



this county from the State of South Carolina, the remainder of the eastern boundary being formed by the Stephens County line. It is bounded by Banks County on the south, by Hall County on the southwest, and by White and Towns Counties on the west and northwest. The greater part of the western boundary of the county is formed by the Chattahoochee River. The county is very irregular in outline. It comprises an area of approximately 283 square miles, or 181,120 acres.

Habersham County lies within two broad physiographic divisions, the Blue Ridge Mountains and the Piedmont Plateau. The boundary between these two regions extends in a general westerly direction from near the junction of the Stephens County line and Panther Creek, in the eastern part of the county, to the point at which Maulden Mill Creek crosses the White County line. This line is very irregular, running northward along the creeks which flow from the mountains and then southward, around the various high ridges. The line is also somewhat arbitrary in places, owing to the many valleys and coves which extend back into the mountains. Generally, however, the line is determined by distinct differences in the topography. In places there is a gradual rise from the Piedmont to the mountains and as a rule in such instances the 1,500-foot contour line represents the boundary, although in the northeastern part of the county the line of separation is somewhat lower. In this section Panther Creek is arbitrarily taken as a boundary.

The Blue Ridge section is characterized by a mountainous and rugged topography, consisting of narrow-crested ridges of various altitudes flanked by steep slopes, with many ravines, coves, or deep, broad valleys. The crest of the Blue Ridge runs in a northeast-southwest direction. Tray Mountain has the highest altitude, 4,403 feet above sea level. The eastern slope is very steep and rough, with little land smooth enough for cultivation. Spurs extend southeastward and southward from the main ridge, such are the Tallulah Mountains and Alec Mountain. The highest point on Alec Mountain is approximately 1,700 feet, on Stony Mountain 2,000 feet, and on Oakey Mountain 2,309 feet above sea level. The elevations decrease very rapidly toward the Tallulah River on the east and toward the Piedmont on the south. The cliffs along the Tallulah River gorge vary from 500 to 700 feet in height. The stony-walled valleys also extend back along the streams which flow into this river.

In contrast to this rough, steeply sloping country there are some gently sloping benches or shoulders which can be farmed. The streams flowing through the mountain region have cut deep and broad valleys, with bottoms varying in width from one-eighth to one-half mile.

The Piedmont Plateau portion of the county embraces over two-thirds of its area. It is characterized by an undulating or gently rolling to strongly rolling topography, with some areas of a distinctly hilly character. The crests of the stream divides represent the smoothest areas. The slopes of these divides have been dissected in varying degrees by erosion, the surface irregularities being represented by the drainage ways. The highest elevation of the Piedmont, 1,587 feet, is on the ridge between the Chattahoochee River and the Middle Fork Broad River, in the vicinity of Mount Airy. From this ridge northward a panoramic view presents a flat to gently rolling country, with a gradual rise toward the mountain. To the south and east of this ridge the roughest topography is found. The surface here is badly dissected by the deep valleys of the many intermittent streams. There are many rounded to sharp-crested ridges and hills. In many places the topography is so rough and broken that cultivation is unsafe. In this section the streams have cut ravines or gorges from fifty to several hundred feet deep. On account of this rough topography this section is locally spoken of as "mountains."

Habersham County is within the Savannah and Chattahoochee River drainage basins. The ridge separating these drainage systems extends from the vicinity of Alto, in the southwestern part of the county, northeasterly to New Switzerland, at which point it turns northward, passing through Turnerville to the top of Hickory Nut Mountain. The Soque River is the chief tributary of the Chattahoochee. It rises in the northwestern part of the county, in Goshen Mountain, and with its tributaries drains the greater part of the county. Deep and Glade Creeks, two of the main tributaries of this stream, carry the drainage waters of the northeastern section. Panther and Little Panther Creeks form the chief tributaries of the Tugaloo River, draining practically all of the land in the northeastern part of the county east of the dividing ridge. The southeastern areas are drained by various branches of the Broad River.

The streams of the county form a very intricate drainage system, dividing upstream into smaller drainageways and finally disappearing in intermittent streams and gullies. The waters of the mountain streams descend rapidly, often over cascades, to the less swiftly flowing Piedmont streams.

Habersham County was originally a part of Franklin County, from which it was separated and established as a county in 1818. At a later date a part of its area was used in the formation of Banks and Rabun Counties, while in 1895 approximately one-half of the remaining portion was taken in the formation of Stephens County.

Settlement within the territory now embraced within this county began in the latter part of the eighteenth century, the settlers com-

ing from North and South Carolina and Tennessee. The early settlements were made along the stream courses in the mountain sections of the county. A large settlement was also made on Goshen Mountain. Many of the early immigrants subsequently moved to other sections of the State, leaving the general region which was first settled sparsely inhabited. The present population, which is given in the 1910 census as 10,134, is chiefly distributed through the southern part or the Piedmont division of the county. The mountain sections are very sparsely settled, many of the rougher areas being practically uninhabited.

Habersham County includes a number of prosperous towns of local importance. Clarkesville, the county seat, is centrally located. It has a population of 528 according to the 1910 census. Cornelia, with a population of 1,114, is the largest town in the county. This town is situated on the Southern Railway in the southern part of the county, and is an important shipping point. Mount Airy, a small town near Cornelia, is a popular summer resort. Demorest, with a population of 760, is about 4 miles south of Clarkesville and 4 miles north of Cornelia. It is noted for its mineral springs. At Tallulah Falls, on the Tallulah River, one of the largest electric power plants in the State of Georgia is in operation. The electricity is generated by water power. Other towns or shipping points of local importance are Alto, Baldwin, Turnerville, Hollywood, and New Switzerland.

Transportation facilities are afforded by the main line of the Southern Railway, which extends across the southern part of the county from west to east, passing through the towns of Alto, Baldwin, Cornelia, Mount Airy, and New Switzerland. From this line at Cornelia the Tallulah Falls Railway extends in a northerly direction to Tallulah Falls through Demorest, Clarkesville, Hollywood, and Turnerville.

Habersham County has an excellent system of public roads which extends into all parts of the county. The roads are chiefly of the sand-clay type and are kept in good condition.

Gainesville, Athens, and Atlanta are the principal outside markets. Orchard products are generally crated and shipped in carload lots to New York and other large northern markets.

#### CLIMATE.

The climate of Habersham County is in general similar to that prevailing throughout the Piedmont-Blue Ridge belt extending through the Carolinas and terminating in northern Virginia. There is no Weather Bureau station within the county, but the data in the table below, taken from the records of the Weather Bureau station at Clayton, Rabun County, represent fairly well the local conditions.

*Normal monthly, seasonal, and annual temperature and precipitation at Clayton, Rabun County, Ga.*

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December.....	41.7	75	2	6.58	8.19	7.70
January.....	40.0	75	— 1	5.64	5.70	10.98
February.....	39.5	71	— 5	6.73	6.53	1.65
Winter.....	40.4			18.93	20.42	20.33
March.....	50.6	89	8	7.15	2.48	10.36
April.....	55.8	91	23	5.81	2.66	3.01
May.....	65.9	94	20	3.63	2.52	2.84
Spring.....	57.4			16.59	7.66	16.21
June.....	67.0	96	42	5.31	2.31	5.63
July.....	74.4	96	49	7.73	7.29	14.50
August.....	74.1	95	47	7.66	2.99	10.84
Summer.....	71.8			20.70	12.59	30.97
September.....	68.5	93	36	5.06	1.98	13.72
October.....	56.8	89	24	3.99	2.95	6.12
November.....	48.3	76	14	3.82	0.66	4.20
Fall.....	57.9			12.87	5.59	24.04
Year.....	56.9	96	— 5	69.09	46.26	91.55

The climate is characterized by long summers and short, mild winters. The average annual temperature is about 57° F. July and August are the hottest months, but the temperature does not reach 100° F. Cool nights relieve the intensity of the heat of the day. The winters in general are mild, but occasional cold periods occur, the temperature dropping below zero. January and February are the coldest and most disagreeable months of the year. The cold waves are generally followed by short periods of warm weather. In late spring a series of warm days sometimes forces the fruit buds, which may be frozen during subsequent cold waves.

There is considerable difference between the climate of the mountain region and that of the southern part of the county, both in the summer and the winter, the summer months being markedly cooler in the mountain section. Also, the precipitation in the mountain region is greater than in the southern part of the county. Snowfalls of 2 to 6 inches are of frequent occurrence.

The average date of the last killing frost in spring is April 15, and of the first in the fall October 19. This gives a growing season

of 186 days. The latest date of killing frost in the spring reported is May 10, and the earliest date in the fall October 1.

The rainfall of the northern part of the county is probably not exceeded anywhere in the United States except on the Pacific coast. There is an annual mean precipitation of about 69 inches, which is more than sufficient to meet the needs of growing crops. During the driest year the total rainfall recorded at Clayton was 46.26 inches, which is above the average for many parts of the United States, while during the wettest year the total precipitation was 91.55 inches. The greater part of the precipitation occurs during the growing season, while the lightest rainfall is during September, October, and November, which is favorable to the harvesting of fall crops.

On the high dividing ridge in the southern part of the county between Alto and Mount Airy very few crops are lost on account of frost, as the many gullies or heads of streams along the steep sides to the south permit excellent air drainage. On the tops of the highest mountains, as Tray and Oakey, it is claimed that injurious frosts also do not occur.

The climate is decidedly healthful, and for this reason many people from the southern part of the State, and from other southern States, maintain summer homes within the county.

#### AGRICULTURE.

Agriculture has been the chief industry in Habersham County since the time of its earliest settlement.

The first settlements were made on the fertile bottom lands and valley slopes of the various streams in the northern part of the county. The settlers brought with them a large number of cattle and sheep, which were pastured on the open range. The agriculture practiced by these settlers was entirely of the self-sustaining type, there being little incentive to produce more than could be locally consumed.

Augusta was the chief market during the early history of the county, whisky, hides, and cattle being the principal products sold. At a later date trading was done at Athens and Gainesville.

Agriculture developed gradually. At first only the bottom lands were farmed, and later, with the increase in population, the uplands were occupied. The establishment of railway transportation in the seventies gave a strong impetus to agricultural development. Cotton, corn, and small grain became the principal crops. The production of fruit also became important.

The acreage devoted to corn is greater than that of any other crop. Almost one-third of the improved farm land of the county is in this crop. According to the census of 1910, 13,250 acres were planted to

corn in 1909, with a total yield of 157,474 bushels. This shows an average yield for that year of about 12 bushels per acre. On the better soils under best management the yields range as high as 80 or 100 bushels per acre, and progressive farmers have averaged for the last four years from 20 to 40 bushels per acre on the upland soils.

The best corn soils are the alluvial soils, the Congaree silt loam giving the heaviest yields. The Congaree sandy loam and Toxaway fine sandy loam are also good corn soils, the yields ranging considerably higher than on any of the upland types. The majority of the farmers in the upland prefer the Cecil clay loam for corn.

The land for corn is, in many cases, prepared in the same manner as that for cotton, being plowed in the fall with a 2-horse or a 3-horse turning plow, unless the field is planted in a cover crop during the winter months. In the spring the soil is finely pulverized, generally by the use of a disk harrow or a drag harrow. The soil is then bedded and the seed planted. The rows are  $3\frac{1}{2}$  to 5 feet apart, the average distance being  $4\frac{1}{2}$  feet, depending chiefly on the productiveness of the land and the treatment of the soil. On productive and well-fertilized soil the distance between the rows is decreased, while where the soil is less productive the distance is greater. The interval between the hills in the rows is governed by the same conditions, varying from 1 to 3 feet, with an average of about 2 feet.

