the State.

Railroad facilities are generally sufficient for the needs of the counties. The Southern Railroad, from Brunswick to Chattanooga, traverses the region from the southeast corner of Butts nearly to the northwest corner of Henry County, passing through Flovilla, Jackson, Jenkinsburg, Locust Grove, McDonough, Flippen, and Stockbridge. A branch line of this system extends from McDonough to Griffin and Columbus. The main line of the Central of Georgia between Savannah and Atlanta passes through the western part of Henry County. A system of public roads extends to all parts of the area. The roads, which are for the most part graded and of earth material, are built and maintained by convict labor. There are no macadam or surfaced roads. Rural telephones are in general use.

#### CLIMATE.

The climate of Butts and Henry Counties is characterized by short, open winters, during which the temperature may approach zero, and long, hot summers, with a maximum temperature above 100° F. Generally the annual range in temperature is about 100°. The mean annual temperature is about 62°.

The mean annual rainfall is around 50 inches and is well distributed throughout the year. The fall months are the driest of the year, a condition favorable to the harvesting of cotton and other long-season crops.

The average growing season extends over a period of 226 days, the average date of the last killing frost in spring occurring on March 26, and the first killing frost in the fall on November 7. The latest recorded date of killing frost in the spring is April 26, at Griffin, while the earliest date in the fall is October 11, at Covington.

The tables below, compiled from the records of the Weather Bureau stations at Griffin, Covington, and Monticello, in Spalding, Newton, and Jasper Counties, respectively, give climatic data applicable to the area:

*Normal monthly, seasonal, and annual temperature and precipitation at Griffin, Spalding County, and Covington, Newton County.*

Month.	Griffin (elevation, 975 feet).						Covington (elevation, 800 feet).					
	Temperature.			Precipitation.			Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1906).	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1906).
	° F.	° F.	° F.	Inches.	Inches.	Inches.	° F.	° F.	° F.	Inches.	Inches.	Inches.
December...	45.2	74	5	4.90	3.95	3.98	43.5	73	6	4.54	3.89	7.66
January....	43.3	78	8	3.34	3.75	5.72	42.4	73	6	3.79	2.39	2.35
February...	45.3	81	4	5.61	3.69	1.37	42.1	78	10	5.45	4.16	10.46
Winter...	44.6	81	4	13.85	11.39	11.07	42.6	78	6	13.78	10.44	20.47
March.....	54.8	91	17	4.92	2.07	7.43	55.6	90	10	4.98	2.51	3.40
April.....	62.2	93	24	3.46	1.88	.48	61.0	92	26	3.95	2.30	7.54
May.....	71.5	101	36	3.21	3.09	2.39	71.0	98	35	3.36	2.25	2.21
Spring...	62.8	101	17	11.59	7.04	10.30	62.5	98	10	12.29	7.06	13.15
June.....	77.7	103	45	4.55	1.66	7.84	77.7	103	46	4.32	2.13	14.78
July.....	79.7	104	55	5.37	2.70	4.14	80.6	104	58	5.26	3.47	4.08
August....	79.0	103	55	5.56	6.44	8.66	79.2	105	54	5.12	5.65	5.16
Summer.	78.8	104	45	15.43	10.80	20.64	79.2	105	46	14.70	11.25	24.02
September.	74.7	99	39	3.04	.42	4.32	73.8	102	39	2.91	T.	4.08
October....	63.7	93	26	2.72	.39	4.75	62.7	92	30	3.32	.38	1.90
November.	53.6	83	14	2.55	2.87	2.60	51.7	82	17	2.84	3.37	3.69
Fall.....	64.0	99	14	8.31	3.68	11.67	62.7	102	17	9.07	3.75	9.67
Year.....	62.6	104	4	49.23	32.91	53.68	61.8	105	6	49.84	32.50	67.31

*Normal monthly, seasonal, and annual temperature and precipitation at Monticello, Jasper County.*

[Elevation, 800 feet.]

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1906).
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December.....	45.4	77	8	3.98	4.83	3.88
January.....	44.8	78	11	4.02	3.63	9.23
February.....	45.8	81	6	5.68	3.58	2.09
Winter.....	45.3	81	6	13.68	12.04	15.20
March.....	55.4	91	17	5.60	2.35	7.43
April.....	62.6	95	31	3.49	1.47	1.42
May.....	72.2	101	38	3.20	2.37	1.89
Spring.....	63.4	101	17	12.29	6.19	10.74
June.....	78.2	105	46	4.73	2.88	10.72
July.....	80.2	105	56	5.38	2.34	6.36
August.....	79.5	104	57	5.21	7.87	6.49
Summer.....	79.3	105	46	15.32	13.09	23.57
September.....	75.1	100	42	3.13	0.49	4.08
October.....	63.8	97	26	3.08	0.39	5.70
November.....	53.6	92	17	2.49	3.35	1.66
Fall.....	64.1	100	17	8.70	4.23	11.44
Year.....	63.0	105	6	49.99	35.55	60.95

AGRICULTURE.

The lands included in the Butts and Henry Counties area were originally forested, the uplands principally with post, black, red, and Spanish oak, with some white oak, hickory, dogwood, shortleaf pine, and chestnut, and the river bottoms with black and sweet gum, some white and chestnut oak, water oak, tulip poplar, ash, hackberry, shortleaf pine, willow, and alder.

The lands were surveyed in tracts of 202½ acres and about 1822 were opened for settlement through a lottery system. Settlers were attracted from other parts of the State and from the Carolinas and Virginia. The early agriculture was of a self-sustaining type, only such crops as were indispensable for the home needs being produced. Animal products were of considerable importance, and cattle, hogs, and sheep were raised upon the open range. They were utilized for food and as commodities of exchange. Corn, wheat, oats, and barley

were the first cultivated crops. Cotton was grown to a small extent and increased in importance as transportation facilities and markets developed.

