

SOIL SURVEY OF WALKER COUNTY, GEORGIA.

By W. E. McLENDON.

DESCRIPTION OF THE AREA.

Walker County, with an area about 434 square miles, or 277,760 acres, is situated in the northwestern part of Georgia, being the most western county but one in the northern tier, and touching both the Alabama and Tennessee lines. The adjoining counties of Georgia are Catoosa and Whit-

field on the east, Gordon and Chattooga on the south, and Dade on the west. From a width of 5½ miles on the Tennessee line the county broadens to a width of about 27 miles at the southern boundary, while north and south there is a variation from 2½ miles along the Alabama line and 16½ miles along the extreme eastern boundary to about 27 miles through the center. It extends to the east by a series of jogs, mostly along district and land-lot lines, and nearly an equal distance to the west in an irregular line along the crest of Lookout Mountain.

The topographic features characterizing the northwestern part of Georgia and extensive regions in East Tennessee and northern Alabama are well developed in Walker County. They consist of high mountains capped by plateau lands, sharp-topped mountains, and

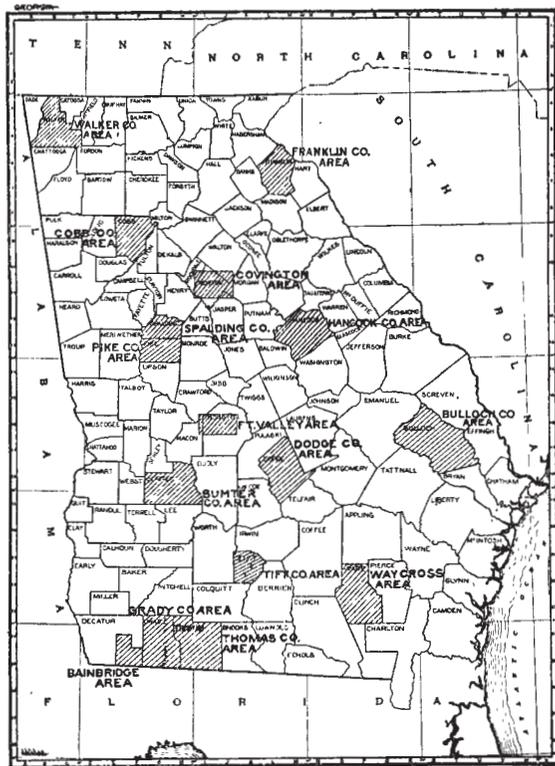


FIG. 14.—Sketch map showing location of the Walker County area, Georgia.

series of level to gently rolling narrow valleys alternating with steep broken and broad ridges. The trend of all of these is north and south to about 30° east of north and the majority of them extend entirely across the county.

The drainage of the county is almost equally divided between streams flowing south into the Coosa River and those flowing north into the Tennessee River, there being no distinct divide between the two systems except in the case of Pigeon Mountain, which directs all the drainage of McLamore Cove to the north. The head of the cove and the extensive valley land to the east of Missionary Ridge are drained by West Chickamauga Creek and the narrow valley west of Missionary Ridge by Chattanooga Creek. Farther east a narrow strip along the northern boundary is drained by Crawfish Creek—a tributary of West Chickamauga—Peavine, and Middle Chickamauga and East Chickamauga Creeks. East and West Armuchee Valleys are drained mainly to the south by streams of the same name. An extensive area between Taylor Ridge and Pigeon Mountain, as well as a part of the mountain areas, is drained to the south through the Chattooga River and its upper tributaries. A part of the plateau land on Lookout Mountain drains to the south through Little River. Some of the smaller streams through the limestone valleys and rolling cherty areas flow only during wet weather, the others having a continuous flow, although getting very low in dry spells. Sufficient power for grist and flouring mills has been developed in places on the larger streams.

A large section in northwest Georgia, including Walker and a dozen other of the present counties, was neutral ground between the State of Georgia on the one hand and the Cherokee Nation on the other, but by the treaty of December 29, 1835, the Indians relinquished all claim to the land and the old county of Cherokee was established. Prior to the treaty there was a scattering white population within this region, but there was very little agricultural development until after the Indians left, when settlers came in numbers from the lower part of the State and to less extent from South Carolina, North Carolina, and Virginia. The old land-lot survey was made in 1831, by which the lands were divided into districts 9 miles square, and each district into lots of 160 acres each, and two years thereafter Walker County was organized from a part of the old county of Cherokee.

The descendants of the early settlers constitute the bulk of the present population. As there were only a few slaveholders before the Civil War the present negro population is comparatively small. The extent and rate of increase in the population are shown by the census reports. According to this authority the total population in 1880 was 11,055; in 1890, 13,282; in 1900, 15,661; and in 1910, 18,692.

La Fayette, the county seat, had a population in 1910 of 1,590. Rossville, on the Tennessee line and virtually a suburb of Chattanooga, has about 1,000 inhabitants. The only other town is Chickamauga, between Rossville and La Fayette, which has less than 500 inhabitants.

The best development in the county is found on the level limestone lands of East and West Armuchee Valleys and of the several valleys farther west. Next after these are the level shale valley lands; then the rolling cherty lands, about half of which are under cultivation; the mountain plateaus, which are very sparsely settled; and the rougher mountain ridges and escarpments, which are not used at all.

The railroad facilities are good in the central and northern parts of the county, but the section east of Taylor Ridge is from 7 to 15 miles from the nearest railroad station, and if the travel is to the west over steep mountain roads. The Central of Georgia Railway between Chattanooga and Griffin crosses the county almost centrally from north to south, passing through Rossville, Chickamauga, La Fayette, and the smaller places of Mission Ridge, Lytle, Rock Spring, Noble, Guild, Martindale, and Wilson. From 5 to 8 miles farther west is the Chattanooga Southern, which now extends from Chattanooga to Gadsden, Ala., and soon will be a connecting link in a short line between Chattanooga and Atlanta. The Chickamauga & Durham Railroad, used principally for hauling coal, extends from Chickamauga to the Durham mines on top of Lookout Mountain. Through Chattanooga the county has quick and efficient service to all points north, east, and west.

The county has a fair system of public roads, considering the density of settlement and the number of ridges that are encountered. Some of the mountain roads should be laid out in a way to reduce the grades, widened, and kept in better repair. Especially is this true of the gapway roads leading onto Lookout and Pigeon Mountains. A great deal has already been done toward the general betterment of the roads. The United States Government has built a good macadam road from La Fayette to Chattanooga and others through the Chickamauga National Park, between Chickamauga and Rossville. Others of the main roads have been improved by the county. Nowhere is there a more abundant supply of good material for road construction. Rural delivery service reaches nearly all sections of the county.

Besides farming, which is the main industry, considerable attention is given to manufacturing and mining. Coal is mined extensively on Lookout Mountain and iron in several places in the western part of the county. At La Fayette are three cotton mills, at Rossville two, and at Chickamauga one. A large tile factory is operated at Blowing Spring and a fire-brick factory at Mission Ridge. With

so much cheap coal at hand there is no reason why the county should not assume much greater importance in a manufacturing way.

About all of the local trade, including the marketing of the farm produce, goes to La Fayette, Chickamauga, and Chattanooga.

CLIMATE.

The mountains and high altitude of the valleys give Walker County a cooler climate than prevails in lower lying regions farther to the north, although very mild, pleasant, and healthful. The cool nights of spring and fall make it impossible to grow cotton as a staple crop on the mountain plateau lands, and even in the valleys it does not give satisfactory results on the heavy clay soils, where the tendency is toward late maturity.

Winter weather begins about November 1, but as a rule very little real cold weather is looked for until after Christmas, January and February being the coldest months. By the middle of March the danger of frost has about passed, and pleasant spring weather generally prevails until late May or June. The summer months are also pleasant, except for short, sultry periods, when the temperature may go above 90° F., and as is the case all over the South, the fall months are delightful.

The following tables are compiled from records of the Weather Bureau station at Valley Head, Dekalb County, Ala., which is near enough to give some idea of the conditions in Walker County:

Normal monthly, seasonal, and annual temperature and precipitation at Valley Head, Dekalb County, Ala.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	° F.	° F.	° F.	Inches.	Inches.	Inches.	Inches.
December.....	42	78	1	4.4	3.8	9.4	0.4
January.....	39	74	-7	5.2	5.4	5.0	.3
February.....	43	89	-17	5.0	4.6	3.1	1.4
Winter.....	41			14.6	13.8	17.5	2.1
March.....	50	82	4	6.6	5.9	9.2	.1
April.....	59	88	26	4.9	3.4	5.0	.0
May.....	67	96	33	4.1	2.4	9.3	.0
Spring.....	59			15.6	11.7	23.5	.1
June.....	74	102	39	5.0	2.1	3.3	.0
July.....	76	100	53	5.1	2.0	8.9	.0
August.....	76	102	51	4.8	2.2	13.8	.0
Summer.....	75			14.9	6.3	26.0	.0

Normal monthly, seasonal, and annual temperature, etc.—Continued.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	° F.	° F.	° F.	Inches.	Inches.	Inches.	Inches.
September.....	71	97	34	3.3	2.5	3.6	.0
October.....	58	91	22	2.8	4.0	.6	T.
November.....	49	79	12	3.2	3.4	2.4	T.
Fall.....	59	9.3	9.9	6.6	T.
Annual.....	59	102	— 17	54.4	41.7	73.6	2.2

Average date of first killing frost in autumn, Oct. 20; of last in spring, Apr. 5. Date of earliest killing frost in autumn, Oct. 6; of latest in spring, Apr. 30.

From the above table it is seen that the mean annual temperature is 59° F., or 41° F. for the three winter months and 71° F. for the three summer months. The average rainfall is about 54 inches, but varies considerably from this in extremely dry or wet years. The snowfall is of little or no consequence, averaging 2.2 inches. The average date of last killing frost in the spring and the first in the fall are April 5 and October 20, respectively. The earliest recorded date of killing frost in the fall is October 6 and the latest in the spring April 30. Excepting very abnormal years the growing season is about six and one-half months long, which is sufficient to bring to maturity a great variety of crops.

AGRICULTURE.