Corn is planted between April 1 and May 5. The date of planting is slightly later on the bottom or alluvial lands because these soils are not in condition to work as early in the spring as the upland types. The cultivation of this crop is begun when the plants are well above the ground by throwing a small amount of the soil down into the furrows with a small plow. This is followed by a similar working, only with a heavier plow, which throws more soil into the furrow. Subsequent cultivation consists of harrowing the bed or the soil between the rows to remove weeds and to maintain a good surface mulch. Sweeps are then used until the crop is "laid by," usually between July 1 and July 15. About the latter part of August the fodder is pulled, the stalks being stripped of the leaves, which are tied into bundles, to be used as forage. Sometimes the top of the stalk, or that portion above the ear, is cut off and the remaining lower leaves are pulled. Only a very small part of the corn is cut and shocked or shredded.

Fertilizers are not in general use for corn, although a large number of the best farmers are giving increasing attention to the fertilization of this crop. It is a common practice, where no fertilizers are used, to apply all the stable manure available on corn land. The manure is generally placed in the furrows in which the corn is planted. In some cases it is broadcasted over the land, while in many other cases it is distributed along the middle of the rows, the

soil being bedded over it. Commercial fertilizers are used in quantities ranging from 150 to 600 pounds per acre. A mixture analyzing 10 per cent phosphoric acid, 2 per cent nitrogen, and 2 per cent potash is commonly used. The mixtures vary, however, from 8 to 10 per cent phosphoric acid, 2 to 4 per cent nitrogen, and 2 to 6 per cent potash. The fertilizer is generally distributed in the rows before the time of planting, although in a few cases it is distributed in two applications, half at the time of planting and half as a side dressing during the period of cultivation. Sometimes a side dressing of 100 pounds per acre of sodium nitrate is applied. On the alluvial lands little or no fertilizer is used.

Of the varieties of corn grown in the county the Marlboro Prolific is the most popular and the most extensively planted on the upland soils. The Hastings Prolific is used throughout the county, while a local variety called the "Disharoon" is commonly grown, especially on the bottom lands.

Cotton is produced to only a limited extent in this county, occupying only about 7 per cent of the improved farm land at the time of the last census. It is grown chiefly in the southern part of the county. The United States census of 1910 reports a yield of 1,053 500-pound bales from 2,976 acres, or an average of a little over one-third bale per acre.

In preparing the land for cotton it is usually broken broadcast in the fall, generally with a 2-horse plow. In some cases the land is prepared in the spring, although after fall plowing and deep subsoiling the land is in better condition for planting and the crop can be planted earlier. The land is harrowed, in some cases several times, with an ordinary disk or drag harrow. The rows are laid off by plowing out a furrow with an ordinary turning plow at distances ranging from 3 to 4½ feet, depending upon the productiveness of the land. The fertilizer is applied in the furrow, and the soil is listed over this furrow to form a bed, ranging from 4 to 6 inches in height, in which the seed is planted. In some cases level preparation of the land and level cultivation are practiced, but these methods are not popular.

Cotton is generally planted between May 1 and May 15. It is planted as early as possible in the southern part of the county, and at a later date in the more northern sections. The first cultivation of this crop consists of harrowing between the rows with a diverse harrow and cultivator. The "barring off," which is usually the first cultivation of the crop in other parts of the State, is not practiced in this county. The plants are thinned by the use of hand hoes and are left 4 to 18 inches apart, the average distance being approximately 8 inches. Subsequent cultivations are given to this crop

with sweeps and harrows. The crop is given four or five cultivations before it is "laid by," generally about July 1 to July 10.

In order to force quicker fruiting the practice of topping the cotton is followed to a limited extent. This consists of either cutting or pinching off the tops of the cotton stalks when they are about 3 feet high.

The cotton crop is generally fertilized, the quantity of fertilizer used and manner of application varying on the different farms. The lowest grade fertilizer used is about an 8-2-2 mixture, and the highest about a 10-4-4. The applications range from 250 to 800 pounds per acre, averaging between 300 and 400 pounds. In most cases all the fertilizer is used at the time the seed beds are made. In a few cases two or three applications are made, particularly where large quantities are used.

A comparatively large number of varieties are grown. Owing to the location of the area the early-maturing varieties are most popular. The King, which is an early small-boll variety, is most commonly used, while the Broadwell Double-Jointed and Truitt are extensively grown.

Oats have never had an important place in the agriculture of the county, although the crop has been grown since the time of earliest settlement. According to the census of 1910 oats occupied an acreage of 506 acres, with a production of 4,381 bushels. The average yield per acre is about  $8\frac{1}{2}$  bushels. The crop is grown for several different purposes. It is used for pasture during the winter months, as a cover crop both on farms and in apple orchards, as a forage crop, and for grain. The acreage devoted to oats is increasing owing to the use of the crop in systematic crop rotations. Although the average yield is low, as high as 60 bushels per acre have been produced on upland soils properly prepared and well manured before seeding. Oats do well on the uplands, but produce greater average yields on the alluvial soils.

In planting oats the seed is usually broadcasted over the land and plowed under with an ordinary small turning plow, which necessarily leaves the land rough and forms an imperfect seed bed. A better method consists of plowing the land and preparing a good seed bed by thorough harrowing, and drilling the seed in by the use of the ordinary grain drill. The latter method is gradually replacing the older and less satisfactory practice. Another method which is commonly practiced is to sow the seed in deep furrows between the corn or cotton rows, giving it only a shallow covering. By the time the corn or cotton crop is harvested the oats are well above ground, and are not materially damaged by the harvesting of the other crops. The rows are from 8 to 12 inches apart.

The most satisfactory results are had where the oats are seeded in October, which permits the crop to make a sufficient growth to resist the effects of winter freezing. A large acreage is sown during the winter months or in the spring. When sown in October the crop in some cases is pastured during the winter. It also tends to prevent the washing of the land.

The crop is harvested about June. It is sometimes cut at an earlier date, or when green as a hay crop. It is sometimes fed in the straw, while in other cases the grain is thrashed. The harvesting is done chiefly by hand with a cradle, although mowers are sometimes used.

In growing oats the use of fertilizers is not general. However, where used the fertilizer is of practically the same grades as that used for cotton or corn. The application is somewhat lighter, ranging from 100 to 250 pounds per acre. Where the grain is drilled in, the fertilizer is applied at the time of seeding; where the seed is broadcasted the fertilizer is also broadcasted. During the spring a top dressing of 100 pounds per acre of sodium nitrate is applied to the crop. This is beneficial, particularly where the crop shows a yellowish-green color and lacks a vigorous growth. In the rotation oats generally follow cotton or corn, and are usually followed by cowpeas. Where used as a cover crop the turning under of the oats in the spring, to supply organic matter and to give a more friable and mellow structure to the soil, is beneficial.

Among the varieties of oats used the Appler is the favorite, while the Texas Rust Proof, or Red Rust Proof or Rust Proof, is also popular. The winter turf or grazing varieties are commonly grown and make a vigorous growth under local climatic conditions. For spring seeding the Burt is the most popular variety.

Cowpeas are becoming more popular in this county, as their value is now fully recognized by the farmers. This crop is grown either alone or in combination with sorghum as a forage crop. It is also grown in corn fields, between the rows, and in orchards both for seed and as a soil renovator. Cowpeas do well on all the soils of the county. When grown as a forage crop, they usually follow small grain. They are sown broadcast and turned under by a disk harrow or by a small turning plow. Sometimes the land is plowed and harrowed, and the seed drilled in with an ordinary grain drill. The crop is usually seeded in this manner between July 10 and July 20. It is harvested during September or October.

By growing cowpeas with sorghum a heavy yield of rough winter forage is produced. Where sown for seed and for the improvement of the soil the cowpeas are usually sown in the corn fields either broadcast or between the rows at the time of last cultivation. They are sometimes planted in the rows at the cultivation preceding the

last, so that with the last cultivation of the corn the cowpeas receive at least one cultivation. The peas are picked by hand, while the vines remain in the fields during the winter months, where they serve as a protection against erosion. The seed is used chiefly as a feed for stock, but to some extent also for human food.

The principal varieties used are the Clay, Little Lady, Grandeur, Whippoorwill, and Iron. No fertilizers are applied with this crop.

Wheat was at one time one of the most important crops of the county. At present only a small acreage is devoted to this crop. It is grown throughout the county usually in small fields of 5 acres or less. The 1910 census reports a production of 3,743 bushels from 610 acres. The average yield is about 6 bushels per acre. The decrease in the acreage of this crop is probably due mainly to the low yields commonly obtained.

For wheat, the land is generally broken and the seed sown broadcast, after which it is plowed under. The most progressive farmers prepare the land carefully by plowing deeply and working the surface soil into a good seed bed, as where oats are grown, the seed being sown with a grain drill. The crop is generally sown in November, about 1 bushel of seed per acre being used. It is sometimes pastured during the winter months, and is harvested about the middle of June with the cradle. Some of the crop is milled at home, while larger quantities are sold. Owing to the present high price of flour, wheat is being more extensively grown. This crop may be used to advantage as a money crop maturing during the summer months.

Rye is grown to only a small extent. The 1910 census reports a production of 1,920 bushels from 450 acres. The average yield is about  $4\frac{1}{2}$  bushels per acre. The rye produces only a comparatively small amount of grain, and this probably accounts for the small total acreage devoted to this crop. It is used mainly for winter pasturage and as a winter cover crop. For such use the seed is sown broadcast between the cotton and corn rows during October, and harrowed in with a diverse cultivator. After the cotton or corn is harvested, the rye is pastured. In some cases it is turned under in the spring, with good results, while in others it is harvested with the cradle and thrashed. The grain is generally sold at the standard price of \$1 a bushel. This crop is beneficial in protecting the land against erosion during the winter months. In combination with vetch it produces a good hay crop when cut green. The methods of seeding and handling the rye crop are similar to those used in the case of wheat.

A particularly large number of varieties of garden vegetables are grown in Habersham County. On almost every farm a sufficient quantity is produced to supply home needs, and in many cases vegetables are grown for local markets. Some truck is shipped out of

the county. Beans, beets, cabbage, and rhubarb are the principal truck crops grown. Sweet potatoes are grown for home use. According to the 1910 census 244 acres were devoted to this crop in 1909, with a total yield of 23,557 bushels. Irish potatoes are less extensively grown, 130 acres being reported in this crop, with a yield of 7,981 bushels. On practically every farm a small patch of sorghum is grown. This is generally used for making sirup. The 1910 census reports a total of 285 acres in this crop. In addition, 124 acres are reported in sugar cane.

Broom sedge, Bermuda grass, crab grass, "Cherokee grass," and lespedeza, locally called "wild clover," are the principal hay and pasture crops grown. Lespedeza grows wild in all parts of the county and affords excellent pasturage. It is also valuable as a soil renovator, although its use for this purpose is negligible. Red clover is also grown in places and constitutes a good pasture and hay crop. White clover grows wild and makes good pasturage. The farmers, however, depend upon the native grasses chiefly for pasturing stock. For this purpose woodlands are frequently burned over in order to produce a succulent growth of broom sedge, which is relished by the stock. Johnson grass is common, but is not considered a desirable grass, owing to the difficulty of its removal from areas which are to be used for cultivated crops. It makes a strong growth and produces a good hay where harvested before the seed ripens. Mixed redtop and tall meadow oat grass produce large yields of hay. In general very little attention is paid to pasture grasses. For forage during the winter months the farmers depend upon corn fodder, pea-vine hay, pea-vine and sorghum hay, oats, straw, shredded fodder, cottonseed hulls, and hay of the native grasses.