There were no commercial fertilizers in the early period of development, and it was a common practice to abandon old fields as their productiveness declined and take in new lands. This resulted not only in serious damage to the abandoned fields through erosion, but also in the loss of much valuable timber in clearing the new land. The present forest growth consists almost wholly of second-growth shortleaf pine and loblolly pine, with some oak, hickory, and dogwood.

Cotton gradually increased in importance until the close of the Civil War, when it became the chief source of income. During this period nearly all the land devoted to grain crops was put into cotton as well as all newly cleared land; commercial fertilizers became necessary to stimulate the production; and foodstuffs and stock feed, as well as animal products, which heretofore had been produced in sufficient quantities for local needs, had to be purchased outside the counties. The agriculture of these counties as well as all business activities, such as credits, price of land, etc., is still centered about cotton production.

In recent years, however, the diversification of crops is receiving favorable consideration, and there is a tendency among the farmers to make cotton a surplus crop in conjunction with a better balanced system of farming. So far this practice prevails only on farms operated by owners.

The following table gives a comparison of the principal crops for the census years 1899, 1909, and 1919:

*Acreage, production, yield per acre, and percentage of improved land of the county occupied by the crop, 1899, 1909, and 1919.*

## HENRY COUNTY.

Crop.	1899				1909			
	Acres.	Production.	Yield per acre.	Proportion of improved land.	Acres.	Production.	Yield per acre.	Proportion of improved land.
Cotton.....	53,166	<i>Bales.</i> 19,408	<i>Bale.</i> 0.35	<i>Per cent.</i> 44.0	63,899	<i>Bales.</i> 26,133	<i>Bale.</i> 0.41	<i>Per cent.</i> 51.0
Corn.....	29,589	<i>Bushels.</i> 340,270	<i>Bushels.</i> 11.0	25.0	26,688	<i>Bushels.</i> 324,573	<i>Bushels.</i> 12.0	21.0
Oats.....					3,319	57,015	17.0	

*Acreage, production, yield per acre, and percentage of improved land of the county occupied by the crop, 1899, 1909, and 1919—Continued.*

HENRY COUNTY—Continued.

Crop.	1919			
	Acres.	Production.	Yield per acre.	Proportion of improved land.
Cotton.....	66,238	<i>Bales.</i> 33,726	<i>Bale.</i> 0.51	<i>Per cent.</i> 58.2
Corn.....	29,764	<i>Bushels.</i> 395,335	<i>Bushels.</i> 13.3	26.2
Oats.....	627	11,553	18.4	.5

BUTTS COUNTY.

Crop.	1899				1909			
	Acres.	Production.	Yield per acre.	Proportion of improved land.	Acres.	Production.	Yield per acre.	Proportion of improved land.
Cotton.....	31,698	<i>Bales.</i> 14,369	<i>Bale.</i> 0.45	<i>Per cent.</i> 35.0	37,913	<i>Bales.</i> 15,670	<i>Bale.</i> 0.41	<i>Per cent.</i> 44.0
Corn.....	18,897	<i>Bushels.</i> 145,600	<i>Bushels.</i> 7.7	29.1	16,447	<i>Bushels.</i> 186,142	<i>Bushels.</i> 11.3	19.0
Oats.....	1,367	17,110	12.5	2.1	1,938	32,044	16.5	2.7

Crop.	1919			
	Acres.	Production.	Yield per acre.	Proportion of improved land.
Cotton.....	32,712	<i>Bales.</i> 15,046	<i>Bale.</i> 0.46	<i>Per cent.</i> 58.1
Corn.....	14,810	<i>Bushels.</i> 192,227	<i>Bushels.</i> 13.0	26.3
Oats.....	797	15,462	19.4	1.4

From this table it will be seen that corn ranks second to the cotton crop, the counties within the last few years producing almost enough to supply their needs.

The yield of oats varies widely, depending upon the severity of the winter season and the dryness of the maturing season, which occurs in May. Occasionally the crop freezes out in the winter, and a dry month of May usually results in a low yield. The crop is all used on the farm. It is very often cut green for hay, or, if matured, is fed in the straw or thrashed. A large quantity of oats is shipped in annually from other States to supplement the local crop.

Cowpeas are thought by some farmers to be more important in the agricultural system than oats, as this crop is more generally grown, being found on nearly every farm. They are grown for hay, for seed, and for the improvement of the soil.

Wheat and rye are grown to a very limited extent on small plats. The rye is used chiefly for winter pasturage, while the wheat is ground at local mills.

Alfalfa is grown in an experimental way, in fields mainly a few acres in extent, although one of considerable size was noted near McDonough.

Increased interest is being manifested in the production of beef cattle and hogs, but the production is insufficient to meet the needs of the counties, considerable beef and pork products being shipped in annually. Purebred sires are mainly Shorthorn and Hereford, but there are not many purebred herds in these counties. Dairying is not carried on to any great extent, considering the advantages offered by the proximity of such markets as Atlanta and Macon, though on nearly every farm a cow is maintained to supply the home with dairy products.

The production of pork is increasing more rapidly than the production of beef. More hogs are being raised on the farms each year. The growth of the industry is shown by the returns of the census, which gives the number in 1909 as 10,233 and in 1919 as 13,560. Purebred sires are very common, and most of the hogs are of good grades, if not purebred. Poland-China, Hampshire, and Berkshire are the most popular breeds.

Differences in the various soils of the counties are generally reflected in the crops, but on account of the small number of types in the area and the small number of crops in the agricultural system the farmers generally do not pay much attention to the matter of crop adaptation. In a broad way the differences in the soils are taken into consideration. Thus, cotton is very seldom planted on the bottom lands on account of the rank growth of stalk at the expense of fruit on such areas. On the contrary, corn, which produces the highest yields on the bottom lands, is the important crop on these soils. On the uplands there is a noticeable difference in the yield of cotton on different soils in different seasons. In dry seasons the better yields are obtained on the gray or sandy soils, while in wet seasons the clay loam soil (red land) is most productive. Sugar cane, sorghum, and sweet potatoes are more productive and of better quality when grown on the Cecil and Appling sandy loams than when grown on the Cecil sandy clay loam and clay loam types. When opportunity offers, advantage of these differences is taken by the farmers.