The early settlers, having no transportation facilities or near-by markets, turned their attention to a mixed system of farming that would furnish about all of the food supplies required and the material with which to make clothing. Corn took first place on account of its wide range of uses and the fact that it grows with more or less success on almost every kind of soil. Next after corn was wheat, which was converted into flour at local water mills. A smaller acreage was devoted to oats and forage crops, and a number of other crops, including tobacco, hemp, flax, cotton, and sweet potatoes, were grown in small patches. The extensive timbered areas afforded opportunities for raising stock at little or no cost, and every farmer had at least a few cattle and hogs, and some gave considerable attention to the raising of sheep. As the area became better settled and was provided with better marketing facilities the crude practices among the early settlers gave way gradually to the system of agriculture which has prevailed without any radical changes until the present time. Some

of the settlers found it difficult to make a satisfactory living, either because they did not understand the soils and climatic conditions or on account of careless methods, or because they happened to settle on some of the least desirable lands, but generally steady progress was made, and at the beginning of the Civil War many of those on the better lands were in good circumstances and the pioneer cabins had long since given place to comfortable, well-built houses.

For some 20 years after the Civil War, which left all classes in poverty, progress was very slow. In fact, many farmers lost their property through foreclosure of mortgages, and former land-owners became tenants or moved away to take up western lands. Gradually, however, conditions improved and during the last 15 years progress has been much more rapid. More improved methods are being practiced, the inefficient one-horse plow and other light implements are giving way to improved types of implements, and the tendency generally is toward a better system of agriculture. Yet, while this is true, one visiting the region can not help being impressed with the fact that the possibilities in agriculture have hardly begun to be realized. There is a general lack of attention to the problem of maintaining the productiveness of the soil, and the importance of thorough tillage and cultivation is yet to be appreciated. The breaking of the land is generally too shallow and the rows are frequently laid off without any regard to the lay of the land. As a result of such methods nearly all of the slopes have been reduced to a low state of productiveness by the washing away of the finer soil particles, including the organic matter, and in many places erosion has been so severe that the land has had to be thrown out of cultivation. All of the slopes that are to be used for cultivated crops should be terraced to prevent the loss of soil.

The relative importance of the different agricultural products of the county is shown by the returns of the Federal census. There has been very little change in the total acreage in farms during the 20 years between 1880 and 1900 or in the number of acres of improved lands. According to the census of 1900 there were 195,598 acres in farms, of which 87,945 acres, or 44.4 per cent of the total area of the county, was improved. The same authority gives 28,835 acres as the area in corn, of which the production was 448,190 bushels; 9,264 acres in wheat, producing 53,580 bushels; 7,038 acres in cotton, producing 2,751 bales of 500 pounds each; and 1,455 acres in oats, producing 11,950 bushels. All of the other crops had less than 1,000 acres each. Among these may be mentioned grasses for hay, clover, sorghum, cowpeas, rye, sweet potatoes, and miscellaneous vegetables. The total value of the orchard products was reported at \$3,493 and of the forest products at \$30,992. Since 1900 cotton has become the main money crop with a large number of the farmers

and the acreage has been greatly increased, with possibly a corresponding decrease in the acreage of some of the other crops. Within this time the growing of peaches for the market has assumed considerable importance near La Fayette and around and to the south of Martindale.

A larger acreage is devoted to corn than to all the other crops combined, this crop being grown to some extent on every farm regardless of the topography or productiveness of the soil. In places, of course, it is planted on lands not adapted to corn culture, and with a large majority of the farmers it does not receive the attention necessary to get the most satisfactory yields. The average yield has been near 15 bushels per acre for a long period of years. That so low an average is not the consequence of soil or climatic conditions is shown by the yields secured by the better farmers, who produce 50 or more bushels per acre. The best corn lands are the Hagerstown and Decatur types, which are expected to yield from 30 to 60 bushels per acre. Next in productiveness comes the Conasauga loam and silt loam, Armuchee silty clay loam, the Clarksville gravelly loam, and the Dekalb fine sandy loam. The rougher types, no matter whether productive or not, can not be used to advantage in growing corn. A great deal more corn could be grown in the county with profit.

Cotton has been an important crop in the county only within the last 10 years. The ruling high prices are influencing more and more farmers to take up cotton culture every year, and the tendency is to extend it to some areas that are not adapted to the crop on account of the high altitude and comparatively short growing season. On the Decatur and Hagerstown soils it makes a good growth, but, as a rule, a part of the crop is injured by frost. It is not advisable to grow cotton on any of the heavier soils. Possibly the tendency to make too much weed and to grow too late can be overcome to some extent by making liberal applications of phosphate and only small applications of nitrogen. If properly fertilized cotton gives fair to good yields on the Clarksville gravelly loam and Conasauga loam and the Conasauga silt loam. On these types, which are deficient in humus, it should be included in a rotation with other crops.

The acreages in wheat and oats fluctuate considerably from year to year and over periods of years. For instance, in 1880 there were 15,115 acres in wheat, while in 1890 the acreage had dropped to 4,411 acres, and in 1900 it had risen again to 9,264 acres. On the other hand, oats increased from 5,915 acres in 1880 to 6,267 acres in 1890, and dropped to 1,455 acres in 1900.

Good yields of wheat can be obtained from the Hagerstown silt loam, Hagerstown clay, Decatur loam, Decatur clay loam, Conasauga silt loam, and the Armuchee silty clay loam. It is not adapted to the Clarksville or Dekalb types. The best oat soils are the Hagerstown

silt loam, the Decatur loam and clay loam, and the Conasauga loam and silt loam. Where the rotation of crops is practiced good oats can be grown on any of the soils not too rough for the use of machinery.

Cowpeas are not grown nearly to the extent they should be, either as a forage crop or as an improver of the soil. Some plant small patches for forage or more rarely for the seed, and in places they follow oats and wheat. They should play an important part in the rotation of crops, as they not only make the best of hay but afford the easiest means of keeping the soil supplied with humus and nitrogen.

Raising stock has received little attention, although the country offers admirable opportunities along this line, as well as for dairy farming. The herds of cattle kept are not especially fit for milk production or for beef. A few of the farmers on the Decatur, Hagerstown, and Conasauga soils have put a part of their lands in cultivated grasses to improve the grazing and they have also made some provision for taking care of the stock during winter.

The growing of peaches, while not an extensive industry, has proved very profitable where the orchards were rightly located and given the proper care. In some cases almost complete failures have resulted, either because the orchards were put on soils not adapted to the peach or because the trees were not given proper care after planting. The best results with this crop are obtained on the Clarksville gravelly loam and the Clarksville stony loam.

Strawberries, now grown in a limited way on the Clarksville gravelly loam, should become an important crop on this type. They possibly would do as well on the Conasauga silt loam. There is no reason why every farmer should not have an abundance of good fruit for home use. As it is, the orchards generally consist of a few apple trees which receive little or no care and as a result most of the fruit is inferior in quality. Good apples, pears, and cherries can be grown on any of the types. Apple growing for commercial purposes is especially recommended for the Dekalb fine sandy loam on Lookout Mountain. The Dekalb fine sandy loam is also an excellent peach soil, but the crop would have to be grown very largely for canning and drying purposes.

The different soils offer other opportunities for specialized farming. Tobacco can, in all probability, be grown very successfully on the Clarksville gravelly loam and the Conasauga silt loam. Alfalfa could be grown very successfully on the Decatur and Hagerstown types, if they were first brought to a high state of cultivation. Irish potatoes and a variety of miscellaneous vegetables do well on the lighter sandy and silty soils, such as the Dekalb fine sandy loam, Clarksville gravelly loam, and the Conasauga silt loam. The difficulty in getting a potato of good keeping quality seems to be solved

in the Lookout Mountain variety, which not only keeps well but has a good mealy texture when cooked.

The farmers as a rule have practiced a continuous system of cropping without much attention to rotation. Too often corn or cotton are grown for a number of years in succession, or if one crop follows the other the rotation is not planned so as to get the best results. By some the value of clover and cowpeas as land improvers is recognized, and they are being used in a limited way in different rotations. Some of the lands intended for the small grains are first planted in cowpeas, cutting the crop for forage and returning only the roots to the soil. On the thinner lands a better plan would be to plow under the entire crop while still green. Where a heavy crop is to be handled in this way liming may prove necessary to assist in the proper decay of the organic matter. Another and cheap way of increasing the returns from the soil and at the same time of keeping the land in a more productive state is by planting cowpeas between the rows of corn at laying-by time. At present this is rarely done. As a result of lack of appreciation of the importance of crop diversification and rotation in their relation to maintaining productiveness, the soils have naturally become more or less run down. With the resulting unsatisfactory yields the farmers have drifted into the use of commercial fertilizers, mainly for cotton but to a less extent for corn and the small grain crops. The consumption of fertilizers is increasing rapidly, both on account of the tendency to apply larger quantities per acre and on account of the increasing acreage of cotton.

In 1879 the amount expended for fertilizers was \$12,719. In 1899 it had increased to \$21,480. The manurial requirements of the different soils are so little understood that no doubt a large part of the money put in fertilizers is thrown away. Generally the soils decline in productiveness through a depletion of their organic content, due in a large measure to careless cultural methods. The deteriorated areas are the ones on which the fertilizers are most used, yet fertilizers will give the most satisfactory results where the soil is well prepared and kept well supplied with humus. Instead of trying to offset the unproductiveness, caused largely by a lack of humus in the soil, by the use of commercial fertilizers, the more sensible plan is to keep the soil as productive as possible by the rotation of crops; then liberal applications of fertilizers would probably be attended with very satisfactory results. Except for cotton, there is no need of using much fertilizers on any of the limestone soils, which are naturally very productive and can be kept in a high state of cultivation simply by the proper rotation of crops. On the lighter soils they can be used to better advantage but here the amount and kind should depend upon the kind of crop to be planted, the condition the land is in, and the kind of crop last occupying the land. For in-

stance, where cowpeas have occupied the land the year before, there will be no need of heavy applications of nitrogenous fertilizers.

In general it is better to buy the different fertilizer ingredients and to mix them at home, as in this way the cost is less and there is less uncertainty as to the composition of the material. Cottonseed meal may be used in making up the mixtures. This practice is better than using the seed, the oil in which has no fertilizer value.

Only a few of the broader soil adaptations are recognized by the farmers, the tendency being to grow the same general line of crops regardless of the type of soil used. The wheat and oat crops are confined very largely to the leveler valley limestone and shale soils, while most of the cotton is grown on the lighter loam and silt-loam types, where it matures earliest and therefore yields best. The peach orchards are confined largely to the Clarksville types and the largest apple orchards are found on Lookout and Pigeon Mountains.