The live stock raised in Habersham County is not sufficient to supply home needs. In the 1910 census domestic animals are reported on 1,281 farms, and the value of domestic animals is given as \$225,860. A total of 3,579 cattle is reported, 1,858 of which are dairy cows. The number of swine is given as 2,520. The value of dairy products reported in the census of 1910, excluding the home use of milk and cream, is \$33,396, while the receipts from the sale of dairy products amounted to only \$7,205. Of the 398,868 gallons of milk produced only 18,637 gallons were sold.

Dairying is practiced in only a few cases, the products being sold at local markets. Within the last few years the number of cattle has decreased considerably, although the grade is steadily being improved. On a few farms registered Jersey cows are kept to supply milk and butter for home use. The quality of the hogs in the county is also being improved. The Poland China, Berkshire, and Ohio Improved Chester are among the better breeds of swine, with many

grades and crosses between these breeds and the native stock. The beef cattle are generally pastured until winter, when they are sometimes fattened and sold at local markets. The farmers usually dispose of the stock before the winter to avoid the expense of feeding.

The county offers excellent opportunities for dairying and stock raising. The broad, fertile valleys of the Soque River and some of its larger tributaries are particularly adapted to dairying, while on the adjoining uplands excellent pastures are available. There is a good demand for such products, and good transportation facilities are available. The soils of all parts of the county produce excellent pasture grasses, and even the areas of rough topography afford good grazing.

The peach industry of Habersham County has developed to such proportions that it constitutes one of the most important forms of agriculture in the county. The commercial orcharding of peaches has proved very remunerative from the beginning. The first orchards in the county were set out in the vicinity of Cornelia about 20 years ago, and the industry has grown until at present there is a total of about 600,000 trees in the county, the orchards occupying about 4,300 acres. The industry has had its greatest development during the last 10 years, and there are many young orchards that have not come into bearing. Large tracts of land are being cleared and prepared for peaches. Practically all of the orchards have been successful; there have been very few failures from mismanagement and practically no complete failures on account of climatic conditions. In 1912, 450 cars of peaches were shipped from the county, while about 100 carloads were lost on account of inability to handle the crop. The output of the orchards varies considerably, as in 1911 250 cars were shipped and in 1913 only 40 cars.

Most of the orchards are in the southern part of the county along the Southern Railway, extending from the vicinity of Alto to the eastern county line. These orchards are chiefly located on a ridge, and the soils used are mainly the Cecil sandy loam, with its hilly phase, the Cecil clay loam, and the Cecil gravelly loam. On the sandy loam and the hilly phase of the sandy loam the trees start to grow sooner and the fruit ripens a few days earlier than on the Cecil clay loam. This is probably due to the sandy character of the surface or subsoil material, which permits the soil to warm earlier in the spring. In other parts of the peach-growing region of the State the trees on the Cecil clay loam are larger and produce a heavier yield for a longer time than on the lighter sandy soils. The industry has not developed far enough in Habersham County to determine whether or not the same difference will be observed here. The differences seen in the various orchards are in most cases due to the various methods of management, as those orchards which are well

cared for, receiving proper cultivation, fertilization, and spraying are the most thrifty and vigorous.

The most successful orchards are situated on northern, northwestern, and northeastern slopes. In such areas the trees bloom from five to seven days later than upon southern exposures. This lessens the danger of the crop being lost or injured by freezing. Very little damage is caused by frost on the ridges, on which most of the peach orchards are located. This immunity is probably due to thorough air drainage.

The peach trees are generally set out in straight rows up and down the high slopes. In some places this system is objected to on account of the danger from erosion following the cultivation of the trees. To prevent such damage the peach growers either terrace the land, running the terraces between the trees, or construct ditches to collect surface waters. The ditches have a slight fall and follow the contour of the land. Some orchardists depend upon cover crops of cowpeas, oats, rye, or the native grasses to minimize erosion.

As a general rule the trees are set out in February. The holes for planting the trees are chiefly dug by hand, though the practice of dynamiting has recently been introduced. In the most successful orchards the number of trees per acre is 125 to 130. Usually when the trees are set out they are heavily fertilized, each tree receiving an application of about one-fourth pound of sodium nitrate and 4 or 5 pounds of bone meal. For the first two years the orchards are cropped with corn or cotton. This provides an income until the fruit can be marketed and insures thorough cultivation of the orchard. Some orchards are cropped continuously, but this practice is not considered profitable. The orchards are plowed either in the spring or the fall, and sometimes in both seasons. In some cases the orchards are given as many cultivations during the year as possible, although most of the orchardists do not cultivate more than three times. These cultivations are accomplished by the use of the diverse harrow, drag, or general orchard harrow. The best orchards are practically clean and free from weeds during the greater part of the year. The cultivation of these orchards is most thorough while the fruit is maturing in order to conserve moisture in the soil during the time it is most needed by the trees.

The peach orchards are sprayed from three to five times each season. The first spraying occurs during the dormant stage to protect the trees from scale. At this time lime-sulphur mixture is used. Arsenate of lead with some lime is used in the second spraying, chiefly to combat the curculio. A third spraying with the lime-sulphur solution and arsenate of lead is directed against the curculio, scab, and brown rot. After the trees are set with fruit another spraying is generally given for the same purpose. The trees which

are properly sprayed are free from serious disease and insect pests, and the fruit is generally of high quality.

Local labor is depended upon to handle the greater part of the crop. The peaches are packed in crates and shipped in refrigerator cars to northern markets. A large part of the fruit is marketed through the Georgia Fruit Exchange, large quantities sometimes being purchased at the orchard by fruit agents or commission men.

Only three varieties of peaches are grown commercially, the Elberta, the Georgia Belle, and the Carman. Other varieties are grown for local use. The greater part of the peach shipments is composed of the Elberta and Georgia Belle. The Carman is grown to only a small extent. It is ready for market about July 10 and comes into competition with the Elberta of southern Georgia; it is thus ready for shipment at a time when prices are low. For this reason the Carman is not a popular variety for this locality, and many trees are being removed.

The Georgia Belle is ready for market about July 15. This is a valuable commercial peach, reaching the northern markets about the same time as the Elberta peaches from the southern part of the State, but, being a white peach, it brings a higher price than the Elberta and can compete more successfully than the Carman. Sometimes this variety matures with the early maturing trees of the Elberta variety.

The Elberta is the most prominent variety in the county. It is ready for market about July 20 to 25, after the southern Georgia Elberta has been shipped, and meets with little competition in the northern markets.

The Huyley Belle or Early Belle is a later peach than the Carman. It is grown to a slight extent and is becoming popular with the growers in Habersham County. Its time of ripening makes it a valuable variety for this region.

The production of apples in the county is yet in an experimental stage, and there are many young orchards, the success of which can not be determined at the present time. With the older orchards there have been some failures and some successes. The orchards which depreciate in value have been generally those owned by nonresidents. The cases of failure so far seem to be due to improper management and neglect.

Approximately 1,500 acres are in apple orchards. The orchards are situated mainly along the Tallulah Falls Railway from the southern part of the county at Cornelia to Tallulah Falls. They range from 10 to 300 acres in size, although larger orchards are being developed, mainly by companies which sell them in small tracts under the unit system. These larger projects have not existed long enough

to determine their success. About 10 per cent of the trees in the county now planted are in full bearing.

Apples were first grown on a commercial scale in the vicinity of Demorest in 1896. This orchard was carefully managed, and its success encouraged the development of other orchards in various sections of the county.

Apples are set out mainly on the soils of the Cecil series, chiefly the clay loam and sandy loam types. Several large orchards of young trees are found in the Blue Ridge Mountains region, where they occupy the Porters sandy loam and clay loam and the Habersham sandy loam. Trees on the Habersham sandy loam are more subject to injury by drought, owing to the light texture of the soil and subsoil, than on the Porters soils.

The orchards usually occupy slopes. No practical advantages are claimed for any particular exposure. The trees apparently do better on the tops of the ridges than on the lower slopes. Considerable damage is done at times by winds and rains while the trees are in blossom. This damage is considerably less on slopes which are protected from these wind storms. In the valleys frost is more damaging than on the uplands.

The methods of managing the orchards vary with the individual. It is generally desired that sloping areas be terraced, a 3-foot fall being allowed between the terraces. Generally about 50 trees are planted to the acre. The trees are set out in February. The holes in which the trees are set are generally dug by hand; in some cases blasting is employed. After the trees are set out the orchard is plowed twice, running the furrows at right angles. The trees are given frequent cultivations during the first year of growth, the cultivation being discontinued in August. Corn or cotton is generally grown between the rows of trees during the first year, but during subsequent years the land is not usually cropped. Fertilizer is supplied during the first year by placing several pounds of bone meal around each tree, or in a few cases in the hole in which the tree is planted. During the third year the orchard is cultivated from four to eight times, and in subsequent years as frequently as possible. Cover crops, such as peas, rye, crimson clover, and winter vetch, are usually seeded in October. These cover crops are beneficial to the growing trees and check the washing of the land during the winter.

In a large number of the orchards the trees are set out in straight lines up and down the hills, which in many cases is objectionable on account of the erosion of the surface and the difficulty of cultivation. Spraying is sometimes interfered with under these conditions, as it is difficult to drive the power sprayer between the rows on the steep slopes or to move the sprayer up and down the hill. Under this method there are no contours or ditches, and in many cases the soil

has been washed off, leaving the subsoil exposed. Most of the large orchards were originally set out in this manner, but in the more recent additions the contour system is being employed.

The orchardists have learned by experience that it is absolutely necessary to spray from three to eight times during the year, depending upon the age and the variety of the trees, in order to produce profitable crops. It has been found that the Ben Davis, King, Shockley, and Winesap varieties need special spraying, as they are particularly subject to certain diseases. The trees are sprayed during the dormant period of the winter months to protect them from scale and again when the buds begin to separate with lime-sulphur mixture and some lead arsenate to combat cedar rust and apple scab. Later the trees are given two sprayings, about three weeks apart, to combat the codling moth. About forty days after the buds drop the trees are sprayed for bitter rot, and the more susceptible varieties are given an additional spraying during the maturing season. The additional spraying depends upon the condition of the fruit.

The fruit is packed in bushel boxes and either shipped immediately to northern markets or placed in storage.

Experiments are being made with about fifty varieties. The Kinnard, Winesap, Yates, Terry, Ben Davis, York Imperial, and Gano are apparently the most profitable. Of these the Yates, Terry, and York Imperial are the better keepers.

The rotation of crops is not practiced to any great extent in Habersham County. The value of systematic crop rotation, however, is appreciated by the majority of the farmers, and in many cases the limited number of crops produced are rotated. In the southern part of the county it is a common practice to follow cotton with corn, and where oats and cowpeas are grown the oats generally follow either cotton or corn, and are followed by cowpeas. Some farmers, after growing corn, allow the land to lie idle for a year or so in order to "rest" it. Better results are had where the land, instead of being allowed to lie idle, is used for cowpeas or some other crop which may be turned under to improve the soil. Where the land is "rested" it frequently becomes weedy. In some places, particularly in the alluvial soils, corn has been grown continuously for periods of 20 to 40 years, and in some cases cotton has been grown on the same land for as many as 10 successive years.

Very little improved farm machinery is used on the average farm of the county. Ordinarily the equipment includes two-horse plows, disk harrows, diverse harrows, and other cultural implements, such as sweeps and scrapes. Mowers are in general use. Grain drills are used on some of the larger farms. Only a few grain binders are found in the county, and the use of the subsoil plow is uncommon.