The average farm equipment consists of such light implements as have been used throughout the cotton belt with fair success. In growing cotton, corn, and other intertilled crops the implements consist of one-horse plows, sweeps, and scrapes. Within recent years, chiefly on account of the scarcity of labor, improved implements such as two-horse plows, riding cultivators, disk plows, and harrows, grain drills, planters, and fertilizer distributors are coming into more general use. A number of tractors are used for general farm work within the counties. Mules comprise the work stock.

The farm buildings are generally small but adequate for the needs of the cotton farmer, as no great storage room is required.

The method of preparing the land for cotton varies considerably, the procedure depending upon the time of harvesting the preceding crop. Under the most advantageous conditions the land is plowed broadcast in the fall, but often the gathering of crops and the seeding of fall-sown grains prevents plowing at this time. In this case the land is prepared in the spring, or in late winter when weather conditions permit. The old cotton rows are plowed out and the land bedded by throwing several furrows together. On this bed the fertilizer is distributed and seed is planted.

A few farmers practice level cultivation. Cotton is planted during the month of April and the first part of May, although under unfavorable weather conditions planting of a part of the crop may be delayed until the latter part of May. The crop ordinarily is cultivated four times, although in some cases as many as six cultivations are given, where necessary to control the growth of grass and weeds. The crop is hoed at least once when the crop is thinned to a stand.

Less care is taken in the cultivation of corn than of cotton, though in recent years some of the better farmers are giving more attention to this crop and as a result are obtaining better yields. Generally, the lack of careful cultivation has been the chief cause of the low average yields in these counties. Very few farmers prepare the land for corn in the fall or plow the land broadcast. Ordinarily a furrow is opened, the fertilizer, where any is used, distributed, and the seed planted in this.

Some of the corn is dropped by hand, but the majority of farmers use corn planters. On the bottom lands the crop is generally planted on ridges. Corn usually receives three cultivations, but the best results are obtained from more frequent cultivations. Corn is planted from the latter part of March to the latter part of June. Very few farmers plant all of the crop at one time, thus avoiding complete loss should a drought occur at the critical period of development. Some of the crop is cut and shredded, but the general method of pulling the leaves for fodder is followed. Corn is gathered during the late fall or early winter.

In growing oats the seed is generally sown broadcast and plowed under with small turning plows or covered with a harrow, but a part of the crop is drilled in on well plowed and harrowed land. A method which is becoming common consists in sowing the seed with small drills between the cotton rows, usually three rows of oats between every two rows of cotton.

A few farmers cultivate the oats when sown in this way. Early fall seeding of oats is most desirable, but often the crop is not sown until early in December. Practically no spring oats are grown. The Fulghum, Texas Rustproof, Bancroft, and Appler are the leading varieties.

Cowpeas, when intended for hay, usually follow a small grain. Ordinarily the seed is sown broadcast and plowed or disked under. In some cases it is sown on land that has been disked or plowed. When intended for soil improvement, for seed, or for winter grazing, it is planted between the corn rows or in the corn rows at the last cultivation of the corn. Cowpeas and sorghum mixed give a heavy yield of roughage.

No general system of crop rotation is followed in these counties. Farmers endeavor to change the crops on the land as often as practicable, but in some cases fields have been continuously planted to cotton for more than 40 years. Rotations are impracticable under the one-crop and tenant system of farming, but some of the more progressive farmers rotate cotton, corn, corn, a small grain, and cowpeas for hay on a small acreage.

The use of fertilizers is general and they are largely depended upon to maintain the yields of cotton. The expenditure for fertilizers is increasing rapidly from year to year. Henry County in 1919 expended \$556,920 for this purpose, an average of \$209.52 for each of the 2,658 farms reporting; in 1909 the expenditure amounted to \$182,221; and in 1899 to \$82,530. Butts County expended \$275,994 for commercial fertilizers in 1919, an average of \$178.40 for each of the 1,547 farms reporting; in 1909 the expenditure was \$93,244; and in 1899, \$41,140. Practically all the fertilizer used consists of ready-mixed goods. Grades analyzing 9-3-3 and 10-2-2 are the most commonly used. Most of the fertilizer is applied to the cotton fields. Applications average about 250 pounds per acre, but range as high as 600 pounds per acre. For corn, many farmers use the same quantity and the same grade of fertilizer as for cotton, but a large number do not apply more than 100 pounds per acre. A number of the tenant farmers use no commercial fertilizers on corn, relying instead upon the small quantities of stable manure which are available. Home-mixed fertilizers consist chiefly of equal proportions of acid phosphate and cottonseed meal. This is usually applied to cotton land at the rate of 400 pounds per acre. Besides the fertilizers men-

tioned, side dressing of nitrate of soda is used to a small extent on cotton and corn. The practice of top-dressing oats with nitrate of soda is even more common, especially when no other fertilizer is applied.

Farm labor is drawn chiefly from the negro population. Generally it is plentiful, but under the present (1919) conditions it is very scarce. Extra farm help is needed chiefly for hoeing and chopping out cotton and for cotton picking. At the present time (1919) work of this kind costs three times as much as under normal conditions.

According to the census of 1920 there were 3,276 farms<sup>1</sup> in Henry County, averaging 53.2 acres per farm, with 34.7 acres of improved land per farm. More than 76 per cent of the farms were operated by tenants. Butts County in the same year had 1,626 farms, giving an average size of 49.8 acres, of which 34.6 acres was classed as improved. Of these farms 80.2 per cent were operated by tenants.

Most of the tenants give a definite amount of cotton, varying from 1 to 2 bales for each 30 or 40 acres, for the use of the land. Under the plan of share rent, also used to some extent, the landowner furnishes the stock, implements, and one-half the fertilizer, and the tenant furnishes the labor and one-half the fertilizer, the total proceeds of the farm being divided equally.