Land values, although still comparatively low, are generally rising in response to the better prices paid for all of the products of the farm. The roughest mountain areas have little or no value except for the timber they support. The rougher areas suitable for cultivation are valued at \$5 to \$15 an acre, and the plateau lands of Lookout and Pigeon Mountains bring about the same prices. The highest prices asked are for the best areas of the Decatur and Hagerstown soils, and these range from \$25 to \$75 an acre.

Few of the farms contain less than 50 acres, the majority of them range from 100 to 500 acres in extent, and some of the largest holdings contain 1,000 or more acres. According to the census of 1900, the average size of farms is 96 acres. Prior to 1890 over 60 per cent of the farms were operated by the owners, but between 1890 and 1900 there was a decline to only about 48 per cent, and now the proportion is possibly smaller still. This rapid decline no doubt is due to the extensive movement of the smaller farmers to the cotton mills and to the coal and iron mines. This has been most marked on Pigeon and Lookout Mountains, where a number of the farms have been abandoned. Only a small percentage of the tenants rent on a cash basis. If the landowner furnishes a house with the land he gets a third or a fourth of the crop. When he furnishes everything but the labor he gets from a half to two-thirds.

On account of the small negro population and the large number of whites required in the mills and mines, farm labor is scarce and sometimes difficult to get when most needed. This, however, is not felt to any great extent by the smaller landowners and tenants, as they depend very largely upon their families for the necessary help. The growing scarcity of labor can be offset to a large extent by going more into the raising of stock and the growing of forage crops

which do not require much labor. This line of farming should in any case prove the most profitable for a large majority of the farmers. The day wage ranges from 75 cents to \$1, including one or two meals; the monthly wage is \$12 to \$15.

SOILS.

Walker County includes portions of the three main physical divisions of the great Appalachian province extending from central Alabama to northern Pennsylvania. The region between Lookout and Pigeon Mountains on the west and Taylor Ridge on the east is a part of the Appalachian Valley, while the country from Taylor Ridge east may be considered as in the Appalachian Mountain region and Lookout and Pigeon Mountains as forming the eastern boundary of the Cumberland Plateau. These differences are largely the result of the geological structure and the character of the formations underlying the country. These in general consist of conglomerate, sandstones, sandy, clayey, and calcareous shales, chert, cherty magnesian limestone, and massive to flaggy and soft fossiliferous limestones. The rocks were deposited as ocean sediments during the different periods of Paleozoic time and were subsequently elevated into highland, some of them being metamorphosed. As soon as they emerged from the water weathering began and the different rocks were broken down into soil with varying degrees of rapidity, the ones most easily weathered being also the ones subject to the most extensive erosion. So in the present surface configuration the easily weathered limestones and soft shales form the valleys, the cherty limestone forms rolling to broken ridge lands, the shaly sandstones and sandy shales form the sharp broken ridges, and the heavy almost horizontal layers of sandstone form the mountain plateaus.

With the exception of the small alluvial and colluvial strips, which in most places represent a mixture of material washed down from the adjacent slopes, the soils bear a direct relation to the underlying rocks, and many of their boundaries are as sharply defined as the boundaries between the rocks themselves.

Based upon differences in origin, color, surface and drainage features, productiveness, etc., the soils fall naturally into several general groups, or series, and in each series there may be sufficient range in the texture of the material to give rise to several classes, or types, of soil. Some of the rocks give only one type of soil; others with considerable variation in composition and surface features may give one or more general groups and in each group one or more types, and in other instances, where there is close similarity between the rocks of different formations, only one type may be formed from two or more rock formations. While there is more or less blending of

one set of conditions into another and even of the types from the same and different formations, it is possible to divide the soils into six general groups or series, with a few types that have to be separately classed. The roughest very stony areas, with scarcely any agricultural value, are classed as Rough stony land, whether of sandstone or limestone origin. In this division is included the heavy sandstone strip at the top of Taylor Ridge and the cliffs of Lookout and Pigeon Mountains, consisting mostly of the conglomerate and sandstones of the Lookout sandstone formation, and the lower slopes of these mountains composed of the Bangor limestone. The first group of soils, the Dekalb series, includes the plateau lands from the Walden sandstone on Lookout and Pigeon Mountains and the broken ridges in the eastern part of the county, from the Rome formation, and from the sandstone and sandy shale phases of the Rockwood formation. The soils here are characterized by light-gray to yellowish surface color and by yellow to yellowish-brown color below. From the Walden sandstone comes the Dekalb fine sandy loam and from the Rockwood and Rome formations the Dekalb stony loam. Associated with the latter is the Hanceville stony loam from a highly ferruginous sandstone of the Rockwood formation. In the western part of the county, where the Rockwood consists largely of soft, thin-bedded, and highly colored shales, the Montevallo shale loam is derived.

The second group, the Clarksville series, includes the Fort Payne chert and Knox dolomite areas, characterized by rolling to broken topography, gray cherty soils, and yellowish-brown to red cherty subsoils. The Fort Payne chert, which occurs only in narrow broken strips, gives the Clarksville stony loam, while the Knox dolomite, except in local areas of almost pure limestone, gives the Clarksville gravelly loam in rolling areas and the Clarksville stony loam in the rougher areas.

The Bangor limestone in the valleys and bluish massive limestone phases of the Floyd shale and Conasauga shale formations and possibly a heavy limestone phase of the Knox dolomite weather into brown to reddish-brown soils with intensely red clay subsoils. These constitute members of the Decatur series, the loam and clay loam being recognized.

The fourth or Conasauga series includes areas from the Conasauga shale formation, where the soil is gray to brownish and the subsoil yellowish to yellowish brown. The more level areas are classed as the Conasauga silt loam and the badly eroded slopes as the Conasauga shale loam. The heavier textured areas, where the subsoil is reddish brown to red, constitute a miscellaneous type called the Armuchee silty clay loam.

The Chickamauga limestone, which is extensively developed in Walker County, gives rise to the Hagerstown series, and a less ex-

tensive condition, represented by the silty clay loam and stony clay to types of the Colbert series. The silt loam and clay types were recognized in the Hagerstown series.

Based upon differences in their origin, two types were recognized in the bottom lands. The small areas composed of wash from the Knox dolomite are the Holly silt loam, while those coming very largely from the limestones are the Hagerstown silt loam.

Including the Rough stony land 20 types of soil were recognized and mapped. They are named in the following table in the order of their extent:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Percent.
Clarksville gravelly loam.....	69,632	25.1	Decatur clay loam.....	7,744	2.8
Dekalb fine sandy loam.....	38,016	13.7	Colbert stony clay.....	7,488	2.7
Rough stony land.....	28,416	10.2	Armuchee silty clay loam.....	6,016	2.2
Clarksville stony loam.....	18,112	6.5	Conasauga loam.....	2,944	1.0
Hagerstown clay.....	17,216	6.2	Colbert silty clay loam.....	2,624	.9
Dekalb stony loam.....	14,976	5.4	Conasauga shale loam.....	2,176	.8
Hagerstown silt loam.....	14,464	5.2	Hanceville stony loam.....	1,728	.6
Montevallo shale loam.....	12,992	4.7	Allen fine sandy loam.....	1,408	.5
Decatur loam.....	11,584	4.2	Holly silt loam.....	320	.1
Conasauga silt loam.....	11,584	4.2			
Huntington silt loam.....	8,320	3.0	Total.....	277,760

CLARKSVILLE GRAVELLY LOAM.

The Clarksville gravelly loam consists of 7 to 10 inches of a gray to light-brown friable silt loam, underlain by a yellowish-brown, compact silt loam or silty clay loam extending to a depth of 2½ to 3 feet. Below this occurs a silty clay loam to clay varying from brown to light-red in color. The surface is strewn with fine angular chert gravel and varying quantities of the same material are found throughout both the soil and subsoil. In addition to the small gravel, larger fragments of chert are scattered over the surface, although not in quantities sufficient to interfere seriously with cultivation. A striking feature of this type is its deficiency in organic matter even in the forested areas. In the latter case the lack of humus-forming material can be accounted for to some extent by the frequency of forest fires, which remove about all of the leaf mold from the surface, but the chief trouble throughout the type is that the soil, on account of the large amount of stone fragments in it, does not have the capacity for holding large amounts of organic matter for any great length of time. The natural productiveness of the soil is rather low, but by careful management it can be brought to a high state of cultivation.

The Clarksville gravelly loam is an extensive type, including the greater part of a series of well-defined ridges. Missionary Ridge,

extending from a point in McLamore Cove to beyond the Tennessee line, is very largely of this type, as well as a broad belt crossing the county just to the east of La Fayette. A similar but narrower ridge extends along the west edge of the Chattooga and Peavine Valleys and other areas occur in the eastern part of the county.

The topography of this soil is of a general rolling character, consisting of an intricate system of rounded knolls and ridges and narrow V-shaped valleys with local differences in elevation ranging up to 100 feet or more. Missionary and the other ridges rise gradually on the east from the limestone and shale valleys, but on the west, specially overlooking the Chattooga, Peavine, Straight Gut, and Chattanooga Valleys, they break away in rough escarpments, and some of the steeper slopes and high knolls constitute a phase of the Clarksville stony loam and are shown as such on the map. On account of the rolling topography, which allows a large proportion of the rainfall to pass off at the surface, and the soft, partially decomposed condition of the underlying rocks, which promotes downward percolation, all but the largest of the streams flow only during wet weather. Then they become torrents and may do serious damage to crops along their courses. The steeper cultivated slopes are subject to severe erosion.

This is a residual soil from a very cherty phase of the Knox dolomite. The same formations in some sections consist for the most part of a gray to bluish massive magnesium limestone with more or less chert; but in Walker and adjoining counties of Georgia and Tennessee the massive limestone phases are confined to narrow, comparatively thin layers, generally at the base of the formation, and the remainder is a gray, very siliceous magnesian limestone, interbedded with numerous layers of chert. In weathering, the bulk of the rock first turns white, then it begins to crumble into small fragments, and finally it is reduced to silt and clay. In only very small areas has the weathering been anything like complete, and hence numerous small fragments of chert are found mixed with the soil material, besides larger scattering fragments from the very resistant cherty layers. In the deeper subsoil some of the chert layers are still intact and the clay gives way very largely to partially weathered white material.