There are only a small number of corn planters and very few cotton planters in the county. The corn is usually dropped by hand, and cotton is planted with the ordinary cotton-seed distributor.

General farm labor is very scarce, the greater part of the work being performed by the families of the farmers. The expenditure for labor reported in the 1910 census is \$45,070. For general farm work laborers are usually paid \$1 a day, and for picking cotton they receive 50 cents per hundred pounds.

Something over one-half of the farms of the county are operated by the owners, and by far the greater number of tenants are white. Nearly all of the rented farms are operated under the share system, the owner of the land furnishing the stock, tools, and one-half of the fertilizer, and receiving one-half of all receipts from the sale of the crops. Where the owner furnishes only the land he receives one-third of the corn and one-fourth of the cotton produced, and pays for a proportionate part of the fertilizer. In some cases the land is rented for a definite amount of cotton. For an average one-horse farm of 20 to 25 acres the owner usually receives 500 pounds of lint cotton. Some of the large farms along the river are operated by managers who receive a monthly salary, all labor being paid for in cash by the owner.

According to the census of 1910 there were 131,426 acres in farms in Habersham County, 40,818 acres of which are reported as improved. The average size of the farms is given as 96 acres.<sup>1</sup> Land holdings vary from a few acres to as high as 1,500 acres or more. The greater number of farms range from 20 to 175 acres.

The agricultural progress of this county is dependent upon the maintenance of the productiveness of the soils by a greater diversification of crops, the use of crop rotations, the more extensive use of cowpeas and other legumes, the incorporation of organic matter with the soil, the keeping of more live stock upon the farms, the exercise of care in seed selection, and the proper mixing and use of fertilizers.

#### SOILS.

The soils of Habersham County fall into three broad divisions: (1) The Blue Ridge division of the Appalachian Mountains, (2) the Piedmont Plateau, and (3) the stream flood plains. The soils of the first two groups are differentiated chiefly on basis of differences in altitude. The soils of the Blue Ridge region are largely similar in character of material to those of the Piedmont, but they occur at higher elevations, with attendant climatic differences affecting the agricultural use and value of the lands.

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<sup>1</sup>The tabulation of each tenancy as a farm affects this average. The average of individual holdings is probably considerably larger than 96 acres.

All the upland soils of both the Mountain and Piedmont are residual from the underlying rocks, consisting chiefly of granite, gneiss, and schist. Locally the soils have been influenced by colluvial material from higher elevations. Erosion has been the chief factor in bringing about differences in the textural characteristics of the surface material of most of the types.

The alluvial soils are derived from materials washed from the uplands and reworked and deposited by the streams in their flood plains.

The various types of soils in the several divisions of the county have been grouped in series, the members of which have the same general range in color and origin, and a similar type of topography and drainage. In the Mountain division are found the Porters, Ashe, and Habersham series; in the Piedmont section the Cecil and Durham series, and in the flood plains the Congaree and Toxaway series. In addition to this series there are two miscellaneous separations, Rough gullied land and Rough stony land.

In the following pages the various soils are described in detail, both with respect to character of material and their relation to agriculture. The following table gives the names and the actual and relative extent of the several types mapped in the county:

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil clay loam.....	63,424	43.1	Cecil loam.....	2,752	1.5
Hilly phase.....	14,208		Cecil gravelly loam.....	2,048	1.1
Chocolate-colored phase...	512		Porters black loam.....	1,856	1.0
Porters clay loam.....	30,976	19.2	Cecil stony loam.....	1,600	.8
Smooth phase.....	3,072		Habersham sandy loam.....	1,536	.8
Cecil sandy loam.....	17,088	10.4	Ashe sandy loam.....	1,344	.7
Hilly phase.....	1,856		Habersham stony sandy loam	1,152	.6
Porters sandy loam.....	11,072		Rough stony land.....	960	.5
Congaree sandy loam.....	8,448	4.8	Cecil clay.....	576	.3
Rough gullied land.....	4,224	2.3	Durham sandy loam.....	384	.2
Toxaway fine sandy loam....	4,160	2.3	Durham loam.....	128	.1
Congaree silt loam.....	4,032	2.2			
Porters stony loam.....	3,712	2.0	Total.....	181,120	.....

CECIL SERIES.

The Cecil series includes the most important and widely distributed soils of the Piedmont Plateau. The heavier members are known as the "red clay lands." These soils are characterized by their red clay subsoils and gray to red soils ranging in texture from sand to clay, the lighter colors prevailing in the sandy members. A characteristic of the subsoil is the content of sharp quartz sand and the frequent occurrence of veins of quartz. Mica flakes are also usually

present in the subsoil. The soils are of residual origin and derived principally from granite and gneiss, weathered to great depths, so that rock outcrops are rare. Fragments and bowlders of the parent rock are, however, found in places on the surface. The topography is rolling to hilly, with level to undulating areas in situations where stream erosion has not been active. Six types of this series occur in Habersham County.

#### CECIL STONY LOAM.

The soil of the Cecil stony loam consists of a grayish to yellowish-gray sandy loam, underlain at about 4 to 8 inches by a stiff red clay. In places the surface soil is a loam or clay loam. A stratum of yellowish-red or red friable sandy clay loam is sometimes encountered between the soil and subsoil. The lower part of the subsoil in some areas is rather friable, owing to the presence of partly decomposed rock.

Rock fragments in varying quantities are scattered over the surface. As a rule these fragments are so numerous as to interfere seriously with cultivation. They range from a few inches to a foot or more in thickness and consist of quartz, gneiss, and schist. There are some outcrops of the rock from which the soil is derived. As mapped the type includes spots which are very stony, with intervening areas in which there are practically no stones. In some areas the stones are disseminated throughout the soil mass and are so abundant that it is impossible to bore into the subsoil. This condition is found in the vicinity of New Liberty Church, in the northern part of the county.

The Cecil stony loam is not an extensive type. The areas, however, are scattered over the entire Piedmont portion of the county. The most important areas occur about  $1\frac{1}{2}$  miles northeast of Alleys Chapel, at New Liberty Church, Dicks Hill, and about  $1\frac{3}{4}$  miles southwest of Fairfield School. Some areas of the type are included with the hilly phase of the Cecil clay loam type, owing to the difficulty of making satisfactory separations.

The Cecil stony loam occupies steep slopes, ridge crests, and rolling areas. Most of it is too stony and too steep for successful cultivation. The smoother areas are largely utilized for growing cotton, corn, and other crops. Cotton yields from about one-third to three-fourths bale per acre with the application of a small amount of low-grade fertilizer. Corn will yield from 15 to 25 bushels per acre. In many places this type is best suited for pasture or forest land. Some areas are well suited to peaches. The uncleared areas support a growth of various species of oak, hickory, and other hardwoods, with some shortleaf yellow pine.

## CECIL GRAVELLY LOAM.

The Cecil gravelly loam, as found in this county, varies considerably in the texture of the surface material, in the character and quantity of the gravel on the surface, in topography, and in the proximity of the underlying rocks to the surface. The fine material of the surface soil ranges from a sandy loam to clay loam, but is prevalently a heavy sandy loam of gray, grayish-brown, or reddish-brown color. This grades at about 4 inches into yellowish or reddish sandy clay loam, which passes into a heavy reddish clay of moderately friable structure. When the surface soil is shallow it frequently has a reddish color.

There are included areas in this type in which the surface material consists of a grayish loose sand to loamy sand, underlain at about 8 to 10 inches by red clay. The subsurface material, or the material between the soil and subsoil, is usually somewhat heavier in texture than the surface soil. Again, erosion has carried away the sandy soil from many spots, a small area of gravelly loam being intricately associated with areas of gravelly clay or gravelly clay loam.

The subsoil of the Cecil gravelly loam is encountered at depths varying from about 4 to 12 inches, the average depth being about 6 inches. The subsoil is prevalently a stiff red clay. In places where the underlying rock from which the material is derived is near the surface the presence of incompletely weathered material renders the lower subsoil somewhat friable. In many places partially decomposed rock is encountered within the 3-foot section. Very few outcrops of rock occur.

Over the surface of this type are scattered rock fragments of varying size, giving the soil a decidedly gravelly character. This gravel varies in size from small chips to fragments 3 inches or more in thickness. It is composed of quartz, schist, and gneiss. Usually there are very few such fragments in the subsoil. There is considerable variation in the quantity of the gravel present, and occasionally it is sufficient to interfere considerably with cultivation.

The Cecil gravelly loam is not extensively developed in this county. It occurs in small scattered areas. The largest are those in the vicinity of Cornelia and Baldwin. Other important areas are found in the southwestern corner of the county near Leno School. In these areas the surface soil is somewhat more sandy than is typical. The areas between New Switzerland and Hazel Church are small, and include a sandy phase. Several small areas occur in the northeastern part of the county in the vicinity of Turnerville and Hollywood.

The Cecil gravelly loam occupies stream divides, the tops of ridges, and the slopes of some of the streams. The general surface configuration is undulating to gently rolling. The topography in gen-

eral is favorable to cultivation, and there is little danger of damage from erosion. In the vicinity of Cornelia and Baldwin a more broken topography makes cultivation less safe. The rock fragments on the surface of this soil check erosion to some extent. The areas are generally well drained.

The areas mapped as the Cecil gravelly loam originally supported a heavy growth of hickory, oak, shortleaf pine, and other trees. All the areas have been cleared and are utilized for farming. The general farm crops are grown, producing good yields. Cotton yields about one-half to three-fourths bale; corn, 15 to 30 bushels; and oats, 15 to 35 bushels per acre. These yields are secured generally with an application of about 200 to 500 pounds of low-grade commercial fertilizer. A large part of this type is used in growing peaches. It gives large yields of fruit of excellent quality.

#### CECIL SANDY LOAM.

In its typical development, the surface soil of the Cecil sandy loam consists of a gray to brownish-gray sand, 2 to 3 inches deep, passing into yellowish-gray or yellow sand, which extends to a depth of 6 to 14 inches. At an average depth of 8 inches the subsoil, a stiff, brittle, red clay, is encountered, and this extends to a depth of 3 feet or more without any decided change in color or texture. Over a large part of the type as developed in Habersham County there is a departure from this typical description. It consists of a subsurface stratum of heavy, yellow sandy loam to sandy clay which changes to reddish yellow as the depth increases, and immediately above the clay subsoil passes into red sandy clay loam.

Mica flakes are abundant in the subsoil. Where the parent rock is near the surface the quantity of mica flakes is unusually high. Under this condition the subsoil is more friable on account of the presence of partly weathered material from the parent rock. There are some patches in which the surface soil is a red to reddish-brown sandy loam. Again, there are areas where the soil contains a larger percentage of fine to very fine sand and silt, causing the soil to approach closely the Cecil loam. There are also some included spots of Cecil clay loam and Cecil clay. These variations are unimportant, occurring only in patches too small to be shown separately on the soil map.

Over the surface and throughout the soil angular fragments of quartz and of the parent rock are usually found in varying quantities. In some places there is enough of such material present to make the soil a gravelly type. Quartz veins are encountered in the subsoil. In places they appear at the surface and fragments from these veins are scattered over small areas.

The Cecil sandy loam occurs in areas of various sizes throughout the Piedmont section of the county. As a rule the areas are surrounded by the more predominant type, the Cecil clay loam. The larger bodies are found in the west-central part of the county, or between Clarkesville and Demorest on the east and the Chattahoochee River on the west. There are several large areas in the vicinity of Turnerville and Hollywood.

Along the Chattahoochee River in the vicinity of Aerial and also immediately north of the confluence of the Soque and Chattahoochee Rivers the topography is very rolling.