#### SOILS.

In the survey of the area represented by Henry and Butts counties six types of soil and one phase, excluding Meadow (Congaree material) have been mapped. The small number of types is significant, because it is about the lowest number that has ever been mapped in the Piedmont regions within an area of this size, and it shows homogeneity in the underlying rock formations and in the conditions of weathering.

The geologic formations of the region comprise crystalline igneous and metamorphic igneous rocks of varying textures and of varying mineralogical composition. All the various formations from the oldest to the youngest are closely associated in the field through folding and faulting. From the standpoint of mineralogical composition the rocks may be broadly grouped into acidic or light-colored rocks, and basic or dark-colored rocks, but the latter are of importance in this survey in only a few local areas where they, together with acidic rocks, give soils of mixed derivation. The soils of the area, therefore, are derived almost entirely from the light-colored acidic rocks. These do not vary greatly in texture, and as a consequence but a few soil types are developed in the area.

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<sup>1</sup> The census classes each tenancy as a farm.

A broad separation of the soils of these counties may be based on the difference in mode of formation. The upland soils are residual, i. e., derived from the underlying rocks. The soils of the Cecil and Appling series belong to this group. The second division comprises the alluvial or bottom-land types, composed of material similar to the upland types, but which has been transported and deposited by streams. The Congaree types and Meadow (Congaree material) are of this group.

The rocks giving the upland soils are generally high in quartz and feldspar, potash feldspar predominating. These rocks include a large number of different formations, but all as a rule have weathered deeply and are now buried by a thick mantle of residual clays. They are occasionally exposed along the stream courses and in road cuts. In both Henry and Butts Counties there are areas of the Carolina gneiss formation, which includes a number of highly metamorphosed schists and gneisses. This is the oldest formation of the Piedmont region. It is generally cut by later intrusions of granite, while injections and interfoliations with other formations occur to such an extent that no large uninterrupted areas occur. It is also cut by many quartz veins and narrow pegmatite dikes. The Carolina gneiss, however, may be considered the important formation of the two counties.

Granites and granitic gneisses are also found in both counties. These belong to the "early" and "later" granites, the distinction being made on the differences of metamorphism which the rocks have undergone. The early granites show considerably more metamorphic change than the later. Small strips of the early granites are found cutting the Carolina gneiss in Henry County, while in Butts County a great complex of granitic gneiss extends from the southwestern part northeastward to the Ocmulgee River. It is medium to coarse grained and in some places is somewhat porphyritic in structure.

Another type of rock occurring through the northern and southern parts of Henry County and in the western part of Butts County is the injection gneiss. This rock type appears chiefly in exposures where only a part of the original formation remains. The unweathered rock is rarely seen. It consists of banded gneisses composed of a dark band of either hornblende or biotite, alternating with a light-colored band composed essentially of a mixture of quartz and feldspar, while other bands of fine-grained to coarse-grained granitic material may intervene. The bands broaden and narrow and extend in a wavy or grained form. Both field and laboratory study indicate that these banded or foliate rocks are due to injection of highly liquid granitic solutions along planes of shearing and foliation in other rocks. As a rule, the Roan gneiss seems to be most favorable to such solutions, although the Carolina gneiss

is often injected.<sup>2</sup> In the southeastern part of Butts County there is found considerable fine-grained mica schist which, combined with some hornblende schist and a small quantity of diorites mixed with granitic gneiss, gives rise to a soil that may be said to be derived from a mixed rock formation.

Gneisses and hornblende schists are also found interlaminated in a number of places through the northern part of Henry County. The Cecil clay loam as mapped represents these areas.

The soils of the area are classified into series, each series being composed of soil types having a common origin and similar characteristics in color and structure of the subsoil. The series are further divided into types based upon the texture of the surface soil. In these counties three series are mapped, the Cecil, Appling, and Congaree.

The types in the Cecil series are characterized by brownish-gray to reddish-brown or brownish-red soil and a heavy, stiff, brittle, brick-red clay subsoil that is rather tenacious and sticky when wet. The sandy loam, sandy clay loam and its hilly phase, and the clay loam types of this series are mapped in the present survey.

The Appling series includes types with light-gray to yellowish-gray surface soils and a pale-yellow friable sandy clay subsoil becoming, at a depth of 14 to 18 inches, mottled with shades of yellow, red and gray. The sandy loam of this series is the only type mapped.

The Congaree series includes the alluvial or first-bottom soils. These are grayish brown to reddish brown in the surface and reddish brown to brown in the subsoil. Characteristically the subsoil contains much finely divided mica. The fine sandy loam and silty clay loam of this series are mapped in the present survey.

Meadow (Congaree material) is a classification embracing the first-bottom alluvial land that is so variable in the character of the material that no type designation could be given to it.

The following table gives the actual and relative extent of the several soils of the area. The distribution of these soils is shown on the accompanying map.

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil sandy clay loam.....	219,392	} 67.5	Cecil clay loam .....	12,480	3.8
Hilly phase.....	768		Congaree silty clay loam .....	7,104	2.2
Cecil sandy loam.....	58,560	17.9	Congaree fine sandy loam .....	1,216	.4
Meadow (Congaree material).....	14,144	4.3	Total.....	326,400	.....
Appling sandy loam.....	12,736	3.9			

<sup>2</sup> Galpin, Bulletin No. 30, Georgia Geological Survey.

## CECIL SANDY LOAM.

The surface soil of the Cecil sandy loam consists of a moderately loose, friable, light brownish gray or grayish-brown to brown loamy sand or light sandy loam with an average depth of 7 or 8 inches. In the lighter colored areas of this type the soil is usually deeper and becomes yellowish gray at 2 to 4 inches below the surface. The subsoil of much of the type is in the upper part a heavy sandy loam of yellowish-red color, but this is a comparatively thin layer and passes into heavy red clay, sticky and plastic when wet. Over the rest of the type the soil lies immediately upon the red subsoil clay. In these areas the soil is usually redder and heavier, approaching a sandy clay loam in texture. Included with the type as mapped are small spots of other soils, chiefly the Cecil sandy clay loam and the Appling sandy loam.