The Clarksville gravelly loam was originally forested with a good growth of post, red, white, and chestnut oaks, intermixed with chestnut, scattering upland black gum, hickory, and dogwood. About half of the type has been cleared and put under cultivation. Corn and cotton are the main crops, although nearly every farmer plants small areas of sorghum and cowpeas, and some grow oats and wheat extensively. The type is not adapted to the growing of oats and wheat, on account of the very siliceous character of the soil and the rolling

topography, which makes it impossible to use the necessary improved machinery, the yields being almost invariably light. Cotton is grown more extensively on the Clarksville gravelly loam than on any other type in the county. As a rule it does not make a very large plant, but it fruits heavily. With careful cultivation and the liberal application of fertilizer it can be made to produce about a bale of cotton or over 60 bushels of corn to the acre. The average yield of the former is not much over a third of a bale and of the latter from 10 to 20 bushels per acre.

Small commercial orchards of peaches near La Fayette indicate that the type is especially adapted to the production of this fruit. No apples are grown for the market, but nearly every farmer has a small orchard for home use, and wherever they are properly cared for the fruit is of good quality. Dark export tobacco now grown in Tennessee on similar soils probably can be grown profitably here. Among other promising crops, now given little or no attention, are strawberries, a variety of vegetables, cantaloupes, sweet potatoes, and Irish potatoes.

The chief problem in handling the Clarksville gravelly loam is to keep it better supplied with humus-forming materials. In its present state it is more droughty than it would be were the content of organic matter greater, and the use of commercial fertilizers is not attended with as satisfactory results as it would be were the organic matter increased.¹ The lack of humus could be overcome by the systematic rotation of crops, with cowpeas and other legumes playing an important part in the rotation. Occasional applications of lime would prove beneficial after the soil has become supplied with organic matter. All of the slopes should be terraced to check erosion.

The price of land of this type ranges from \$10 to \$25 an acre.

CLARKSVILLE STONY LOAM.

The Clarksville stony loam to a depth of 6 to 10 inches is a light-gray to brownish-gray stony silt loam, underlain by a light-yellowish compact silt loam or a yellowish-brown silty clay loam. In the less broken areas the subsoil as a rule is heavier and may have a reddish cast below a depth of $2\frac{1}{2}$ or 3 feet, while in the rougher areas there is not much difference in the texture of the soil and subsoil, the color varying from light gray at the surface to yellowish beneath. The surface is thickly strewn with angular fragments of chert and from

¹ The results of tests by the wire-basket method, to determine the manurial needs of this type, using acid phosphate, nitrate of soda, and muriate of potash, singly and in combinations, showed an increased growth with each of the fertilizers. Nitrate of soda alone gave an increase superior to either acid phosphate or muriate of potash. The soil was improved for crop growth by an addition of lime at the rate of 1 ton per acre. Fertilizers were more efficient on the soil after liming than on the unlimed soil. This was especially marked with the nitrogenous fertilizers. The increased growth with nitrogen on the limed soil was better than any other treatment in this test.

20 to 50 per cent of the same material occurs in the soil mass, the quantity generally increasing with depth until bed rock is encountered.

The type occurs in two phases of about equal extent, one including all of the Fort Payne chert and the other the very cherty ridges and steep slopes of the Knox dolomite. The color and texture of the fine material are about the same in both phases, but the areas from the Knox dolomite are characterized by a quantity of fine chert gravel like that in the Clarksville gravelly loam. Both phases are similar in having a very rough hilly to mountainous topography, the same kind of forest growth, and the same crop adaptation. West Armuchee Valley is completely surrounded by a strip of the Fort Valley chert phase. A similar strip extends around Pigeon Mountain and along Lookout Mountain from Dougherty Gap to near Eagle Cliff. The most extensive areas of the Knox dolomite phase occupy the rough escarpment overlooking the Chattanooga, Chattooga, and Peavine Valleys from the east.

The natural drainage is perfect and were it not for the large quantity of stones on the surface erosion would be very destructive. The stony mulch not only checks the erosion, but by retarding the flowing of the water a much greater proportion of the rainfall soaks into the soil than would be the case in a less stony type of soil. In dry weather this stone mulch serves to prevent excessive evaporation from the surface.

The original forest growth is essentially the same as on the Clarksville gravelly loam.

Small areas of the type are cultivated to the general crops, of which cotton and corn are the most important. The yields are light, and hardly justify the labor and time involved in cultivation. The type is now being used to a limited extent in commercial peach growing and where the trees have been given good care the crop has proved very profitable. The production of peaches and apples is the most promising use for all of the areas not too far from the railroad. Parts of the type would make good pasture if seeded to Bermuda grass.

DECATUR LOAM.

The Decatur loam consists of a light-brown to reddish-brown friable silty loam, from 5 to 8 inches deep, underlain to a depth of several feet by a friable red clay. The typical color of the subsoil is a deep red, but it varies in places to a light red. Generally where the subsoil is lightest the soil is deepest and correspondingly light in color. From this extreme it ranges to reddish-brown heavy material of shallow depth. It is somewhat variable within the limits of small fields. The areas associated with the light chert lands may have quite a sprinkling of chert fragments on the surface and occasional frag-

ments throughout the soil mass. The more extensive areas are practically devoid of stones.

The largest areas of the type occur in West Armuchee Valley. A small one was mapped in the small valley just east of Wood Gap in Dick Ridge, another in East Armuchee Valley, and a number of others in the successive valleys to the west of Taylor Ridge. Areas of considerable extent are found between La Fayette and Rock Spring and along the east edge of Missionary Ridge from about 2 miles south of Kensington to some 3 miles north of Chickamauga. The surface features are level to gently sloping, with local areas steep enough to cause excessive erosion. The natural drainage is well established throughout the type.

The Decatur loam is a residual soil from bluish massive almost pure limestones to slightly cherty and dolomitic limestones. The areas in West Armuchee Valley are derived from a slightly cherty to bluish massive limestone of the Floyd formation, the strata being very similar to the Bangor limestone. Near the head of McLamore Cove and in the narrow valley just west of Pigeon Mountain are some small areas derived from the Bangor limestone, with modifications from the adjoining Fort Payne chert ridges. All of the other areas are from the bluish massive (possibly dolomitic) limestone occurring at the base of and to a less extent higher up in the Knox dolomitic formation. About the only observable difference between the areas of different origin is that the cherty soils are slightly lighter in texture and have more fragmental rock strewn over the surface.

The type was originally heavily forested with a variety of oaks, hickory, elm, beech, maple, dogwood, and other hardwood trees.

Almost all of the Decatur loam is under cultivation, being highly prized for general farming. The most important crops are corn, wheat, oats, cowpeas, and cotton. Small areas are devoted to a variety of other crops for home use. Corn yields from 25 to 50 bushels and cotton from one-half to three-fourths bale per acre. The short seasons limit the yields of cotton, otherwise a bale or more to the acre could be easily secured. The applications of commercial fertilizers are light as a rule and confined largely to the cotton crop. The type is especially adapted to corn, oats, wheat, forage crops, dairying, and the raising of mules, horses, hogs, and beef cattle. Alfalfa could be grown successfully. In the line of fruits, apples, pears, and cherries should do well.

Some of the best-kept farms in the county are found on the Decatur loam, there being a number of fine farms in West Armuchee Valley and on the strip from Kensington to Chickamauga. At Kensington is a large dairy and stock farm that is being very successfully operated. Depending upon the surface features and the value of improvements, the price of land of this type ranges from \$25 to \$60 an acre.

DECATUR CLAY LOAM.

The Decatur clay loam consists of 4 to 6 inches of a brown fine loam to reddish-brown, mellow clay loam, underlain to a depth of several feet by a deep-red friable clay. The differences in the soil have been brought about largely by erosion. In the level and slightly depressed areas it is a mellow heavy loam to clay loam with a depth of about 6 inches, while on the slopes, where a part of the finer material has been washed out, it is a brown to reddish-brown fine loam with a depth of 3 to 4 inches, and on the steeper slopes where practically all of the original soil has been removed it is little else than the clay exposed.

With deeper and more thorough tillage the soil of all areas would be essentially the same in color, texture, and crop-producing capacity. The heavier clay areas would become gradually lighter and mellow and the lighter areas somewhat heavier by the mixture of some of the underlying clay with the thin layer of loam. The small areas in Pigeon Mountain have quite a sprinkling of limestone fragments over the surface, and they are otherwise more variable than the valley areas.

Excepting the areas in Pigeon Mountain referred to above, the Decatur clay loam is a level to gently rolling valley type. The main development is in the narrow valleys at the base of Lookout and Pigeon Mountains. Smaller areas occur in the Chattooga Valley along Duck Creek and farther east associated with the Clarksville gravelly loam. All areas have good natural drainage.

The type has been formed in place by the decay and disintegration of bluish massive and fossiliferous limestone, mainly of the Bangor formation. The areas adjoining Lookout and Pigeon Mountains are entirely from the Bangor. The two small areas to the east and north-east of Sharpe, the one south of Guild, and the others in the valley at the base of Taylor Ridge are from a bluish massive limestone, probably of the Chickamauga formation. The other areas, including the one west of Middle Chickamauga Creek at the Catoosa County line, are from a bluish massive limestone occurring either on the top of the Conasauga shale formation or at the base of the Knox dolomite.

The original forest consisted of a luxuriant growth of oak of different varieties, hickory, maple, elm, chestnut, and other hardwood trees.

The Decatur clay loam being nearly level, comparatively easy to till, and naturally very productive, practically all of it has been put under cultivation. All of the general crops of the region are grown, but the main crops are corn, oats, and wheat. Cotton is grown to a very limited extent. It has a tendency to produce too much "weed" and to be slow in maturing, preventing the harvesting of a full crop. The yield of corn ranges from 25 to 60 bushels, of oats from 30 to 60 bushels, and of wheat from 10 to 25 bushels per acre. Cowpeas and

grasses are grown to a limited extent for forage. Small areas near Chattanooga are being used for truck growing. The type is best adapted to corn, oats, wheat, forage crops, dairying, and stock raising. Areas put in a high state of cultivation would give very satisfactory results with alfalfa.

The price of land of this type ranges from \$25 to \$75 an acre, depending upon location and improvements. Some large well-kept farms are found on the Decatur clay loam.

HAGERSTOWN SILT LOAM.

The soil of the Hagerstown silt loam is a brown mellow silt loam or fine loam with a depth of 6 to 8 inches. Below this is a yellowish-brown friable silty clay loam which grades at a depth of 24 to 30 inches into a more compact silty clay, varying from yellowish-brown to slightly reddish in color. The soil is easily tilled and naturally very productive.