With these exceptions, the Cecil sandy loam occupies drainage divides having a comparatively smooth to gently undulating surface configuration. It is seldom found on the slopes toward streams, since the Cecil clay loam is usually developed where the surface is steep enough to cause erosion. The soil is well drained. In places the run-off is so rapid that it is necessary to handle the land very carefully in order to prevent erosion. This type is locally referred to as "gray land."

The Cecil sandy loam is a productive soil, although it is not locally considered as strong as the Cecil loam or Cecil clay loam. The sandy surface material and the clay subsoil are retentive of moisture, and crops on this type are less subject to injury by drought than on the clay loam, especially where the surface of the latter is not kept in a pulverulent condition.

The light texture of the surface permits easy and early preparation of the land as well as its cultivation under a comparatively wide range of moisture conditions. It is the earliest soil in the Piedmont section of the county. It is well suited to the general farm crops of the region, and is especially favorable for use in growing sweet and Irish potatoes, beans, peas, cabbage, beets, and other vegetables.

About 60 per cent of the Cecil sandy loam has been cleared of its original growth of white, black, red, and blackjack oak, hickory, and shortleaf pine. The land is utilized chiefly for the production of corn and hay crops in the northern part of the Piedmont section and for cotton in the southern part of the county. Corn yields from 15 to 50 bushels per acre, the larger yields being obtained by a careful system of management. Only small applications of commercial fertilizer are made. Cotton yields from one-third to 1 bale per acre, the crop being injured occasionally by early frosts. Cowpeas produce as much as three-fourths of a ton of hay per acre, while a mixture of cowpeas and sorghum gives an average yield of as much as 2 tons per acre. Sweet potatoes do well on this land, yielding from 75 to 150 bushels per acre. Sorghum produces as much as 150 gallons of sirup per acre.

Land values range from about \$10 to \$70 an acre, depending upon location and improvements.

*Cecil sandy loam, hilly phase.*—The hilly phase of the Cecil sandy loam differs from the main type chiefly in having a more uneven topography. The soil of the phase consists of a gray to brownish-gray sand to sandy loam underlain at about 6 to 14 inches by yellowish-red to reddish-yellow, friable sandy clay, which grades at 15 to 30 inches into red clay. The areas in which the red clay lies closest to the surface usually occur on the lower slopes. The clay is encountered at an average depth of about 18 inches. In many places the rock from which the material is derived occurs at depths of less than 3 feet.

In places angular fragments of quartz and of the parent rock are scattered over the surface in quantities great enough to give the land a gravelly character. These areas are too small to map separately.

The hilly phase of the Cecil sandy loam is typically developed in the southeastern part of the county along the Stephens County line, beginning at Dicks Hill and extending southward in small, broken areas to Banks County. It occurs chiefly on the crests of the ridges in a badly broken region. It is mainly confined to situations where erosion has not removed the original sandy covering. The areas are gradually giving way to the hilly phase of the Cecil clay loam, owing to the activity of erosion. The topography of this phase is generally very rolling to hilly, there being very little level land. In cultivating the sides of the hills it is necessary to exercise care to protect the land from erosion.

The material of this phase is similar in derivation to that of the typical Cecil sandy loam. Until recently most of this phase was forested with various species of oak and hickory and some shortleaf pine. It is now used successfully for the production of peaches. Where the general farm crops are grown corn yields from about 15 to 25 bushels per acre and cotton from one-third to two-thirds of a bale. These crops are usually grown in the young peach orchards.

This land where uncleared is valued at \$10 to \$20 an acre, but where set out in orchards it has a much higher value.

#### CECIL LOAM.

Typically the surface soil of the Cecil loam is a grayish loam in the upper part, and a grayish-yellow loam to silty clay loam in the lower part. The subsoil, beginning at about 6 to 8 inches, consists of a stiff, brittle red clay, similar to the subsoil of the other Cecil types of the county. This material usually extends to a depth of 3 feet or more without change. In places partly decomposed rock is encountered within the 3-foot section. Mica particles occur in the surface soil of some areas and more abundantly in the subsoil.

The Cecil loam varies somewhat, approaching a heavy phase of the Cecil sandy loam in such a way that the boundary drawn between the two types is necessarily arbitrary. In some areas the loam is considerably lighter in texture than usual, but even in these cases the percentage of silt is higher than in the sandy loam, giving a more loamy character to the material. In other areas the type approaches closely the texture of a silt loam, as in patches in the vicinity of Demorest and north of Turnerville. These more silty areas usually occur in lower places favorable for the washing in of finer material. There are also spots in which the surface soil is quite shallow. Such areas grade into the Cecil clay loam type. These variations are encountered within narrow limits in such intricate association with the dominant soil that they can not be separated on a map of the scale used in this survey.

Although the Cecil loam is not extensive, it is one of the most productive soils in the county and ranks next in agricultural value to the Cecil clay loam. The areas are not restricted to any particular locality. They are generally small and are widely scattered. Between Hills on the west and Kinney Mill and Antioch Church on the east several important bodies occur. One of the largest bodies is found just east of Anandale, and another large area is located about one-half mile north of Turnerville. Several of the most prominent areas of the type are developed in the southwestern part of the county along the road between Demorest and Pleasant Grove Church. Other small areas occur around Cornelia and east of Demorest.

The material of the Cecil loam is derived from rocks closely related to those which give rise to the other Cecil types of the county, but which are probably somewhat finer in texture or less quartziferous. It is not improbable that a part, if not all, of the silty material has been washed in from higher land.

The topography of the Cecil loam is gently undulating to very gently rolling. The type occurs chiefly on the crests of ridges and stream divides, in positions where erosion has not been active in removing the surface material. The boundaries of the type are sharply defined along such slopes. The entire type is well suited to cultivation.

The Cecil loam is naturally a productive soil, well adapted to the general farm crops of the region. It is more retentive of moisture than the sandy loam, and it is easier to cultivate than the clay loam. The soil is easily worked into a good tilth. In productiveness this type is intermediate between the Cecil sandy loam and the Cecil clay loam, although under prevailing methods of management there is no appreciable difference in crop yields. Wheat, rye, vetch, Irish potatoes, sweet potatoes, and truck crops give large yields on this type in other parts of the Piedmont, but they are not important

crops in the agriculture of this county. This soil is chiefly utilized for the production of corn and forage crops. Some cotton is grown in the southern part of the county. Corn yields from about 15 to 40 bushels per acre, with light applications of a low-grade commercial fertilizer, and occasionally without the use of fertilizers. Oats produce as much as 20 to 40 bushels per acre, the higher yields being secured under careful management. Cowpeas and sorghum grown together for forage yield from 1 to 2 tons per acre. This type is also well adapted to peaches, and apples are being grown successfully. The addition of organic matter at intervals has the effect of keeping the soil in a good, mellow condition. Deep breaking of the land is very beneficial.

Nearly all of this land has been cleared and is under cultivation. There are a few forested areas which support a growth of white, red, black, and blackjack oak, hickory, shortleaf pine, and some chestnut oak.

Land values range from about \$15 to \$60 an acre, depending upon location and improvements.

#### CECIL CLAY LOAM.

The Cecil clay loam of Habersham County has been shown on the map in three divisions, namely, the typical soil, a hilly phase, and a chocolate-colored phase. The phase separations are made because of determinable variations from the typical soil. These differences affect the productiveness of the soil, its cultivation, and its adaptation to particular crops.

In the typical development of the Cecil clay loam the surface soil is somewhat variable. The predominating soil is a red, friable heavy sandy loam, underlain at a depth of 2 to 3 inches by a red clay loam. A large part of the type has a shallow covering either of sandy loam, loamy sand, or loam, which ranges in depth from about 2 to 5 inches, where the characteristic heavy subsoil material is encountered. This is rather a sandy surface phase of the Cecil clay loam type, but owing to its irregular occurrence and close association with the typical soil the areas could not be satisfactorily separated. With ordinary deep plowing enough of the underlying clay is turned up and mixed with the lighter textured surface material to produce a clay loam of sandy character. This sandy phase in many places closely approaches the Cecil sandy loam in texture, and some of it is included with that type, and the line of separation between this phase and the Cecil sandy loam is arbitrarily drawn in places.

The subsoil of the Cecil clay loam is a red, brittle clay, which extends to a depth of 3 feet or more. When the material is in a moder-

ately moist condition the structure is somewhat friable, but when wet it is sticky and plastic. Mica particles occur throughout the subsoil in varying quantities. Where the underlying rock is near the surface the content of mica is usually higher. In some spots the subsoil is a sandy clay and in such areas the subsoil grades into the partially decomposed rock. Through the subsoil, and the surface soil also in places, fragments of quartz and of the parent rock ranging from mere chips to pieces several inches in thickness, are commonly found. In places these fragments are so abundant that the soil approaches the Cecil gravelly loam in texture. Such areas are not separated on account of their small size. Quartz veins are present throughout the subsoil. Where these reach the surface, large and small fragments of this rock are scattered over small areas.

In a few places the lower subsoil has a reddish-yellow or yellow color and a plastic structure like that of the Iredell clay. Such areas usually occur on low slopes along stream courses where the drainage is not so thoroughly established as over the most of the type.

The Cecil clay loam is the most extensively developed soil in the county, comprising by far the greater part of the Piedmont section. It occurs in large areas interrupted only by small isolated bodies of the sandy loam or loam types of the series.

The predominating parent rock of this type in Habersham County is apparently a gneiss ranging from light to dark in color and carrying considerable mica. It has been metamorphosed and is decidedly schistose. Small micaceous aggregates left in the weathering of this rock give rise to the local term of "button-rock land." There is not enough mica left upon weathering to give the subsoil a decided greasy feel such as is found in the subsoil of the Louisa. The parent rock carries considerable feldspar.

The area of the Cecil clay loam is gradually increasing from year to year as the sandy material of the associated sandy loam is removed by erosion leaving the heavy subsoil material at or near the surface.

The Cecil clay loam has a gently rolling topography, the surface being interrupted frequently by the valleys of streams and small drainage ways. The type occupies narrow stream divides, knolls, and slopes. There is very little level land. Owing to the steepness of the slopes terracing is necessary in many cases, particularly on the brows of the slopes, to prevent destructive erosion. Over most of the type, however, the topography is such that close terracing is not necessary. The type is well drained. Excess rain water flows off rapidly, usually without causing serious washing.

The Cecil clay loam is a productive soil. It is the strongest upland type in the Piedmont section of the State. It is well adapted to the general farm crops of the region. The surface soil can be worked

into a good tilth by the use of improved farm machinery. If plowed too wet there is a tendency for the material to clod badly, the clods being difficult to pulverize, and a heavy farm equipment is required to handle this soil properly.

Much of the type is forested with white, black, red, and blackjack oak, hickory, dogwood, persimmon, and other hardwood trees. There is also a scattering of shortleaf pine.

The type at present is utilized for the production of general farm crops. In the northern part of the county corn is the chief crop, cotton being grown less extensively in this section on account of the altitude. Corn yields range from 15 to 50 bushels per acre, depending largely upon the management of the soil. In many cases no commercial fertilizer is used; in others mixtures analyzing about 9-2-2 to 10-3-3 are applied at the rate of 200 to 500 pounds per acre. Cotton is grown in the southern and central parts of the county. This crop produces from one-third to 1 bale per acre, depending upon the season. Owing to the altitude the seasons are short, and it is necessary to grow the early varieties and to use phosphatic fertilizers to hasten the maturity of the crop in order to escape injury by early fall frosts.