The Cecil sandy loam is practically stone free, except in small areas where quartz veins outcrop. In such places angular fragments of this rock, ranging up to 20 inches in diameter, are more or less plentiful. The more important of these areas are indicated on the map by gravel or stone symbols.

The Cecil sandy loam occurs in well-developed areas in both Henry and Butts Counties. In the northwestern corner of Henry County there is an area of 5.1 square miles which represents the typical development from massive gneisses and granites of the Lithonia region. Another area lies just north of Stockbridge. Large areas are mapped in the vicinity of Hampton, in the southwestern part of the county. This area continues eastward through the central part of the county south of McDonough. There are only a few small isolated areas of the type in the northeastern part of the county.

Throughout the greater part of Henry County this type has a gently rolling topography, being situated almost entirely on broad, smooth divides. Surface drainage is completely established.

In Butts County considerable areas of this type are mapped in the vicinities of Fincherville, Jenkinsburg, Jackson, Stark, and in the southwestern part of the county. The underlying rock is mainly biotite gneiss.

The topography is in general gently rolling, but northeast of Stark there are some decidedly rolling areas.

About 80 per cent of the Cecil sandy loam is cleared and under cultivation. It is a strong, productive soil, utilized in the production of the staple general farm crops. Cotton, the chief crop, averages about one-half bale per acre, with a range from one-fifth to 1 bale or more per acre. The best crops of cotton are obtained in seasons of moderate rainfall, and in years of low rainfall this soil produces better yields than any of the other types. In wet seasons the yield is

decreased by excess of moisture, resulting from poor internal drainage. Under the prevailing methods of cultivation, corn yields from 8 to 25 bushels, with an average of about 15 bushels per acre, but considerably higher yields are obtained where proper fertilization and care are given the crop.

Small grains, such as oats, rye, and wheat, do not yield as high on this type as on the clay loam and sandy clay loam types of the series. Oats ordinarily return from 12 to 15 bushels and wheat 9 or 10 bushels per acre. Cowpeas average about three-fourths ton of hay per acre. The methods of fertilization and cultivation described in the chapter on agriculture are followed on this type.

The Cecil sandy loam is a valuable soil and includes a large number of well-equipped farms. The soil, on account of its loose, open structure, is easily prepared and cultivated. Light implements and light draft animals are all that is necessary. The land can also be worked under a wide range of moisture conditions. It is suited for general farming crops and special crops, including truck, peaches, and tobacco.

The greatest need of this type is organic matter. This can be supplied by turning under green-manure crops, especially cowpeas and velvet beans. The rotation of crops would also materially increase the productiveness.

#### CECIL SANDY CLAY LOAM.

The Cecil sandy clay loam in its native condition has a surface soil consisting of two layers—an upper layer of brownish-gray loamy sand to brown to reddish-brown heavy sandy loam, 2 to 4 inches thick, and a lower layer of brownish-red friable clay loam, 7 or 8 inches thick. Where the soil has been disturbed by plowing, it consists of a reddish-brown friable sandy clay loam from 9 to 12 inches deep. The subsoil consists of a heavy, stiff, brittle red clay, extending to depths well below 3 feet. This type is generally free from stony material, except in local spots where there occur small angular quartz fragments derived from veins or stringers of this rock that cut through the formations giving rise to the soil material, or in small areas in which the parent granitic gneiss or granite outcrop. These areas are indicated on the map by gravel or stone symbols.

The surface soil of Cecil sandy clay loam is variable, as the type is gradational between the lighter sandy loam and the heavier clay loam of the series. As mapped, it contains small spots of the Cecil sandy loam and clay loam, but over the greater area it is intermediate between these two soils. Another variation, which occurs in the more rolling regions, includes spots of the red clay loam and the gray sandy loam, the areas being too small to be shown separately on a map of the scale used in this survey.

The Cecil sandy clay loam is the most extensive soil in the area. It occurs in large areas in all parts of the two counties. In parts of Henry County it is developed almost to the exclusion of other types. The most typical development occurs in the central and southern parts.

Practically all the type in Henry County is derived through weathering from feldspathic rocks, ranging from schist to granite, most of it from a biotitic granitic gneiss. In the northeastern section mica schist has entered into its composition to a small extent. In all parts of this county there is more or less injection gneiss. Hornblende schists in narrow lenses also cut through the formation of light-colored rocks in various parts of the northwestern section of the county.

In Butts County the Cecil sandy clay loam is typically developed in all sections, except the southeastern part, where it becomes more uniformly red and closely resembles the Cecil clay loam. This difference is due chiefly to differences in the parent rocks, which are finer grained and include a small proportion of hornblendic rocks intermixed with the feldspathic gneisses and schists. The topography in this section is also more rolling than in general, although there is little waste land except along some of the steeper slopes. Throughout other parts of the county the type is derived from biotite gneiss and some granite, which, although metamorphosed to some extent, retain their massive structure. In the northeastern part of the county the gneiss and granite are very coarse grained. Injection gneisses occur locally, but basic intrusions in the rocks giving rise to the soil are so small that their influence is negligible.

The topography is gently rolling to undulating, and in places sharply rolling. It includes smooth, undulating divides and long, gentle slopes, as well as narrow-crested rolling ridges and rather short and steep slopes. The more rolling areas are found in the northwestern part of Henry County and in the southeastern part of Butts County. The areas of smoothest surface extend through the central part of each county. Owing to the surface relief, the type has excellent drainage. In many places terracing is necessary to prevent washing.