This type occurs as level to gently sloping, well-drained valley lands from the Chickamauga limestone formation. To the east of Taylor Ridge, where the formation reaches the surface at a very sharp angle and consists partly of heavy calcareous shales, the Hagerstown silt loam is the main type. But to the west as the shales disappear from the formation, it gives way more and more to the Colbert stony clay, the Hagerstown clay being confined largely to the lower slopes bordering the streams.

The natural productiveness of the type is indicated in the original forest growth, which consisted of large oaks of different varieties, intermixed with hickory, elm, maple, beech, dogwood, and other hardwood trees. This has been cut off and about all of the type is under cultivation. Without the use of fertilizers it gives yields of 40 to 60 bushels of corn per acre, 15 to 25 bushels of wheat, 40 to 60 bushels of oats, and corresponding yields of cowpeas, sorghum, and grasses. The tendency of cotton is to go too much to "weed" and to mature too late. As a result the type is not used to any extent for this crop. Alfalfa is a promising crop that should be introduced. The best uses of the type are for corn, wheat, oats, clover, alfalfa, grasses, dairying, and stock raising.

Land of this type of soil brings from \$25 to \$60 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of the Hagerstown silt loam.

Mechanical analyses of Hagerstown silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
24804.....	Soil.....	1.8	4.0	3.2	6.9	4.4	65.1	14.2
24805.....	Subsoil.....	2.4	3.5	2.3	4.4	4.0	50.6	32.2

HAGERSTOWN CLAY.

The Hagerstown clay consists of 3 to 4 inches of a brown to reddish-brown silty clay loam, underlain by a yellowish to reddish-brown friable silty clay. Some areas are practically devoid of stone to a depth of several feet, while in others there may be occasional small outcropping ledges of limestone or fragments of the rock scattered over the surface. The type is naturally very productive, but most of the cultivated areas are in a badly run-down condition, owing to careless methods and to erosion, which has removed about all of the original loamy soil and depleted the humus content of the shallow veneer remaining.

The Hagerstown clay is a residual soil from the Chickamauga limestone. It occupies gentle slopes and higher rolling topography. The most extensive areas form almost a continuous belt around Pigeon Mountain and extend along Lookout Mountain nearly to Eagle Cliff. Smaller areas occur in the narrow valley just west of Taylor Ridge and similar valleys to the east of Dick Ridge. Many of the steeper slopes are being ruined by erosion.

The original forest consisted of a heavy growth of white, red, and other varieties of oak, intermixed with elm, maple, chestnut, and dogwood.

All but the roughest slopes and the least desirable of the leveler areas are under cultivation, and even the rougher areas are used as pastures. Corn, the chief crop, yields from 20 to 40 bushels, wheat from 10 to 20 bushels, and oats from 30 to 50 bushels per acre. Cow-peas, sorghum, clovers, and grasses do well. The roughest areas, which are not considered desirable for cultivated crops, can be developed into excellent pastures. In fact a very large proportion of the type could better be used for pasture than for any other purpose.

The average yields on this type are lower than on the Hagerstown loam, but this is due very largely to the greater difficulty of handling the soil. With deeper plowing and the rotation of crops, so as to build up a deep, mellow soil, it would give as heavy yields of the grain and forage crops as any other type in the county. It is valued at \$20 to \$50 an acre.

COLBERT SILTY CLAY LOAM.

The soil of the Colbert silty clay loam, to a depth of 4 to 6 inches, consists of a light, brownish-gray compact silt loam to silty clay loam. The subsoil is a yellow to light yellowish brown tough silty clay. At depths of 3 to 8 feet the clay gives way to limestone in varying stages of disintegration. Locally, in areas approaching the character of the Colbert stony clay, the limestone outcrops in occa-

sional ledges, and small to large flaggy fragments are scattered over the surface of a large proportion of the type. The color and structure of the subsoil varies somewhat in different areas, depending upon whether the surface is flat or sloping and upon the depth to bed rock. In the flat areas, which are the more extensive, and where, as a rule, the rock is nearest the surface, the clay is yellow or light brown from the surface to the rock and rather tough and plastic in its properties. On some of the gentle slopes the brownish color is better developed, even inclining to a brownish red in the lower depths, and the structure is somewhat more friable. The clay in the heavier phases is lighter and much less sticky and plastic than the Colbert stony clay, and the lighter phases are considerably more compact than the subsoil of the Hagerstown clay. The soil is deficient in humus, and has a tendency to bake and clod.

This type is of limited extent in Walker County. Its main occurrence is in the northern part of the county in the Chickamauga National Park, along the Catoosa County line, and in Dry Creek Valley. Smaller areas are found in Peavine Valley, just west of where Middle Chickamauga Creek leaves the county and east of Wilson. The surface features are flat to gently sloping or rolling, and the natural drainage is imperfect.

The areas in the northern part of the county are derived from the Chickamauga limestone, where the layers are almost horizontal; while those in the eastern part of the county are from a similar bluish limestone occurring in the upper part of the Conasauga shale formation. The original growth, consisting of red, white, post, and blackjack oaks, and scattering hickory, elm, and maple, is noticeably less vigorous than on the Hagerstown types.

About half of the type is under cultivation, being used principally for corn, wheat, oats, and grasses. The yields are light to fair, but, as a whole, less satisfactory than those secured on the Hagerstown soils. Its best uses are for wheat, cowpeas, grasses, and pasturage.

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

Mechanical analyses of Colbert silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
24782.....	Soil.....	1.3	2.6	1.3	2.6	5.2	70.0	16.9
24783.....	Subsoil.....	.3	.4	.2	.6	2.4	33.0	62.6

COLBERT STONY CLAY.

The Colbert stony clay consists of from 3 to 5 inches of a brown, compact, silty loam to plastic, silty, clay loam, underlain by a dingy yellowish-brown, tough, plastic clay. The surface is broken by frequent ledges of limestone and strewn with numerous flaggy fragments of the same rock. The depth of the soil material varies from nothing to 3 feet or more. In the shallower areas there is not much to distinguish the soil from the subsoil, both being brown to dingy yellow in color, very sticky when wet, and harsh and very hard when dry. As the depth of the weathered material increases the soil becomes more a brown silty loam to clay loam, and the subsoil a plastic yellowish-brown clay. Local areas merging into Hagerstown clay have a slight reddish cast in the lower subsoil.

The Colbert stony clay is derived from the Chickamauga limestone, and occurs principally in the West Chickamauga Valley. Other areas are found about the northern end of Pigeon Mountain and in the narrow valleys occupied by the Chickamauga limestone between Pigeon Mountain and Taylor Ridge. In places, as along the road between Pond Spring and Estelle Station, it occupies level to slightly irregular areas on the crests of the ridges, while on the adjoining slopes is the Hagerstown silt loam, with scarcely any stone within several feet of the surface. Again it is found occupying both the ridges and slopes, and the narrow upper slopes and slightly elevated bench lands along the edge of the valleys. Except for small areas of the type, mostly about the head of Pigeon Mountain, which have resulted from erosion, the type owes its differentiation from the Hagerstown soils to the nearly horizontal position of the underlying limestone layers, which has greatly retarded weathering. There is a slight dip of the rock as a rule and where the surface slopes in the opposite direction ledges are generally of frequent occurrence.

The main tree growth is oak, hickory, and cedar, the last being confined largely to the very stony areas.

A considerable proportion of the type is cleared and used for pasture, but none of it is cultivated on account of its stony character and tough unyielding properties. It makes excellent pasture lands. Bluegrass takes possession of it naturally and there are many other valuable grasses and clovers that would thrive if properly started.

CONASAUGA SILT LOAM.

The Conasauga silt loam, to a depth of 6 to 10 inches, is a light-brown to brownish-gray friable silt loam. Below this is a gradation through 3 to 6 inches of a heavier silt loam into a yellowish-brown silty clay, and this in turn increases in compactness to a depth of 18 to 30 inches, where it may grade into reddish-brown or red and

brown mottled compact silty clay. In local spots the subsoil has a reddish cast nearer the surface, while in others, inclined to be poorly drained, it continues a yellowish brown to a depth of 3 or more feet. Typically the soil and subsoil are practically devoid of stone, but on some of the gentle slopes there occur some fine shale fragments on the surface and in the soil, and some of the original shale structure of the parent rock is retained in the subsoil. Areas immediately along the cherty ridges are further modified by chert fragments washed down and scattered over the surface. The soil does not contain an adequate supply of humus to give it the properties necessary to produce maximum crops, being too compact, and as a result losing moisture too rapidly. With as good a supply of organic matter as is found in the gardens and other very productive spots, it is dark brown in color, mellow, and very retentive of moisture.

The Conasauga silt loam is a residual soil formed by the weathering of green to yellowish and blue clay and calcareous shales of the Conasauga shale formation. Its main development is in the Chattooga and Peavine Valleys, where it forms a continuous belt from 1 mile to 2 miles wide through the center of the county. To the south of La Fayette it forms almost an uninterrupted strip, but farther north, about the headwaters of the Chattooga River, it is broken by a number of areas of the Conasauga shale loam and the Armuchee silty clay loam, and in the Peavine Valley it gives way very largely to the Armuchee silty clay loam. Small areas occur in East Armuchee Valley near Villanow and in the small valley just east of Wilson. The surface features are level to very gently rolling and the natural drainage is good. The original forest consists very largely of a heavy growth of oak, combined with hickory, sweet gum, dogwood, and other deciduous trees. Areas inclined to be shaly also support a scattering growth of pine.

About all of the type is under cultivation, being used for the general crops of the area, and to a very limited extent near La Fayette for peach culture. The orchards here have given fair returns, but the type is not as well adapted to the production of this fruit as are the high, rolling cherty areas. The yield of cotton is ordinarily between one-third and one-half bale per acre, although some of the best farmers, by good tillage and liberal applications of fertilizer, have produced a bale to the acre. Corn yields from 20 to 40 bushels, oats 20 to 50 bushels, wheat 8 to 20 bushels, and hay from 1 ton to 2 tons per acre. The level topography of the soil, coupled with its light, friable nature, adapts it to various types of farming. It can be made to produce good yields of any of the general crops, including corn, oats, wheat, cotton, sorghum, cowpeas, and a variety of grasses and clovers for grazing and hay. It probably would grow a good grade of tobacco, and it is a good vegetable soil.

Dairy farming and the raising of cattle, hogs, and horses are also promising industries for this soil.