Oats yield from 20 to 50 bushels per acre, the higher yield being obtained from well-prepared and well-fertilized fields. Cowpeas produce an average of one-half ton of hay per acre, the yields ranging from one-third to 1 ton. Wheat and rye are also grown on the type in a small way, with low yields.

Some of the best farms in the county are located on this type. Land values range from about \$15 to \$100 an acre, depending upon the improvements and location with respect to railroads.

*Cecil clay loam, hilly phase.*—This phase is separated from the typical soil on account of its hilly topography, which materially lowers the agricultural value of the land. The soil consists of a surficial mantle of 2 to 3 inches of a gray heavy sandy loam or loam underlain by a red heavy friable sandy clay loam which grades into clay. The subsoil is a stiff or brittle red clay, which usually extends to a depth of 3 feet or more. In many places the underlying rock or partly decomposed rock is encountered within the 3-foot section.

The phase includes much land having a sandy soil underlain by clay within reach of ordinary plowing. There are also some areas of a hilly phase of the Cecil sandy loam which can not be satisfactorily separated. Eroded spots are common, especially on the steep slopes, the red subsoil material being exposed at the surface. Rock fragments are scattered over the surface of this hilly phase, being more abundant than on the typical soil, and some small areas of Cecil stony loam are found.

The topography of this phase of the Cecil clay loam is strongly rolling to hilly, in many places being very broken and steep. The areas in the vicinity of Mount Airy occupy the highest elevations in the Piedmont section of the county, the maximum being about 1,600 feet. This high land really represents an outlier of the Blue Ridge Mountains. The slopes in some cases are so steep and broken as to be valuable only for pastures or forestry. The streams have cut ravines from 100 to 200 feet deep, and in some places the sides of these ravines are almost perpendicular. On such slopes rock ledges and cliffs are common. The smoother areas comprise rounded ridges with gentle to fairly steep slopes, which are suitable for farming, although terracing is frequently necessary to prevent erosion.

Rain water runs off rapidly, and the surface drainage of the type is excessive. Crops are subject to injury by drought. This land is best utilized for fruit growing and for pasture or forest land. Orchardng is more difficult on this phase than on other areas of the soil, as the rough topography interferes with spraying and harvesting. In addition to this the orchards are subject to injury from erosion, if they are cultivated.

The hilly phase of the Cecil clay loam is most extensively developed in the eastern part of the county. It extends from the northeastern part of the county along the south side of Panther Creek in a strip ranging from 1 to 1½ miles wide to the eastern county line, and southwesterly along Little Panther Creek to within a short distance of Antioch Church. The area generally follows the streams which cut back into the ridges. The southeastern development begins near Dicks Hill and extends in a broken strip along the Stephens County line to the Banks County line. Large areas occur in the western part of the county along the Soque and Chattahoochee Rivers.

The Cecil clay loam, hilly phase, is derived from gneiss, of a gray to dark color and schistose structure. There is considerable associated quartz and quartziferous rock.

A very small acreage of the phase is cultivated. The yields are about the same as on the typical soil.

*Cecil clay loam, chocolate-colored phase.*—The chocolate-colored phase of the Cecil clay loam is separated from the main type on account of a distinct difference in the color of the surface soil and subsoil and its peculiar mellow structure. The soil consists of a dark brownish red or reddish-brown, mellow clay loam, underlain at 8 to 12 inches by dark-red, moderately friable clay loam to clay, becoming heavier and redder with increase in depth, until at about 18 or 24 inches a red, stiff brittle clay, like the subsoil of the typical Cecil clay loam, is encountered.

The soil is rather loose and has a decidedly loamy or mellow structure, which in the field gives it the appearance of a loam. This land is locally called "push land," on account of the tendency of the soil to push in mass rather than to turn smoothly over the mold board in plowing.

The rocks from which this phase is derived are similar to those giving rise to the typical soil. Practically no fragments of the rock material are found in the soil, and the underlying rock is not encountered within the 3-foot section. The phase is not extensively developed, being mapped only in a few small areas. The largest of these are located about 2 to 3 miles southeast of Demorest. Small areas occur in the vicinity of Dicks Hill and about  $1\frac{3}{4}$  miles west of Alto.

Nearly all the phase has been cleared and is used for the production of the general farm crops. It is a highly prized, productive soil. Its only objectionable feature lies in the difficulty of plowing. Cotton yields from one-half to 1 bale per acre with applications of 200 to 300 pounds of a low-grade fertilizer analyzing about 9-2-2 or 9-2-3. Corn yields from about 20 to 40 bushels per acre without the use of commercial fertilizers. The phase is well suited to oats, rye, wheat, vetch, and forage crops, but very little of these are grown.

The soil usually occurs in small patches occupying level areas, slight depressions, or gentle slopes. The drainage is good. Patches of this phase, too small to be mapped separately, are included with the typical Cecil clay loam.

#### CECIL CLAY.

The Cecil clay consists of a thin surface layer of red to reddish-brown clay loam, underlain by red clay which corresponds with the subsoil of the Cecil clay loam. Ordinary plowing brings the red clay to the surface, the usual clay loam surface soil rarely being deeper than about 3 inches. In places the heavy clay is exposed at the surface. The subsoil shows no important change within the 3-foot section.

The Cecil clay occurs as patches on ridge crests or hilltops and slopes where erosion has removed the greater part of any surface material other than clay that may have been present. One of the largest areas is that  $1\frac{1}{4}$  miles southeast of Macedonia Church, in the northern part of the county. Another large area occurs about  $1\frac{1}{4}$  miles northeast of Alleys Chapel. There is a small development about three-eighths of a mile north of Clarkesville. Other areas of about 10 to 30 acres are found in the southwestern part of the county.

All of the type is under cultivation, being farmed in conjunction with the surrounding soils. This soil is not as retentive of moisture

as the associated soils, except where a mellow surface layer is maintained by frequent cultivation. This clay where improperly cultivated bakes quickly and becomes compact at the surface, favoring the rapid loss of moisture by evaporation. The type where carefully handled is a good agricultural soil, but is difficult to cultivate on account of the heavy nature of the material. Where plowed deeply while moderately moist and supplied with organic matter by turning under green crops or other vegetable matter a favorable tilth is easily established and maintained.

Cotton ordinarily yields from one-third to one-half bale per acre with the application of 200 to 300 pounds of low-grade commercial fertilizer. Corn does not seem to make as tall a growth as on the other soils of the Cecil series and the yield is usually somewhat lower, ranging from about 15 to 25 bushels per acre. Owing to its patchy occurrence, this type is usually farmed in conjunction with or in the same manner as the associated soils.

#### DURHAM SERIES.

The soils of the Durham series are characterized by the grayish color of the surface soils and the yellow color of the subsoil. They are derived from light-colored, rather coarse grained granite and gneiss, consisting principally of quartz and feldspar with some mica. The topography is generally gently rolling and the drainage thorough or in places excessive, owing to the sandy, porous texture of the subsoil. The sandy loam and loam members of the Durham series occur in Habersham County.

#### DURHAM SANDY LOAM.

The soil of the Durham sandy loam consists of a yellowish-gray or gray loamy sand underlain at 2 or 3 inches by a yellowish loamy sand which grades into a friable sandy loam. In uncleared areas where organic matter has accumulated the surface has a darker gray color than in cultivated areas. The subsoil is encountered at about 8 to 12 inches, and consists of a yellow, friable sandy clay, which is somewhat heavier in the lower part. In a few places a stratum of quartz fragments intermingled with heavy impervious clay occurs at a depth of about 30 inches. This underlying layer is exposed in spots along the brows of slopes and here gives rise to gravelly patches. On some of the upper slopes the deeper subsoil is reddish in color. Rock fragments are quite common in the subsoil in some places, and in other places they are scattered over the surface. In a few areas disintegrated rock material is encountered at or near the surface.

The Durham sandy loam is not extensive in this county. It sometimes occurs in such narrow strips along the foot of slopes that it

can not be satisfactorily mapped. Several areas are developed in the vicinity of Hurricane School.

The topography of this type is gently undulating or gently sloping. The type occurs mainly on the gentle slopes of streams, although a few patches are found on the higher stream divides. Some of the flat areas are poorly drained; and crops are frequently damaged by excess moisture during wet seasons. In some cases the topography favors good drainage, but water stands upon the surface of the more nearly level areas for a considerable period after heavy rains.

A very small acreage of this soil is under cultivation, and this is generally farmed in conjunction with other types. Most of the type supports a heavy growth of hickory, oak, and shortleaf pine, with some gum in the poorly drained areas. Cotton yields from about one-third to one-half bale and corn from about 15 to 25 bushels per acre. This soil is recognized as a less valuable soil than the Cecil.

#### DURHAM LOAM.

The Durham loam consists of a grayish-yellow loam underlain at about 8 to 12 inches by yellow, moderately friable clay. The type as mapped in this county includes patches of other soils ranging in texture from silt loam to heavy loam. It also includes some colluvial or washed-in material comprising narrow strips of silt loam along shallow drainage ways.

The Durham loam occupies a rather low undulating area about three-fourths mile west of Antioch Church in the east-central part of the county. The soil approaches closely the Wehadkee silt loam, which is a grayish silt loam underlain by mottled yellow, gray or drab, plastic silty clay showing in places some faint mottlings of red. This type is of very small extent, comprising approximately one-fifth square mile. The drainage is rather poor.

The better drained slight elevations or swells are suitable for the production of cotton, corn, oats, sorghum, and forage crops, while the poorer drained depressions are best suited to pasture grasses. A very small percentage of the type is under cultivation. The land is locally considered unfit for farming, being termed "brick land" chiefly on account of the clay subsoil of the included Wehadkee silt loam areas.

The forest growth consists of various species of oak, hickory, and shortleaf pine with a scattering of gum.

#### PORTERS SERIES.

The Porters series includes the residual soils of the Appalachian Mountains derived from igneous and metamorphic rocks. The soils are analogous to those of the Cecil series, but are classed separately

on account of the difference in topographic position. They occur at high elevations and are therefore influenced more or less by different climatic and drainage conditions. The mountainous character of the country in which the Porters soils are found renders them difficult of cultivation. Four types in this series are shown upon the accompanying map.

#### PORTERS STONY LOAM.

The Porters stony loam is the least valuable agricultural soil of the county. In some respects it is a land classification rather than a definite type, for it may consist of a gray to red clay loam, loam, or sandy loam in the surface material, nearly always carrying a large quantity of rock fragments with frequent rock outcrops. The subsoil is a brick-red stiff clay. Bedrock is commonly encountered within the 3-foot section.

The type is confined to the crests of mountains and steep mountain slopes. One area occurs along the Rabun County line on and between Stony and Oakey Mountains. Another important area is encountered in the northwestern part of the county occupying the steep mountain slopes of Tray, Chimney, and Goshen Mountains. In this area the land is steep and stony, but it can be used for pasture and for forest land. Small areas occur in the north-central part of the county, occupying narrow-crested ridges, steep slopes, and the ravines formed at the heads of mountain streams.

The type supports a growth of various species of oak, and hickory, chestnut, and some shortleaf pine, with an undergrowth of rhododendron and mountain laurel. Where the topography is favorable the type is used for grazing.

#### PORTERS SANDY LOAM.

The Porters sandy loam as typically developed consists of a grayish-brown to yellowish sandy loam or loamy sand, underlain at a depth of 3 or 4 inches by yellow sand or loamy sand which continues to a depth of about 8 inches, where a red friable sandy clay is encountered. This grades at about 10 to 15 inches into red clay of stiff to moderately friable structure. On some of the higher mountains, where the vegetation is unusually dense, and along poorly drained slopes the immediate surface has a dark-gray to almost black color, owing to the presence of dark-colored organic material. In some places the texture ranges close to a loam. In those places where partly decomposed rock material is present the subsoil is more friable than the typical red clay. Some fragments of the parent rock and quartz are scattered over the surface and disseminated throughout the soil section. The quantity in some places is suf-

ficiently large to interfere with cultivation. Such areas would be mapped as Porters stony loam if of sufficient size.