This type originally supported a heavy timber of hardwoods, including various oaks, hickory, shortleaf pine, and some chestnut. All the chestnut and most of the other original timber was removed in the early days of settlement. The present growth consists of second-growth shortleaf pine, loblolly pine, dogwood, and a scattering of oaks and hickory. About 80 per cent of the type is cleared and in cultivation.

It is the most important soil in the two counties on account of its large extent and its agricultural value. All the general farm crops

of the region are grown with varying degrees of success, depending largely upon the management. Cotton, the chief crop, averages one-half bale per acre with yields of 1 bale per acre on some of the well-prepared and heavily fertilized fields. The farming methods used do not differ from those mentioned in the chapter on agriculture. Corn yields range from 8 to 30 bushels or more per acre, the average for the two counties being about 15 bushels. Oats average 18 bushels per acre in seasons of normal rainfall. Wheat yields from 8 to 20 bushels per acre, and cowpeas from three-fourths to 1 ton or more of hay per acre.

The Cecil sandy clay loam is intermediate in its characteristics between the Cecil sandy loam and the Cecil clay loam types. Crops are found to endure dry seasons better than on the clay loam and wet seasons better than on the sandy loam. The type is also intermediate in range of moisture conditions under which it can be worked.

Land values range from \$40 to \$150 an acre, depending upon the location and improvements.

*Cecil sandy clay loam, hilly phase.*—The hilly phase of the Cecil sandy clay loam is separated from the typical soil because of its rough topography. The areas comprise narrow-crested ridges and steep slopes that are more or less eroded and gullied and broken by heads of streams reaching back into the uplands.

Areas of this phase occur only in Butts County. One lies in the vicinity of Indian Springs and another on the Ocmulgee River near Pittman Ferry.

The roughness of these areas precludes their use for cultivated crops. At the present time they are covered with second-growth timber. They have some value for forestry or pasture.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the typical Cecil sandy clay loam, the samples being taken in Henry County:

*Mechanical analyses of Cecil sandy clay loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
256001.....	Soil.....	1.4	7.7	6.8	45.8	9.8	10.9	17.6
256002.....	Subsoil.....	3.2	7.6	4.8	21.6	5.3	15.9	41.6

CECIL CLAY LOAM.

The surface soil of the Cecil clay loam typically consists of 7 or 8 inches of brownish-red to reddish-brown heavy clay loam. The subsoil is a heavy, brittle, stiff red clay continuing to a depth of 3 feet or more without material change. The color of the subsoil is usually

a darker shade of red than that of the subsoil underlying the sandy loam and sandy clay loam members of this series, in which it is a brick red. The type is generally free of stony material.

Included with the type are small areas of dark-red or maroon-red friable clay loam, underlain by dark-red friable clay. These areas would have been mapped as the Davidson clay loam, a valuable soil, had they been of sufficient extent to separate. A considerable proportion of the type represents material which is intermediate between the true Cecil and the true Davidson. Other variations occur, but on account of their small extent, from a small fraction of an acre to 1 or 2 acres, they can not be shown on a map of the scale used in this survey. Among these inclusions are small eroded spots of Cecil clay and Cecil sandy clay loam.

The Cecil clay loam is a residual soil derived through the weathering of feldspathic rocks or feldspathic and basic rocks interlaminated or closely associated. The underlying rocks seldom outcrop, because of the great depth of the overlying material, and it is therefore difficult to determine the origin of the material in all of the areas. However, it would appear that the greater part of the material has come from biotite gneiss. In places the parent rocks are cut by areas of hornblende schist and rarely by narrow veins of diorite. The small spots of the Davidson clay loam already mentioned are wholly from the hornblende schist and diorite. Narrow veins of pegmatite also occur. A part of the type is most probably formed through the removal of part of a former sandy surface layer, this mode of formation having been likely in small areas lying on slopes.

The Cecil clay loam is not as extensively developed as the sandy clay loam type of the series. The areas are of smaller size and are more widely scattered over the survey. The largest and most typical areas in Henry County lie in the northern part in the vicinity of Gorden School, and about 3 miles northeast of Stockbridge. All the areas in this section are derived from a complex mixture of rocks. The second important development of the type occurs in the northeastern part of the county, in proximity to South River and along Walnut Creek. Other areas in the county are unimportant.

In Butts County the areas are small and widely scattered. The largest are in the southeastern part of the county along Big Sandy and Little Sandy Creeks. These areas are partly due to erosion of the more sandy types and partly to the occurrence of small areas of basic rocks cutting the more extensive formations. North of Jackson along Yellow Water Creek occur other areas of considerable extent, and tracts each including 10 to 15 acres lie along Tussahaw Creek and Towaliga River.

The areas of the Cecil clay loam consist of rolling ridges to rather steep slopes, the surface generally being more rolling than that of

the other types of the county. Drainage is well established, owing to the surface relief, and the run-off is rather rapid, terracing being necessary to prevent erosion.

This type originally supported a forest, mainly of oak, hickory, and shortleaf pine. Practically all of this timber has been removed. The uncleared areas now support chiefly a mixed second-growth forest of old-field pine.

All the staple crops are produced. Cotton, which is the most important, yields from one-fifth to 1 bale per acre, although the average yield is about two-fifths bale. Corn averages 15 bushels per acre, but yields of 30 bushels per acre are not unusual. Small grains, chiefly oats and wheat, give better returns on this type than on any other of the upland soils, oats averaging about 20 bushels per acre and wheat 12 to 15 bushels. Cowpeas yield about 1 ton of hay per acre.

The Cecil clay loam is a strong, productive soil, and a number of well-developed farms are established upon it. The soil is the heaviest of any in the area, and it is necessary to use heavy work stock and implements to cultivate it efficiently. On account of the heavy retentive nature, it can be worked only within narrow moisture limits.

The incorporation of organic matter, deeper plowing, and better preparation of the seed bed will give increased yields.

Any kind of coarse manure will be beneficial and will improve the structure of the heavy clay soil. Lime also increases the yields, particularly of the clover and grain crops.