Under the present system of management a majority of the farmers on this type are not making the profits they should. There is need for a greater diversity of crops and more attention to the rotation of crops, with the idea of keeping the soil in a productive state. The main manurial requirement of the soil is more organic matter, which can best be supplied by applications of stable manure and the plowing under of leguminous crops. Occasional applications of lime would prove beneficial, especially after the plowing under of heavy green crops.

The price placed upon land of this type depends upon location and the state of development. It ranges anywhere from \$20 to \$50 an acre.

CONASAUGA LOAM.

The Conasauga loam, to a depth of 6 to 8 inches, is a light brownish gray fine loam, carrying small quantities of shale, shaly sandstone, and siliceous limestone fragments. Areas immediately along the edge of the Clarksville stony loam are also strewn with small angular chert fragments. The subsoil is typically a yellowish-brown friable clay loam to clay, extending to a depth of 3 feet or more without much change in color or texture. Locally at a depth of 18 to 30 inches it grades from a yellowish-brown clay loam into a light reddish compact clay. Very little stone occurs in the subsoil to a depth of 6 to 10 feet. The soil is deficient in organic matter and naturally yields less than the red limestone soils, but it is susceptible of being brought to a high state of productiveness.

This type is confined largely to West Armuchee Valley. It is derived from interbedded shales and flaggy sandstones and very siliceous limestones of the Floyd shale formation. These change gradually into a massive blue limestone of the same formation, which gives rise to areas of the Decatur loam, and as would be expected the two types merge into each other and small areas of the one are found in areas of the other. The surface features are level to gently rolling and all areas are naturally well drained.

The original forest consisted of a heavy growth of oak, hickory, chestnut, and other hardwood species.

About all of the type is under cultivation, being used principally for corn, oats, wheat, cotton, and cowpeas, the latter chiefly for hay. The yields are quite variable, depending upon how the soil is handled and the methods of cropping. Cotton yields from one-third to three-fourths bale, corn 20 to 50 bushels, oats 30 to 50 bushels, and wheat from 10 to 15 bushels per acre. The best results are obtained with corn, oats, and forage crops, including sorghum, cowpeas, and

grasses. Stock raising should not only prove immediately profitable, but afford the best means of keeping the soil in a highly productive state.

CONASAUGA SHALE LOAM.

The Conasauga shale loam, to a depth of 6 to 10 inches, ranges from a brownish very shaly silt loam to a mass of finely crumbled shale, with only enough silt and clay to make it slightly loamy. The subsoil is little else than a bed of soft greenish to yellowish-brown clay and calcareous shale in a partially crumbled state.

The Conasauga shale loam is a type of very small extent. It is derived from the Conasauga shale formation and confined to the steeper slopes where erosion has been most active. Several small areas were mapped about the headwaters of the Chattooga River and Peavine Creek, north of La Fayette, and two areas occur in East Armuchee Valley near Villanow. Numerous areas, too small to be shown on the soil map, are scattered here and there through the Conasauga silt loam, usually occupying slight knolls or "gall spots" on the slopes. Small areas of the type were no doubt a shale loam before they were cleared, but the majority of them have been reduced to their present condition by erosion following years of careless tillage. Erosion is still active in all of the cleared areas and in places they have been reduced to a state of practical worthlessness.

A large proportion of the type was cleared and put under cultivation years ago. The yields at first were good, but gradually declined as the soil was washed away, until they were no longer satisfactory. Gradually the least desirable areas were thrown out of cultivation, and now only small patches are under the plow. The abandoned areas are either unused or fenced for pasture. The type is not suitable for cultivated crops, but it could be used to advantage for pasture land, where owned in conjunction with the Conasauga silt loam and the Armuchee silty clay loam. It should be sown to Bermuda grass, as this not only would stop erosion, but afford the best of grazing from early spring until late fall. The worst eroded spots possibly should be allowed to reforest themselves.

On account of the limited extent of this type and its minor importance agriculturally, no samples were collected for mechanical analyses.

ARMUCHEE SILTY CLAY LOAM.

The Armuchee silty clay loam consists of 3 to 5 inches of reddish-brown silt loam to silty clay loam, underlain to a depth of 3 feet or more by a reddish-brown to red silty clay. In typical areas little or no stone occurs within 3 feet of the surface, but in places the soil contains small quantities of fine shale fragments, and traces of the original shale structure still exist in the subsoil. At varying

depths below 3 feet the clay gives way more and more to partially weathered shale, until bedrock is encountered.

The largest areas of the type are in Peavine Valley within the drainage influence of Peavine Creek. Smaller areas occur to the south in the Chattooga Valley and near Villanow in East Armuchee Valley.

This type of soil is a residual type from the Conasauga shale formation, being largely the result of erosion through what were originally silt loam areas, and by the same agency the extent of the type is gradually increasing. In the formation of this type erosion has only gone on to the extent of removing about all of the original soil. Where it has been much more severe not only the soil but the subsoil clay has been removed and areas of the Conasauga shale loam, which have scarcely any value, are found. The prevailing color of the clay of this type is redder than that of the Conasauga silt loam, owing to the more perfect drainage, but it does not show the deep red characteristic of the Decatur clay loam. The surface features, while gently rolling, will permit the use of nearly all kinds of improved implements and machinery.

The type originally supported a heavy growth of oak, hickory, chestnut, etc., the same as found on the Conasauga silt loam, although nearly all of it has been cleared for years. Corn, oats, and wheat are the main crops. A smaller acreage is devoted to grasses, cowpeas, sorghum, and several other crops of minor importance. Cotton is grown to some extent, but does not do as well as on the lighter textured types, on account of the tendency to grow too late in the fall. Corn yields 20 to 40 bushels, wheat 10 to 20 bushels, oats 25 to 50 bushels, and cotton one-third to three-fourths bale per acre. The wide range in yield is not due to any inherent differences in the soil, but to different methods of cropping and cultivation. With deep plowing, and the rotation of crops so as to get a deep, mellow soil, the average yield of corn should be over 50 bushels, wheat over 20 bushels, and oats over 60 bushels per acre. The type is susceptible of being brought to a very high state of cultivation. Its best use is for corn, wheat, clover, cowpeas, grasses, stock raising, and dairying. In the line of fruits, good apples can be grown, possibly also pears, plums, and cherries. It is too heavy to grow a peach of good shipping quality. The badly eroded slopes which have been thrown out of cultivation could be easily reclaimed and made profitable by plowing thoroughly and planting to cowpeas for a few seasons and then sowing to grass for pasturage.

DEKALB FINE SANDY LOAM.

The surface 8 to 12 inches of the Dekalb fine sandy loam consists of a light-gray to yellowish fine sandy loam, deficient in organic constituents. If under cultivation the grayish cast extends to the

depth the soil is usually plowed and changes to yellow immediately below, while in the forested areas the gray gives way to yellow within an inch or so of the surface. The subsoil, in its most extensive development, is a yellow or light yellowish brown compact fine sandy loam to clay loam, extending to a depth of 3 feet or more. Locally, in the more rolling areas, it is a yellowish fine sandy loam, interrupted by ledges and fragments of sandstone, and giving way within a few feet of the surface to solid bedrock. In some of the leveler areas where the weathering has extended to the greatest depths, it may be a yellowish-brown heavy fine sandy loam to clay loam, grading at a depth of 18 to 24 inches into a light yellowish-red clay loam to fine sandy clay. Except in small areas here and there, sandstone fragments are strewn over the surface, being most plentiful on the rougher slopes, where the condition of a true stony loam is approached.

The Dekalb fine sandy loam is a residual soil from the Walden sandstone formation, occupying the plateaus of Lookout and Pigeon Mountains. Above the cliffs which bound the Walden formation is a strip of broken, very stony land, in which are included the highest peaks. Beyond these are the extensive level to gently undulating and rolling areas occupied by the Dekalb fine sandy loam. Extensive tracts of the type are level, except for intricate systems of shallow swales through which the storm waters find their way to the main courses of drainage. Areas cut by frequent small streams are of a general rolling character, with perhaps some very narrow broken strips immediately along the streams. All areas are naturally well drained.

The horizontal to slight synclinal position of the Walden formation has resulted in a greater uniformity of soil than if there had been sufficient folding and tilting to bring the different strata to the surface. In places, however, the heavier sandstone layers have been cut through and the layers of shale reach the surface. Here the soil is considerably more silty than in the typical areas.

The forest growth consists mostly of red, post, white, and black-jack oak, with a scattering growth of chestnut, hickory, and dogwood. Areas bordering the Rough stony land may also have a mixed growth of oak, hickory, chestnut, and other hardwoods with scrubby pines.

The Dekalb fine sandy loam is very sparsely settled and the farms as a rule are small and in a poor state of cultivation, some being entirely abandoned on account of the removal of many families to the factory towns. Corn, the chief crop, gives low yields, ranging from 5 to 20 bushels per acre. Oats, sorghum, cowpeas, and a few other crops for home use are grown in a limited way. Nearly every farm has a small apple orchard, or in many instances a mixed orchard of apples and peaches. The bulk of the fruit is dried for the local

market. Considering the lax care the orchards receive, the fruit is of excellent color and flavor, and it is safe to say that the type is especially adapted to the growing of these tree fruits on a commercial scale. With better roads leading off of the mountains it would be possible to get the apples to the railroad station in good condition.

The growing of peaches for canning and drying purposes should be profitable. Irish potatoes, cabbage, and onions are grown on a very limited scale for the near-by markets. Potatoes do well and have good keeping qualities, especially the Lookout Mountain variety, which has been developed on this type of soil. Extensive areas have been bought up to be used for summer range for cattle, and the type has proved well suited to this use. On account of the high altitude the nights are too cool and the summers too short for the successful growing of cotton.

The Dekalb fine sandy loam naturally gives low yields of the general crops, but it is easily handled and by careful management and the rotation of crops it can be made to give profitable crops of corn, sorghum, cowpeas, and a number of other crops. A further hindrance to the development of the type is the lack of transportation facilities. The roads on top of the mountains are bad and those leading down to the valleys are very difficult to travel, both on account of their poor condition and the steep grades. There is urgent need for a few good roads leading to the near-by railroad stations. With these established it would be possible to grow apples, peaches, vegetables, and other perishable products to which the type is best adapted.

The value of land of this type of soil ranges from \$1 to \$10 an acre for the unimproved areas.

DEKALB STONY LOAM.