The Porters sandy loam is confined to the northern part of the county. It is most extensively developed in the north-central and northwestern sections. It comprises a large part of Alec, Yellow, Crow, Sillycook, Rapor, and Goshen Mountains. It is also found in the northeastern part of the county in the vicinity of Tallulah Falls and Tallulah Park. Other important but smaller areas occur in the mountain section. The Porters clay loam includes areas of this type which on account of their inaccessibility and small size can not be separately mapped.

The Porters sandy loam approaches the Porters clay loam in character as the sand is removed by erosion. This type is not so susceptible to erosion as the Porters clay loam, and the surface configuration is generally smoother. The areas occupy the tops and slopes of mountains, at an elevation ranging from 1,500 feet to 3,000 feet above sea level. Drainage is well established and as a rule the run-off is excessive.

A very small part of the Porters sandy loam is under cultivation, only the smoothest areas being farmed. Corn and forage crops are practically the only crops grown. Corn yields from 15 to 30 bushels per acre, depending upon the season and the methods of cultivation. Very little commercial fertilizer is applied for this crop. Apple orchards have recently been set out on this land in various parts of the county.

The greater part of the Porters sandy loam is forested with a native growth of hickory, oak, and some shortleaf pine. At altitudes of over 2,000 feet the forest growth consists mainly of chestnut oak and chestnut. Rhododendron and mountain laurel are also common at the higher elevations.

In the northwestern part of the county, and also in the north-central part, the value of this land is based chiefly upon the timber growth. In the northeastern section, near the Tallulah Falls Railway, the values range from \$10 to \$35 an acre.

#### PORTERS BLACK LOAM.

The soil of the Porters black loam is a rich, mellow loam to sandy loam, containing a large quantity of dark-colored organic matter which gives it the characteristic black color. In some places, usually where the soil is comparatively thin and where the type grades into the Porters stony loam or clay loam, the soil ranges to brownish black or dark brown in color. The dark material in places extends to a depth of 30 inches or more before the subsoil is encountered. The soil is deepest in the coves of the mountains, where large quantities of organic matter accumulate and where the soil is kept moder-

ately moist throughout the year by springs. The subsoil is a brownish-red to red clay loam or clay. Rock fragments are abundant on the surface and throughout the soil section.

The Porters black loam is not extensive and is confined to the northwestern corner of the county. It occupies the top of Chimney and Tray Mountains and the steep slopes along some of the stream courses. It occurs at the highest elevation in the county, the altitudes ranging from 2,500 to over 4,400 feet above sea level. Smaller areas, which are not mapped separately, occur in coves of other mountains.

This type comprises some of the steepest, roughest, and most inaccessible areas of the county and is not utilized for agriculture. The abundance of rock fragments renders cultivation practically impossible. The land is used to some extent for pasture. It is mainly forested, the oaks, hickory, and chestnut predominating, with some pine and poplar. In the moist coves there is a dense growth of ferns and other moisture-loving plants.

The value of this land is determined chiefly by the timber upon it.

#### PORTERS CLAY LOAM.

The surface soil of the typical Porters clay loam consists of a red to reddish-brown clay loam, underlain at about 6 to 8 inches by brittle red clay. Much of the type has a surface covering, about 1 to 3 inches deep, of grayish sandy loam or loam, and there are some included patches of true Porters sandy loam. Mica particles are quite common in the subsoil. Fragments of the parent rock and quartz ranging in size from several inches to several feet in diameter are scattered over the surface and there are some outcrops of the parent rock. In many places the parent rock is encountered within the 3-foot section, and in some areas the presence of partly weathered material from this rock gives the lower subsoil a rather friable character. Quartz veins commonly occur in the subsoil.

The Porters clay loam is the most extensive soil of the Blue Ridge section of the county. The largest continuous areas occur in the northeastern part of the county on Abram and Big Shoal Mountains. There are also large bodies on Countryman and Powell Mountains, where the areas are broken only by the smooth phase of the type and the stream-bottom soil. In the northwestern part of the county the areas are less extensive and embrace rougher and more mountainous country.

The topography of the Porters clay loam is rolling to mountainous, and rugged, especially on the higher mountains along the northern and northwestern county line. On the lower mountains, such as Alec, and in the southern extremities of Countryman, Powell, and

other small mountains, the topography is less broken than that on the higher mountains. Many of the slopes are precipitous, although there are a few small areas in which farming can be carried on with but little more difficulty than is experienced on the Piedmont soils. This type occurs at elevations ranging from 1,200 to 3,500 feet above sea level, and the greater part of it has an elevation of more than 1,500 feet.

The drainage is well established. The run-off is so rapid that with cultivation the land is subject to ruinous washing, so that terracing is necessary.

Because of the rugged topography very little of the Porters clay loam is cultivated. Most of it is best suited to forestry or to pasturage. The chief crop grown on the few cultivable patches is corn. This crop yields from 15 to 30 bushels per acre. Cowpeas for hay, sorghum, sweet potatoes, and garden vegetables for home use are also produced. Apple orchards have recently been set out on this soil. This type is used for the production of apples in other parts of the Blue Ridge with good results.

Nearly all of the type is forested with oak, hickory, and some shortleaf pine. At the highest elevations chestnut oak and poplar are found.

Land values range as high as \$35 an acre, depending upon the stand of timber and location.

*Porters clay loam, smooth phase.*—The material of the smooth phase of the Porters clay loam is identical with that of the main type. It is separated because of its surface configuration, which is more favorable to agriculture than that of the main type. Although the surface varies from undulating to gently rolling the topography is decidedly smooth as compared with that of the typical Porters clay loam. It lies mainly at an elevation of more than 1,500 feet above sea level. This land occupies the smoother shoulders of the mountain ridges and the less sloping lower portions of the valley walls extending back into the mountains along the stream courses.

The phase is typically developed in large areas in the northern part of the county near Macedonia Church, and also east of this place toward Panther Creek. It occupies a large area in the vicinity of Soque.

This phase comprises the greater part of the cultivated mountain land. The soil is devoted chiefly to the production of corn, which yields from 15 to 40 bushels per acre. The highest yields are obtained where a rotation of crops, including cowpeas, is practiced, and where fertilizer at the rate of 200 or 300 pounds per acre is used. A few small areas are devoted to cotton, but owing to the high elevation the yields are reduced by frosts. Cowpeas grown with sorghum yield from 1 ton to 1½ tons of forage per acre. Cowpeas alone give a yield

of one-half to three-fourths ton per acre. Nearly all of this soil is cleared.

Mechanical analyses of samples of soil and subsoil of the typical Porters clay loam gave the following results:

*Mechanical analyses of Porters clay loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
253121.....	Soil.....	2.0	8.3	9.7	27.0	9.8	16.1	27.1
253122.....	Subsoil.....	3.3	11.3	11.1	22.4	6.6	16.5	28.4

ASHE SERIES.

The Ashe series is characterized by the grayish-brown to brown color of the surface soils and the yellow to slightly reddish yellow color of the clay loam or clay subsoils. The series is confined to the Blue Ridge belt of the Appalachian Mountain and Plateau Province, and the material is derived from crystalline rocks, principally granite, gneiss, and rocks like gabro. These soils resemble the Chester soils of the Piedmont. The topography is mountainous, with many slopes too steep for safe tillage. The Ashe sandy loam is the only type of the series occurring in Habersham County.

ASHE SANDY LOAM.

The Ashe sandy loam consists of a yellowish-gray sand to loamy sand, underlain at 3 or 4 inches by yellow material of similar texture. The subsoil, beginning at about 6 to 10 inches, is a yellow to reddish-yellow loose sand. This grades into reddish-yellow or yellow sandy clay loam or sandy clay, or into disintegrated yellowish rock. The material is residual from gneiss.

The type occupies mountain slopes, occurring chiefly near their crests. It is encountered on Goshen, Rapor, and Sillycook Mountains. Most of the type is forested. It can be used, under favorable conditions, for the production of apples, corn, and vegetables.

HABERSHAM SERIES.

The soils of the Habersham series are characterized by the grayish color of the soil, the yellowish color of the subsurface, and the reddish-yellow to pinkish color and friable character of the subsoil. The material is derived from grayish, yellowish, and slightly pinkish quartzite. The soils occur in the Blue Ridge Mountains. They differ from the Dekalb in showing more red in the subsoil and from the Hanceville in showing less red. The Habersham sandy loam and Habersham stony sandy loam are shown in the accompanying map.

## HABERSHAM SANDY LOAM.

The typical Habersham sandy loam consists of a grayish light sandy loam to loamy sand, which passes quickly into yellowish sandy loam, and this, in turn, grades at about 15 to 24 inches into reddish-yellow friable sandy clay. In many places partly decomposed rock material of reddish, pinkish, or yellowish color is encountered within the 3-foot section in some places just beneath the sandy surface soil, and in others somewhere below the sandy clay subsoil.

There are some included patches in which the subsoil is redder than the typical. The material of these areas resembles the Porters sandy loam.

The Habersham sandy loam occupies the slopes of the Blue Ridge Mountains, the principal area occurring in the vicinity of Tallulah Falls. The topography is sloping, but not too steep, as a rule, for safe cultivation.

Corn yields from 15 to 25 bushels per acre, with fertilization. The soil seems best adapted to the production of truck crops. Portions of the type have been set in apples, but the trees have not come into bearing.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Habersham sandy loam:

*Mechanical analyses of Habersham sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
253115.....	Soil.....	6.9	14.2	10.8	27.7	19.9	14.1	5.7
253116.....	Subsoil.....	6.6	15.4	11.2	25.1	15.2	10.9	15.2

## HABERSHAM STONY SANDY LOAM.

The Habersham stony sandy loam is essentially the same as the Habersham sandy loam in character of the fine material. It differs from this type mainly in the presence of rock fragments in quantities sufficient to give the land a decidedly stony character. These fragments interfere with cultivation in places.

This type is associated with the Habersham sandy loam, but occupies steeper slopes than the latter. Its crop adaptation is the same, but the sandy loam is the more valuable type for the reason that it is much more easily cultivated.

## CONGAREE SERIES.

The soil and subsoil of the types included in the Congaree series are brown to reddish brown, there being comparatively little change

in texture, structure, and color from the surface downward. Occasionally grayish and yellowish mottling is encountered in the subsoil of the poorly drained areas. These soils are developed in the overflowed first bottoms of the streams of the Piedmont region and in similar positions in the Coastal Plain along streams issuing from the Piedmont. The material is derived from the soils of the Piedmont region, with some mixture of Appalachian material, and in the Coastal Plain a slight mingling of Coastal Plain material. Two types of this series, the sandy loam and the silt loam, occur in Habersham County.

#### CONGAREE SANDY LOAM.

The Congaree sandy loam as mapped in Habersham County is quite variable. It consists typically of a friable sandy loam of brown to reddish-brown color, underlain by red or yellowish-red sandy loam to sandy clay. Mottlings of red, yellow, and gray are quite common throughout the subsoil. Patches of sand and other variations in texture are included with the type in places, giving the land the appearance of Meadow. Such areas are so irregular in occurrence that their separation is impracticable. In places the surface soil consists of a yellowish-red or red fine sand about 8 to 10 inches deep. Mica particles are abundant in both soil and subsoil. The subsoil from place to place is even more variable than the soil. It is not uncommon to find yellow, brown, or gray material, or mottlings of these colors, and the texture may vary from a loamy sand to a somewhat heavy, sticky, sandy clay.