#### APPLING SANDY LOAM.

The surface soil of the Appling sandy loam consists of a gray to very light brownish gray or yellowish gray loose sand to loamy sand, usually becoming more definitely yellowish gray in the lower part, and having an average depth of about 8 inches. The upper subsoil typically is a pale-yellow friable loamy sand. This gradually becomes heavier, passing first into a pale-yellow friable sandy loam to light sandy clay, and then, at depths varying from 15 to 24 inches, into the typical subsoil of friable sandy clay, mottled with yellow and red, and sometimes with gray, in the extreme lower part. In some places the subsoil has a reddish-yellow color instead of the mottled coloration. The material in the lower part of the 3-foot section is compact, and this condition becomes more pronounced with depth and continues throughout the substratum.

The type includes small areas of the Cecil sandy loam too small to map separately. There are also included small areas of the Durham sandy loam, a type characterized by a yellow instead of the mottled sandy clay subsoil. The Cecil sandy loam areas usually occupy small knolls, and the Durham sandy loam occurs in slight depressions

around the heads of streams. The type as a whole is free of stony material.

The Appling sandy loam is derived through the weathering of light-colored feldspathic rocks, chiefly gneiss and granite. This is especially true of the areas occupying positions on the crests of ridges. In some places along the streams and around the heads of streams the subsoil has been leached to a light-gray or nearly white color, having a chalky appearance.

This type is one of the less important soils in the survey. The areas are generally small and scattered. The largest and most important area in Henry County lies in the northern part along the Rockdale-Henry boundary line, from which it extends southward to Upton Creek. The second area of importance occurs in the southwestern part of the county, extending from Hampton westward for  $1\frac{1}{2}$  miles. Small areas in this section are mapped in the vicinities of Liberty Hill School and Mount Carmel Church. In the eastern part of the county a prominent area lies in the vicinity of Riverview School. Many smaller areas occur in all parts of the county. The development in Butts County is less than in Henry County, but the areas are widely distributed. The largest area is mapped at Stark. Smaller areas are found within the limits of Jackson, 1 mile south of Indian Springs, at Sandy Plains Church, and at England Chapel. Many others are scattered throughout the county.

The Appling sandy loam has a smooth, undulating to gently rolling topography, which affords good surface drainage. The internal drainage is not well established, and crops suffer from excess moisture in wet seasons. This is apparently due to the compact and dense substratum which prevents the passage of water downward.

The greater part of this type is cleared and cultivated. The uncleared areas are covered by second-growth forest of shortleaf pine, with some oak and hickory. All the common crops of the county are grown. The yields generally are lower than on the other upland types. Cotton averages one-fourth bale per acre; corn, 10 to 12 bushels; oats, 12 to 14 bushels; and peavine hay, three-fourths ton. The best yields are obtained in seasons of moderate rainfall, and crops do better in dry than in wet seasons.

The Appling sandy loam is the lightest upland type of the area. The surface soil is open and loose, and a good seed bed can be prepared with light implements and under a wide range of moisture conditions.

This soil, while used with success for general farm crops, can also be successfully used for special crops, such as truck and bright-leaf tobacco. The productiveness can be materially improved by the addition of organic matter, especially by turning under manure

crops, preferably legumes. The rotation of crops would also be of decided benefit.

CONGAREE FINE SANDY LOAM.

The surface soil of the Congaree fine sandy loam consists of 7 to 12 inches of a mellow, friable, brownish-gray to light-brown loamy fine sand to a smooth, mellow, fine sandy loam. The typical subsoil consists of a brown, friable, smooth silty clay loam to silty clay. Mica flakes are found in great abundance in both the soil and subsoil. Like most alluvial soils, this type varies considerably from place to place. The subsoil in some places consists of a brownish-red, friable fine sandy clay extending to a depth of nearly 3 feet. In other places there may be little difference between the soil and subsoil. It also is quite common to find strata of different-textured material and various colors occurring at various depths. Along the immediate banks of the streams there are narrow areas (natural levees) which consist of a yellowish-gray fine sand underlain at 7 to 10 inches by a yellow to brownish-yellow loamy fine sand. There are local areas in which the surface soil is a sand or loamy sand.

The Congaree fine sandy loam is composed of material washed from regions of crystalline rocks, reworked and deposited by streams in their recent flood plains. It is developed along the rivers of the area and, being subject to overflow, is still in process of accumulation.

This type is not extensive. In Henry County it occurs as narrow strips at intervals along South River. The largest area extends from a point near Butler Bridge southeastward for a distance of 2 miles. In Butts County this type is mapped in a number of places along the Ocmulgee River in strips from 100 to 500 yards wide. An important area lies between Lamars Mill and the Monroe County line. A smaller area mapped near Smith Ferry completes the extent to which the type is developed in this county.

The Congaree fine sandy loam, as developed in these bottoms, generally has a smooth, almost level surface, lying well above the normal water level of the rivers. Except during periods of overflow the type has good drainage.

A large part of the type is cleared and is used either for cultivated crops or as pasture and hay land. No cotton is grown on this type; corn is the important crop. The yield ordinarily ranges from 20 to 25 bushels per acre, but larger yields are often obtained. Cowpeas grow luxuriantly on the type, yielding as much as 2 tons of hay per acre. Sorghum and cowpeas, mixed, give heavy yields of forage. The common grass pasture plants of the region, including Bermuda grass, Johnson grass, crowfoot, and broom sedge, with white clover and lespedeza, afford excellent grazing and are a source of hay.

This is one of the best soils for watermelons in the area.

The present forest is chiefly second-growth shortleaf pine, with some gums and other water-loving hardwoods. The original forest was very much the same as that now occupying a large part of the Congaree silty clay loam.