The soil of the Dekalb stony loam, to a depth of 8 to 12 inches, is a gray to yellowish or light-brown friable silt loam, containing numerous fragments of shaly sandstone and sandy shales. On the higher ridges and steeper slopes sandstone outcrops in ledges, and in all areas the surface is thickly strewn with sandstone and shale fragments. The soil is lighter in color and stonier on the high unprotected ridges, while in the coves, where the wash material accumulates, it is much deeper, darker in color, and very mellow.

The subsoil varies from a yellowish silt loam to a light-brown silty clay loam, or in local spots to a reddish-yellow silty clay loam. It contains shale and sandstone fragments, and the quantity increases rapidly with depth until solid rock is encountered. As with the soil, the subsoil is the deeper and more loamy on the lower slopes, and shallowest, or perhaps almost entirely replaced by stone, where erosion is most active.

The Dekalb stony loam is a rough hilly to mountainous type. It occupies over half of the east slope of Taylor Ridge, the crest and upper east slope of Dick Ridge, practically all of the rougher portions of John, Horn, and Mill Creek Mountains, and the rough, hilly areas, about 2 square miles in extent, at the upper end of East Armuchee Valley.

The rough hilly areas referred to above are derived from the Rome formation. Along the west edge of these areas is a prominent ridge formed by the heavy purplish to brown sandstones and shales occurring at the base of the formation, while to the east the topography, though quite hilly, is less broken, and the underlying rocks are mostly fine sandy and calcareous shales.

In all of the mountainous areas the soil is derived from the Rockwood formation, consisting mainly of green to yellowish thinly bedded shales, interbedded with purple to grayish shaly sandstones and sandy shales. The shales and sandstones have weathered very unevenly, and to this fact is due the stony character of the soil and the rough topography. Through the center of the Rockwood formation is a massive sandstone stratum, which is more resistant to weathering than any of the thinly bedded sandstones and shales. It reaches the surface at the crests of the mountains and gives rise to narrow strips of Rough stony land.

Cultivation of this type is confined to small areas near the county line north of Villanow. These are used for the general crops of the section, including corn, oats, sorghum, cotton, and a few other crops of less importance. The yields are invariably light and rarely ever justify the trouble and expense involved in cultivation. The areas could be used to better advantage by sowing to Bermuda grass and using them for permanent pasture. The growing of apples of some of the best areas of the type could be made a profitable industry. Peaches also would do well in places, but the crop could not be handled satisfactorily on account of the distance to market. The broken hilly and mountainous areas which are still forested with a mixed growth of pine, oak, chestnut, hickory, tulip, maple, and other hardwoods should not be cleared, at least until the section has reached a much higher state of development than at present. A noticeable feature is that pine is much more abundant than on the mountainous limestone areas, and even within the type the fine growth is found largely on the higher stony ridges. Frequent forest fires have killed a very large proportion of the forests on John, Horn, and Mill Creek Mountains, some areas not having the covering necessary to prevent erosion. The valuation of the forested areas is based very largely upon the kind and amount of merchantable timber they support.

HANCEVILLE STONY LOAM.

The soil of the Hanceville stony loam, to a depth of 8 to 10 inches, is a reddish-brown light friable loam. Below this there is a gradation through a few inches of a heavier loam into a distinctly red friable clay loam, which gives way to bedrock at varying depths below 3 feet. Sandstone fragments, ranging from small particles up to pieces a foot or more in diameter, are thickly strewn over the surface and mingled with the soil material.

The Hanceville stony loam is an unimportant type occupying two narrow strips on Taylor Ridge, one just to the east of the crest of the ridge and the other extending from the edge of the valley on the west more than half way up the slope. Small talus slope areas bordering the valley lands are only gently rolling, while the higher lying areas are steep and cut by frequent gorges.

This type has been formed by the decay of highly ferruginous sandstones and sandy shales of the Rockwood formation. The area on the east slope, which is the more typical, follows out the exposure of a dark-brown to purplish sandstone, containing a very high percentage of iron. The area on the west slope is somewhat more variable in texture, and it does not have the intense coloration characteristic of the other area, although quite red. The soil-forming rocks here are purplish sandstones and sandy shales, but the soil has been modified from the massive sandstones above. The soil is deepest and least stony in the low talus slopes on the west side of the mountains, where it is formed very largely by the creep of material from the higher lying areas. The underlying rock here may be limestone, but it does not come near enough the surface to have any influence upon the soil.

Small areas at the foot of the mountain are under cultivation. This gives light to medium yields of corn, cotton, oats, wheat, sorghum, and the other general crops of the area. The rougher areas are still forested with a mixed growth of oaks of different varieties, hickory, chestnut, maple, tulip, and other hardwoods. On account of the mountainous character of this type it could best be used for grazing. The areas now under cultivation should be terraced to prevent destructive erosion. There is need for a systematic rotation of crops, as by this means erosion could be greatly checked, the fertility of the soil maintained, and the crop returns increased. Every effort should be made to keep the soil covered with a crop as nearly all the time as possible.

MONTEVALLO SHALE LOAM.

Occupying as it does rough mountainous areas, the Montevallo shale loam varies considerably in color and texture. In its most extensive development the soil, to a depth of 5 to 8 inches, consists

of a brownish very shaly silt loam to finely crumbled shale with a small admixture of silt and clay. Below this is a mass of soft crumbled shale extending to a depth of 3 feet or more. The other extreme is found on some of the gentle slopes, where the weathering has extended to greater depth. Here the soil may be a light brownish silt loam, containing only a very small quantity of shale fragments, and grading below into a yellowish-brown silty clay loam. The color of the shale content of the soil and subsoil varies from greenish to yellow, red, and purple, some of the most broken and more shaly areas having a pronounced purplish cast.

The Montevallo shale loam is a residual type, including all areas of the Rockwood formation in the western half of the county. It occupies the east slope of Shinbone Ridge from the southern edge of the county to near the Catlett Gap Road, and thence it continues around the head of Lookout Mountain to a point southeast of Cedar Grove in a less well-defined and very broken strip. From the last-named point to the head of McLamore Cove and back along Lookout Mountain to near Eagle Cliff it occupies the slope of a sharp, ridge. North of Eagle Cliff it discontinues at the foot of the mountain and shifts to the east, forming a narrow band around the valley of Dry Creek.

Except in local spots the surface features of the type are very rolling to choppy and broken, with local differences in elevation ranging up to 300 feet or more.

The phase of the Rockwood formation from which the Montevallo shale loam is derived is practically devoid of the heavier sandstone layers, consisting for the most part of thinly bedded, highly colored shales. It contains seams of valuable iron ore now being worked extensively in places. Lying just above the Rockwood formation is a thin stratum of the Chattanooga black shale, which gives a slightly heavier and less shaly soil. On account of the very narrow width of this band and the fact that it has been partially covered by material from the higher lying cherty areas, no attempt was made to outline it as a separate type. The crests of the ridges occupied partly by this type are held up by the very cherty layers at the base of the Fort Payne chert formation, instead of by sandstone layers as in Taylor Ridge and the other mountains occupied by the Dekalb stony loam.

This type is not farmed except in very small areas at the base of the ridges and these areas are not typical. Corn, oats, cotton, and the other crops grown give light yields. The surface features are entirely too rough to allow the type to be used to any extent for general farming. Some areas would make fairly good pasture land. The steep ridges are forested largely with scrubby pine, while in the gorges there is a mixed growth of pine and a variety of deciduous

trees. The value attached to the type is largely dependent upon iron-ore deposits and for the timber it supports.

ALLEN FINE SANDY LOAM.

The Allen fine sandy loam, to a depth of 6 to 8 inches, is a brown to reddish-brown fine sandy loam. The subsoil is a reddish-brown to red heavy, compact fine sandy loam to loam. Rounded sandstone fragments are scattered over the surface and disseminated through the soil mass to a depth of several feet. Some areas were so thickly strewn with bowlders that large quantities had to be removed before they could be used with any satisfaction for cultivated crops. The soil is naturally productive and easy to keep in good tilth.

The Allen fine sandy loam is confined to small areas at the mouths of gorges issuing from Lookout and Pigeon Mountains. The largest of these is at Harrisburg near the Chattooga County line. Smaller areas are found at Bronco, Flintstone, and about a mile and a half southwest of Cassandra. They are of colluvial origin, formed by sandstone material from the mountains, brought down by flood waters, and mixed with the red soil material in the valleys, principally from the Bangor limestone. The surface features are level to gently sloping and the natural drainage is good.

Almost all of the type is cleared and used for cotton, corn, sorghum, grasses, and cowpeas. The average yield of cotton is about one-half bale and of corn about 25 bushels per acre. With good management more than double the present yield should be obtained. Besides the present crops the type would prove well adapted to the growing of peaches, especially on the higher slopes near the edge of the mountains. Apples, pears, and cherries also should do well.

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

Mechanical analyses of Allen fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
24812.....	Soil.....	0.1	2.3	12.1	40.8	14.1	20.3	9.7
24813.....	Subsoil.....	.3	1.8	11.0	34.5	11.1	25.0	15.8

ROUGH STONY LAND.

Rough stony land includes all of the rougher mountainous areas, so stony as to be of no agricultural value, except for the timber they support or if cleared for grazing purposes. The largest areas form a continuous strip one-half mile to nearly 2 miles wide, around Pigeon

Mountain and along the east slope of Lookout Mountain, including the upper steep slopes and cliffs bounding the plateau lands and the lower limestone slopes to the edge of the valleys. It also includes the high, rough areas at Durham and a narrow sandstone strip along the crest of Taylor Ridge.

The limestone areas have a brownish loam to clay loam soil, grading either into a yellowish-brown or a red clay loam to clay subsoil, and this into solid bed rock within a few feet of the surface. Large and small fragments of limestone and of sandstone from the higher cliffs are thickly strewn over the surface and the bed rock outcrops in numerous ledges. The tree growth consists of oak, hickory, chestnut, and a few other deciduous trees, including poplar, elm, and maple, with a scattering growth of pine.

Passing above the Bangor limestone slopes the sandstone areas are encountered. These are rough to precipitous and consist of almost pure rock outcrop in places. Where there is any soil it is a gray to yellow fine sandy loam, underlain by a yellow fine sandy loam to sandy clay. On these areas the tree growth is more scattering and scrubby than on the limestone areas, the forests containing a greater proportion of pine.