The Congaree sandy loam is an alluvial soil, having been deposited by the streams along which it occurs during times of overflow. The material is washed chiefly from the Piedmont soils in the southern part of the county, but in places, especially near the boundary between the Piedmont Plateau and the Appalachian Mountain region, more or less of it is washed from the soils of the Blue Ridge Mountains. The variations in the soil are due mainly to differences in the velocity of the stream. Colluvial material enters into the composition of the type along the margins of the bottom lands.

This type has a level to gently sloping surface. Under normal conditions the type is fairly well drained, but it is subject to overflow. During very high floods the current sometimes erodes the surface considerably, and deposits sand and gravel material. To protect the land from this undesirable washing and deposition of material it is necessary to keep the stream channels clear so as to allow the unmolested flow of water. There are a few poorly drained spots of the type that can be improved by ditching.

The type is most extensively developed along Mud, Mud Hazel, Little Mud Hazel, and other creeks in the southern part of the

county. It also occurs along Panther, Little Panther, Deep and Yellowbank Creeks, along Soque River in small, interrupted areas, especially where the bottoms are not so wide, and along the outer edges of the bottoms as fringes around the Congaree silt loam.

The Congaree sandy loam is a productive soil, being maintained in this condition by the addition of fresh sediments at each inundation. The land is chiefly used for the production of corn and forage crops. Very little cotton is grown on account of the danger of injury by frost. Corn yields from about 20 to 50 bushels per acre with ordinary applications of commercial fertilizer. In many cases no fertilizer is used on this land. Cowpeas produce as much as 2 tons of hay per acre, although the average is about 1 ton. Large areas are devoted to the production of cowpea hay or cowpea and sorghum hay. This is considered one of the most productive soils in the county. In some sections it is the only land cultivated, the associated uplands being too broken or steep.

Below are given the results of mechanical analyses of samples of the soil and subsoil of this type:

*Mechanical analyses of Congaree sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
253111.....	Soil.....	0.6	9.5	16.3	45.4	11.0	8.7	7.7
253112.....	Subsoil.....	.1	.2	.5	8.9	16.6	47.4	25.6

CONGAREE SILT LOAM.

The typical Congaree silt loam consists of a brown, mellow silt loam, underlain at about 8 to 24 inches by a chocolate-brown or reddish-brown silt loam, which generally grades into a dark-brown or black silt loam to silty clay loam. The subsoil is sometimes a light-brown or drab silty clay loam mottled in places with gray or yellow. Mica flakes occur throughout the soil section in quantities sufficient to impart a greasy feel. As is to be expected in alluvial soils, minor variations in the soil and subsoil are encountered. In some areas, especially in the immediate vicinity of the stream channels, the surface is decidedly more sandy than usual, being a fine sand to fine sandy loam to a depth of 8 or 10 inches. In other places there are small spots in which the lower part of the subsoil consists of a fine sandy loam to loam. The sandy areas are usually brown to light brown.

The Congaree silt loam is not so extensive as the closely associated Congaree sandy loam. It occurs along the various streams where the deposition of fine material is favored, as in the broader bottoms, the velocity of the current being lessened with the spreading out of the flood waters.

Typical areas occur along the Soque River 2 and 3 miles northeast of Clarkesville. The type is also encountered along Big Hazel, Mud, Little Mud, and Beaverdam Creeks. Other areas occur throughout the county along some of the creeks and along the Chattahoochee River.

The surface is nearly level. Ditches are generally necessary in order to provide proper drainage. Much of the land requires tiling.

The material has been washed chiefly from the soils of the Piedmont, with some admixture of material derived from the Blue Ridge Mountains in those areas occurring along streams issuing from the mountains.

The Congaree silt loam is the most productive soil in the county. Yields of 30 to 80 bushels of corn are common, without the use of fertilizers. Oats yield from 20 to 40 bushels per acre. Much of the oat crop is cut for hay. Cowpeas produce as much as 2 tons of hay per acre, and when grown in combination with sorghum a production of 3½ tons is not uncommon. The land is not used for cotton on account of the danger of injury by frost. The seasons in the deeper valleys are from two to three weeks shorter than in the uplands. Lime is used with good results on this land. The use of ground phosphate rock materially increases crop yields. Rye is occasionally sown in small patches, and yields 10 to 15 bushels per acre. Rye and vetch when grown in combination give heavy yields of forage.

#### TOXAWAY SERIES.

The Toxaway soils are light brown to dark brown. The subsoils are yellowish brown to dark brown. This series occupies the first bottoms of streams of the southern Appalachian Mountains, and consists of material derived from the soils of this region, principally from granitic, gneissic, and schistose rocks. Along the outer margins there is more or less influence from colluvial material from adjoining slopes. The soils are largely subject to overflow.

#### TOXAWAY FINE SANDY LOAM.

The Toxaway fine sandy loam consists of a gray to dark-gray or brown fine sandy loam or loamy fine sand, underlain at about 4 or 5 inches by heavy sandy loam, loam, loamy sand, or silt loam varying in color from yellowish to brown or reddish brown or mottled with shades of these colors and gray. In places the lighter surface material extends to greater depths, sometimes to 12 or 18 inches, and in a few places even to 30 inches. Also there are places where the surface soil is decidedly heavy for a sandy loam. These variations are common within narrow limits throughout the type. In some small areas the lower part of the subsoil is rather loose and incoherent. Mica flakes are abundant throughout the soil and subsoil.

The Toxaway fine sandy loam occurs exclusively in the mountain section of the county. The largest areas are those in the bottoms of the Soque River in the Goshen Mountain district. The surface is generally level, with a slight slope from the outer margin toward the streams. The drainage is generally good. In a few places ditches have been constructed.

This type, which comprises over 90 per cent of the farmed land of the mountain section, is easily cultivated and naturally productive. The greater part of it is under cultivation, being used chiefly for the production of corn. The yields range from 20 to 60 bushels, with an average of about 40 bushels, per acre, without fertilization. Cow-peas for hay produce from 1 ton to 2 tons per acre. The soil is also a good type for growing truck crops, especially watermelons and cantaloupes.

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

*Mechanical analyses of Toxaway fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
253123.....	Soil.....	0.1	2.4	8.2	46.0	17.2	15.3	10.7
253124.....	Subsoil.....	.0	3.6	11.5	49.4	12.5	13.8	9.0

#### MISCELLANEOUS MATERIAL.

##### ROUGH GULLIED LAND.

Rough gullied land includes those areas of the Piedmont section of the county which are too rough or too stony for successful cultivation. The soil material consists of Cecil clay loam, Cecil loam, Cecil sandy loam, or Cecil stony loam. Bedrock is frequently encountered near the surface, and rock outcrops are common.

Areas of Rough gullied land occur chiefly along stream slopes. The most extensive border Panther and Little Panther Creeks, in the northeastern part of the Piedmont section, and the tributaries of Middle Fork Broad River in the southeastern part. In the western part it occurs on the Soque River in the vicinity of Habersham. At these points the land consists of very steep to precipitous stream slopes. In many cases the cliffs or slopes are thickly strewn with rock fragments. The less steeply sloping areas are badly washed or gullied. This land has no agricultural value. Some of it is suitable for pasture or forest land, but in many places it is so rough that it supports only a scant growth of trees. Some of these slopes where the timber has been removed are barren. Rough gullied land should be kept forested wherever practicable in order to prevent erosion from cutting back into the better lands lying farther back from the streams.

## ROUGH STONY LAND.

The Rough stony land comprises steep stony slopes of no agricultural value. In many cases the land is so stony and rough that there is no forest growth.

Areas of Rough stony land occur in the northeastern part of the county along the Tallulah and Tugaloo Rivers. They flank the steep walls of the gorge of the Tallulah River, which varies from 500 to 700 feet in height.

## SUMMARY.

Habersham County is located in the northeastern corner of the State of Georgia. It comprises an area of approximately 283 square miles, or 181,120 acres.

The county is partly in the Blue Ridge Mountains and partly in the Piedmont Plateau, the topography ranging from rolling to mountainous.

The greater part of the county is drained by the Chattahoochee River system. The Savannah River system drains a small part of the eastern section. The Soque River is the principal stream within the county.

The region now included in Habersham County was settled during the latter part of the eighteenth century. The southern part of the county is most thickly settled. The population, according to the 1910 census, is 10,134.

Clarksville, with a population of 528, is the county seat. Cornelia, the largest town in the county, has a population of 1,114. Demorest and Mount Airy are towns of local importance.

Railroad facilities are afforded by the main line of the Southern Railway and the Tallulah Falls Railway, extending from Cornelia northward to Tallulah Falls. The county has an excellent system of public roads.

The annual temperature averages about 57° F. The average annual precipitation is about 69 inches. The precipitation in the northern part of the county is greater than in any part of the United States except the Pacific Coast. There is an average growing season of 186 days.

The agriculture of the county is fairly well developed. Corn is the chief crop, occupying about one-third of the improved farm land of the county. Cotton is grown to only a small extent, chiefly in the southern part of the county, about 3,000 acres being devoted to this crop. Cowpeas, oats, rye, and wheat are the secondary farm crops. Truck crops are produced to supply local needs and for shipment to outside markets.

The production of fruit—peaches and apples—is an important item in the agriculture of the county.

The soils of Habersham County are residual and alluvial in origin. Twenty types, grouped in seven series, are found, and in addition there are two miscellaneous or nonagricultural types.

The Cecil is the most important series in the county. Six types are found. Of these the clay loam is the predominating soil of the Piedmont section of the county. This type is naturally very productive, and adapted to general farming.

The Cecil sandy loam is less extensive than the clay loam in this county. It is considerably lighter in texture, but is used for peach growing, general farming, and trucking.

The Cecil loam is somewhat heavier in texture than the Cecil sandy loam and lighter than the clay loam. It is an excellent soil for general farming.

The gravelly loam and stony loam of the Cecil series are naturally productive soils, but the gravel and stone on the surface interfere seriously with cultivation.

The Cecil clay is not extensively developed. It is best suited to general farming.

The Durham series is represented by two types, the sandy loam and the loam. Both are inextensively developed in this county. They are generally farmed in conjunction with other soils, being used mainly for general farming.

Four types of the Porters series are recognized. The sandy loam and clay loam are the principal mountain soils of the county. They have a rough topography. The less broken areas are used successfully for orcharding. The smooth phase of the clay loam is a productive and easily cultivated soil. The stony loam and black loam have a very rough topography. They are used to some extent for grazing.

The Ashe series is represented by a single member, the sandy loam. This soil produces fair yields of the general farm crops.

Of the Habersham series two types are recognized, the stony sandy loam, and the sandy loam. The sandy loam is the more valuable type for farming, as it is much more easily cultivated. Both types are used for general farming and trucking.

The Congaree types, the sandy loam and silt loam, constitute the alluvial soils of the Piedmont section of the county. These are the most productive soils of the county. Corn yields from 40 to as much as 80 bushels per acre on these soils, and heavy yields of other general crops are secured.

The Toxaway fine sandy loam is an alluvial soil encountered in the mountain section of the county. This soil is very productive. It is used chiefly for corn, and is well adapted to truck crops.

The Rough gullied land and Rough stony land comprise areas unfit for agriculture, because of their rough, stony character. A few small areas afford some pasturage. In general this land is best utilized, so far as practicable, for forestry.

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