#### CONGAREE SILTY CLAY LOAM.

In its typical development the surface soil of the Congaree silty clay loam consists of a smooth, friable, reddish-brown to brown silty clay loam, of an average depth of 8 inches. The subsoil typically consists of a smooth, friable, brownish-red to light-brown silty clay, which may extend to a depth of more than 3 feet without any appreciable change. Large quantities of finely divided mica flakes occur throughout both the soil and subsoil. Many variations of this type are mapped.

In some places there may be a layer of sand on the surface, but variations from the typical description are most common in the subsoil, which in places contains strata and lenses of sand and sandy loam and in others is made up entirely of alternating strata of materials differing widely in texture.

This type is derived from material originating in crystalline rocks, accumulated in first bottoms. Additional deposits are being laid down by the streams at each overflow, the processes of soil formation still continuing. This, the most extensive of the Congaree soils, occurs in large areas along the streams in both Henry and Butts Counties.

In the former, several areas lie along South River, but the largest occur on the streams in the northern part. Areas also lie in the wide bottoms of Upton Creek and some of its branches, and along Reeves, Line, and Pate Creeks. Smaller areas along the streams are mapped in all parts of the county. The type is confined to the southeastern part of Butts County. The chief areas are along Rocky and Little Sandy Creeks and the lower part of Big Sandy Creek, where it forms the boundary line between Butts and Monroe Counties.

The Congaree silty clay loam occupies low, flat first bottoms. During ordinary stages of the streams most of the type is well drained, although the removal of surface water after heavy rains is slow. There are, however, many low poorly drained areas.

The type is only partly cleared of its heavy forest, mainly of hardwoods. Among the species noted are gums, oaks, hickory, tulip poplar, hackberry, elm, willow, sycamore, shortleaf pine, and magnolia. The cleared areas are used either as pasture and hay land or for cultivated crops, chiefly corn.

The average yield of corn is around 30 bushels per acre, without the use of fertilizer. Cowpeas make a luxuriant growth, yielding as much as 2 tons of hay per acre. No cotton is grown on this type.

The Congaree silty clay loam is inherently the most fertile soil in the area, and drainage on a comprehensive scale would bring large areas of it into cultivation. It could be advantageously used in the production of corn, forage crops, and native grasses for hay and pasturage. Drainage projects to reclaim this land are now under consideration.

#### MEADOW (CONGAREE MATERIAL).

Meadow (Congaree material) embraces soil material in the stream bottoms which is so variable in texture and color that no specific type designation could be assigned to it. The material for the most part consists of various grades of sands and loamy sands. It is alluvial in origin and is still in process of accumulation. Its variability in texture is the direct result of the varying velocities of the currents effecting the transportation and deposition.

Meadow (Congaree material) is the most extensive of the alluvial formations. It occurs along every stream in Henry and Butts Counties.

In general, the areas of Meadow lie well above the normal stage of the streams, but low, poorly drained areas occur. All the areas are subject to overflow after any considerable rainfall. The crops are very often badly damaged, if not completely lost, in wet seasons.

An appreciable percentage of Meadow is under cultivation or used for pasture. The agricultural value of the land is variable, the more sandy parts having the lowest value. Corn, the chief cultivated crop, averages 20 bushels per acre, although as much as 40 bushels per acre has been obtained in good seasons. Sorghum for sirup and forage gives large returns. Summer pasturage for cattle is one of the principal uses made of the Meadow land.

#### SUMMARY.

Henry and Butts are adjoining counties situated just northwest of the geographical center of the State of Georgia.

Their combined area is 510 square miles, or 326,400 acres; that of Henry County being 324 square miles, or 207,360 acres, and of Butts 186 square miles, or 119,040 acres.

These counties lie wholly within the Piedmont region. The topography is in general gently rolling. The drainage is well established and is carried mainly by the Ocmulgee River system.

Henry County had a population in 1920 of 20,420, all classed as rural, or an average of 63 persons per square mile, and Butts County a population of 12,327, or an average of 60.7 per square mile.

Railroad facilities are afforded by the Southern and Central of Georgia Railroad systems.

The climate is characterized by short winters and long summers, with ample rainfall and a growing season of 226 days.

The early agriculture of these counties was of the self-sustaining type. Cotton is the leading crop, with corn of second importance. All business interests center about cotton. The production of corn is insufficient to supply local requirements. Cowpeas are the most important forage crop.

Increasing interest is being manifested in the live-stock industry, but the production is still inadequate to supply the local demands. Purebred sires and herds of both cattle and hogs are not uncommon.

No general crop rotation is followed. Fertilizer is depended upon to maintain the yield of cotton. It is used to a small extent in growing corn and other crops. Henry County expended \$556,920 and Butts County expended \$275,994 for fertilizers in 1919.

The last census enumeration showed 3,276 farms in Henry County, averaging 62.7 acres per farm, and 1,626 in Butts County, averaging 62.2 acres.<sup>3</sup>

Henry and Butts Counties are a part of the Piedmont region of the State, and the soils are derived chiefly from light-colored or acidic rocks, consisting of schist, granitic gneisses, and granite. Dark-colored rocks or those high in hornblende occur to a small extent.

Soils of the Cecil and Appling series occupy the uplands and of the Congaree series the bottom lands.

The Cecil sandy loam forms a part of the so-called gray lands of the upland. It is a desirable soil for general farming and special crops.

The Cecil sandy clay loam is the most extensive of the upland types. It includes a greater number of farms than any other type and is a desirable soil for general farming.

The Cecil clay loam, which comprises the so-called red lands of the survey, is a strong type especially well suited for general farming.

The Appling sandy loam is not as extensive as the Cecil types. It is adapted to both truck and general farm crops.

The Congaree fine sandy loam and silty clay loam are strong first-bottom soils, well suited to the production of corn and forage crops.

Meadow (Congaree material) consists of first-bottom alluvial lands, so lacking in uniformity of color and texture that no type designation could be given them. A part of these lands is used for the production of corn, cowpeas, and sorghum, or as pasture.

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<sup>3</sup> The census tabulates each tenancy as a farm.

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