Small areas on the limestone slopes are in reality a stony loam or clay loam, but it was not possible to show them as a separate type on the map. Such areas, where accessible, can be used to advantage in growing apples. The other limestone areas can be developed into fairly good pasture by clearing away the trees and allowing native grasses to take possession of the land. The sandstone areas should not be cleared.

HUNTINGTON SILT LOAM.

The Huntington silt loam consists of 8 to 12 inches of a brownish-gray to brown silt loam, underlain by a lighter brown compact silt loam to silty clay loam. Being of alluvial origin along small streams draining different formations it is somewhat variable in color and texture. The areas through the Chickamauga limestone formation are the most extensive and the nearest typical, the soil being dark brown, mellow and free from stone. Along the Chattooga River, Peavine Creek, and the upper course of East Armuchee Creek, where the drainage is from the Conasauga shale, the soil has less distinct brownish cast, while those areas composed of rock principally from the Clarksville gravelly loam are light brownish-gray in color, and contain more or less angular chert gravel. Those from the Bangor limestone vary from brown to reddish brown, depending upon the activity of erosion in the adjoining uplands.

All of these areas are first bottoms and subject to overflow during every wet spell, although only in local spots are they constantly too wet to be used successfully for the production of crops.

A very large percentage of the type is under cultivation. It is devoted principally to corn, which yields anywhere from 25 to 60 bushels per acre. Sorghum and grasses make a rank growth, the latter yielding from 1 ton to 2 tons of hay per acre. The uncultivated areas are used for pasture. The very narrow areas subject to the most frequent overflows and those naturally wet could not be used to better advantage than for pasture. Lespedeza and many native grasses thrive without any attention on this soil.

HOLLY SILT LOAM.

The Holly silt loam, to a depth of 6 to 10 inches, is a gray to brownish-gray silt loam. The subsoil is a gray to light-brown compact silt loam extending to a depth of 3 feet or more, or giving way at a depth of 15 to 24 inches to a greenish-yellow or brown plastic clay. Varying quantities of angular chert gravel are strewn over the surface and disseminated through the soil mass.

The Holly silt loam is a very limited type, occurring in narrow strips along the small streams draining the Clarksville gravelly loam areas, the majority of these being too small to show on the soil map. The areas along the east edge of Missionary Ridge between Pond Spring and Lytle are almost purely alluvial and do not have the heavy underlying clay. About a mile and a half east of High Point is a small area, partly alluvial and partly colluvial, where the heavy clay occurs. All areas of the type are subject to overflow during every heavy rain, and are constantly too wet to allow the best results with crops. The type is used to a limited extent for corn, sorghum, cowpeas, and a few other crops which give very variable yields, depending on whether the seasons are dry or wet and upon the destructiveness of the overflows. Its best use is pasture, planting to Bermuda grass. Lespedeza makes a good growth on it without any attention.

SUMMARY.

Walker County is situated in the northwestern part of Georgia and comprises 434 square miles, or 277,760 acres. Lookout Mountain, capped by level to rolling plateau lands, extends along the western boundary. East of this is a series of level to gently rolling valleys alternating with broad rolling to steep broken ridges. The plateau lands of Lookout and Pigeon Mountains are about 2,000 feet above sea level, while the valleys are only 750 to 1,000 feet and intermediately elevated ridges from 1,000 to 1,800 feet.

The drainage is about equally divided between the streams flowing south into the Coosa River and those flowing north into the Tennessee River.

The climate is mild and healthful and adapted to a diversity of farming interests. The growing season of about six and one-half months is rather too short for cotton to become one of the main crops, except on the lighter soils, where it matures early. The mean annual temperature is about 60° F. and the annual precipitation is between 50 and 55 inches, well distributed throughout the year.

The 1900 census gave the total population as 15,661, of which 2,464 were negroes.

La Fayette, the county seat, with a population of about 1,500, is the largest town. Farther north is Chickamauga, with about 500 inhabitants, and Rossville, a suburb of Chattanooga, is in the northern end of the county. These and Chattanooga form the chief marketing and trading centers.

Corn is the main crop. Wheat, cotton, and oats are the next in importance, and often these are grown in small patches for home use.

Stock raising is not an important feature except with a half dozen or less farmers, although many keep small herds of cattle, mostly scrubs and grades that do not command the best prices in the market.

Peaches are becoming an important crop, and small areas near Chattanooga are used for strawberries and vegetables.

There is need for a greater diversification of crops, better methods of tillage, and more attention to the adaptation of the different soils to different lines of farming or to different varieties of crops.

The farms vary in size from 50 to 500 or more acres, the average size farm, according to the census of 1900, being 96 acres. About 48 per cent of the farms are operated by the owners, and the remainder tenanted. Land values are rising but are still comparatively low, considering the healthful climate and wide range of opportunities. From \$1 to \$5 for the rough mountain areas, which are valued chiefly for the forest they support, there is a range in prices to from \$30 to \$75 an acre for the best valley lands.

Labor is scarce but does not cause much concern with a majority of the farmers, who depend upon their families for most of the necessary help.

The county has an extensive system of public roads and rural delivery service to all but the mountain sections.

The railroad facilities are fairly good for the central and northern sections of the county. The eastern part and the mountain plateau areas are handicapped by the lack of shipping facilities.

Walker County has a great variety of soils varying from sandy loams to clays in texture and from level valley lands to rough stony areas unfit for agricultural purposes. Twenty types of soil were recognized and mapped in the county. With the exception of the small stream bottoms, which are of mixed origin, they bear a direct relation to the underlying rocks, the majority being from limestones.

The Clarksville gravelly loam is the most extensive type. About half of it is under cultivation. Corn and cotton are the main crops. Peaches are also grown and do well. It is also used to a limited extent for a variety of other crops for home use. The yields are only fair upon most of the farms, though some have produced 50 or more bushels of corn and a bale of cotton to the acre. Strawberries, cantaloupes, Irish and sweet potatoes, vegetables, and tobacco are promising crops for the type.

The Clarksville stony loam occupies rough slopes and ridges that are not suited to general farming. Small areas are planted to cotton, corn, and other crops and the yields are light. Peaches are grown to some extent and they do exceptionally well. The type is best adapted to the growing of peaches and apples, or if too far from the railroad for this purpose it should be used for pasture lands.

The Decatur loam is a level to gently rolling valley type from limestones, and is about all under cultivation. It is used for corn, wheat, oats, cotton, and forage crops, all of which give good yields. If brought to a high state of cultivation it would grow good alfalfa.

The Decatur clay loam is a level to gently rolling limestone type, somewhat heavier than the Decatur loam, but equally as desirable for general farming. Besides the general crops now grown it could be made to grow a variety of others, including alfalfa. About all of it is under cultivation.

The Hagerstown silt loam is a level to gently rolling valley type from limestone. It is naturally very productive and about all of it is under cultivation, being highly prized for corn, oats, wheat, and forage crops. It would grow good alfalfa.

The Hagerstown clay is a heavier limestone soil of the same origin as the Hagerstown silt loam. It has level to rolling topography, and is naturally productive. It is used mainly for corn, wheat, oats, and grazing purposes. It would give much better yields if handled in a way to prevent erosion. Bluegrass takes to it naturally.

The Colbert silty clay loam is a flat, imperfectly drained limestone soil, occurring mainly in the Chickamauga National Park and Dry Creek Valley, just across Missionary Ridge. It is farmed in a limited way to corn, wheat, and oats, which give light to fair yields. Its best uses are for wheat, cowpeas, grasses, and pasturage.

The Colbert stony clay is a very stony, heavy clay, naturally very productive, but too stony to handle satisfactorily. It makes excellent pasture lands. Kentucky bluegrass and Bermuda grass and clovers thrive on it.

The Conasauga silt loam is a level to gently rolling type from calcareous shales, occupying most of the Chattooga Valley and parts of Peavine and East Armuchee Valleys. It is not quite so productive as the best limestone areas, but produces good crops of corn, wheat,

oats, etc. Besides general crops, it could be used to advantage for trucking where near the railroads. Nearly all of it is under cultivation.

The Conasauga loam is a limited type occurring mostly in West Armuchee Valley. It produces fair to good crops of cotton, corn, sorghum, oats, and other general farm crops. The best results are obtained with corn and forage crops.

The Conasauga shale loam is a minor type, occupying eroded slopes through the Armuchee silty clay loam and the Conasauga silt loam. It is farmed to a limited extent, but is best used for pasture lands. Bermuda grass should be planted to check erosion.

The Armuchee silty clay loam is a productive valley soil from calcareous shales. It is about all cleared and used principally for corn and wheat. The yields are fair to very good, depending upon how it is handled. It is rather too heavy to be used for cotton, although cotton is grown in a limited way. It is a good forage and pasture soil.

The Dekalb fine sandy loam includes all of the plateau lands of Lookout and Pigeon Mountains. Its natural productive capacity is low, and the yields among the majority of the farmers are light, but it can be brought to a high state of cultivation. Corn is the main field crop. Some apples and peaches are grown, and where the trees are given any care the fruit is of good quality. The growing of fruit should be gone into extensively for canning and drying purposes. Irish potatoes and late summer vegetables do well. Extensive tracts are now used as summer range for cattle.

The Dekalb stony loam is a rough mountainous type, not used to any extent for farming purposes. It should remain in forest, excepting possibly those small areas here and there which could be used to advantage in growing apples and peaches.

The Hanceville stony loam is a rough mountainous type that should remain forested. Small areas at the foot of the mountains are now used for corn, cotton, and other crops.

The Montevallo shale loam is a rough mountainous type. Small areas at the base of the ridges are farmed to corn, cotton, and oats, which give light yields. The rougher areas are not used for farming purposes, and they should remain timbered. Local areas probably could be profitably used in growing apples or as pasture.

The Allen fine sandy loam is a very limited type, occurring as level to gently sloping valley lands at the mouth of the mountain gorges. About all of it is cleared and used for cotton, corn, and a few other crops. It is well adapted to the growing of peaches, and produces good apples.

Rough stony land includes the rough very stony mountain areas, which are not suitable for cultivated crops. In places they could be converted into good pastures, but they should be kept in fruit at least

until the section has reached a much higher state of development than at present.

The Huntington silt loam, an alluvial type along the streams, is a mellow and productive soil. It gives good yields of corn and forage crops, and is also adapted to pasturage.

The Holly silt loam does not occur to any extent in Walker County. It is an alluvial and colluvial type found along the small streams where the drainage is entirely from the Clarksville type. Frequent overflows make crops uncertain. In favorable seasons it produces good crops of corn and forage.

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