Issued December 16, 1908.

U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF OCONEE COUNTY, SOUTH CAROLINA.

BY

W. E. McLENDON AND W. J. LATIMER.

[Advance Sheets—Field Operations of the Bureau of Soils, 1907.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1908.

[PUBLIC RESOLUTION—No. 9.]

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

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

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

Approved, March 14, 1904.

[On July 1, 1901 the Division of Soils was reorganized as the Bureau of Soils.]

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., July 17, 1908.

SIR: At the request of Prof. J. N. Harper, director of the South Carolina Experiment Station, a soil survey of Oconee County and a large scale map of the experiment station farm were made during the field season of 1907. The selection was made in continuation of the purpose to make maps of all the experiment station farms and of the regions immediately surrounding in order to correlate the soils used in fertilizer tests and other experiments with soils in other parts of the State and country, and thus enable a more intelligent application of results by the farmer.

The report and map covering this survey are submitted herewith, and I recommend their publication as advance sheets of Field Operations, 1907, as authorized by law.

Very respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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SOIL SURVEY OF OCONEE COUNTY, SOUTH CAROLINA.

By W. E. McLENDON and W. J. LATIMER.

DESCRIPTION OF THE AREA.

Oconee County, with an area of 417,216 acres, or about 652 square miles, is situated in the northwestern corner of South Carolina, between parallels 34° 25′ and 35° 5′ north latitude and meridians 82° 45′ and 83° 25′ west longitude. Taking east for north the shape of the county is roughly that of the State. It is bounded on the north by North Carolina, on the east by Anderson and Pickens counties, and on the southwest, west, and northwest by the State of Georgia.

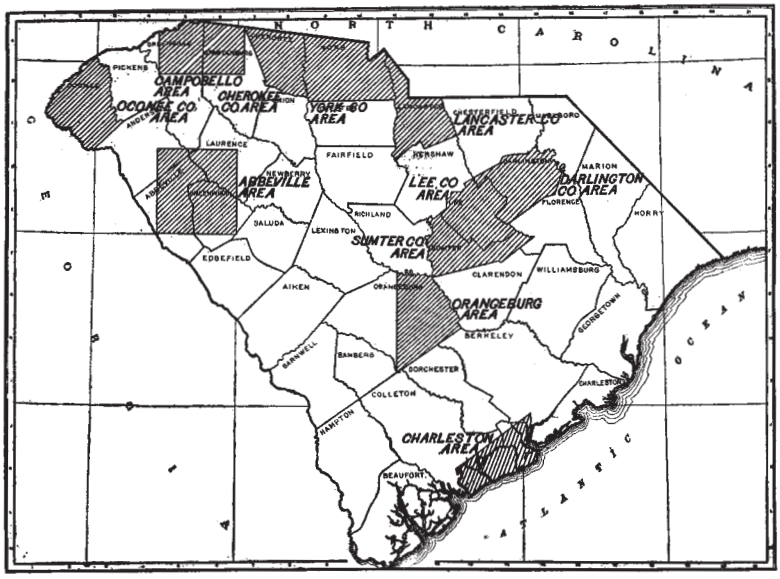

FIG. 1.—Sketch map showing location of the Oconee County area, South Carolina.

The line between the county and Georgia is formed by the Tugaloo and Chattooga rivers and between it and Pickens County for most of the distance by the Toxaway and Keowee rivers. A little less than two-thirds of the county is in the Piedmont Plateau, the remainder being higher and of a mountainous character. In the Piedmont, which is confined to the southern and eastern parts of the county, the characteristic rolling topography of the upland country is well developed, the altitude ranging from 850 to 1,200 feet above sea level. The high altitude and proximity to the mountains have caused the devel-

opment of an intricate system of rapid flowing streams, which have carved out deep, narrow valleys with little or no overflow lands. Where the drainage channels are very deep, as is the case near the mountains along the upper Keowee and Tugaloo rivers, the topography generally is rough and broken. In many other places the streams are bordered by steep slopes, only a few of which, however, are too rough to be successfully farmed. On the northwest the Piedmont gives way rather abruptly to a rough mountainous escarpment with an elevation of 1,500 to 2,000 feet above sea level. In this rim are a number of peaks standing out prominently from the south and east, but they are only slightly higher than the territory immediately beyond. In the northern end of the county the mountains are very rough except for local areas, and rise gradually toward the Chattooga Ridge, which extends along the northwestern border of the county for some 15 miles, and on the north, toward the higher mountains of North Carolina. The Chattooga Ridge has an elevation of 2,000 to 3,100 feet above sea level. Much higher elevations are reached in the adjoining counties of Georgia and North Carolina. In the central western part of the county is a semimountainous plateau of about the same altitude as the broken rim overlooking the Piedmont Plateau on the south and east. Local differences in elevation through the roughest areas range from 600 to 1,000 feet and in the less broken areas from 50 to 500 feet. Streams are very numerous and flow for the most part through deep, rugged valleys, gorges, and canyons. Some of the streams in their rapid descent from the mountains have developed very picturesque rapids, cascades, and falls, the most notable among these being along the Whitewater River and the upper forks of Little River.

The drainage of the county is to the south into the Savannah River through two streams of about equal magnitude, namely, the Seneca and Tugaloo rivers, and their numerous tributaries. The Seneca River drains the eastern and central parts of the county, and the Tugaloo the southern border and the western intermountain areas. The extreme northwestern edge is drained by the Chattooga River, which, with the Tallulah River from the Georgia side, forms the Tugaloo. The plateau section of the mountains is drained by the Chauga River, which flows south into the Tugaloo. Toxaway Creek, also rising well up in the mountains, is a tributary of the Chauga. Ramsey Creek, another of its tributaries, rises between Rich and Poor mountains and swings to the east of the mountainous areas. Among the tributaries of the Tugaloo may be mentioned Brasstown, Longnose, Choestoea, Cleveland, and Beaverdam creeks. The Seneca River is formed by the junction of Keowee and Little rivers, and Keowee in turn by the junction of the Toxaway and Whitewater rivers, which enter the county from North Carolina. Little River

rises in the northern part of the county and flows in a southeasterly direction to within less than a mile and a half of the Keowee River, at which point it turns south, flowing some 6 miles before uniting with it. Cane, Tomassee, Oconee, and Crooked creeks are the principal tributaries of Little River. Coneross Creek rises near the center of the county and flows in a southeasterly direction, leaving the county about a mile south of the point where the Seneca River goes out. Excellent locations for large power plants are found in many places along the larger streams. As yet nothing has been attempted on a large scale, except at Newry, where a cotton mill is being very successfully operated. A number of gristmills are found on the creeks where sufficient power is easily developed.

Prior to 1755, when a treaty was made with the Cherokee Indians, there were very few settlers in the northwestern part of the State, especially in the territory embraced by Oconee County. For several years afterwards settlements were slow and very much hampered by the Indians. During the course of the Revolutionary war the Indians were driven from the section. Immigration then started to this county, and it was not long before all of the better lands were fairly well settled. The mountainous areas are now and have always been very sparsely settled. The settlers came from the lower part of the State, Virginia, and other of the older sections south of Pennsylvania. About the only foreign immigrants were Germans, who settled near the center of the county and were largely responsible for the founding of Walhalla, the county seat. With the possible exception of Pickens County, the percentage of whites over the negroes is larger than in any other county in the State. In the mountains the population is almost entirely white.

The county has an extensive system of public roads which would prove adequate for a much larger population. Most of them are in good condition, although some of the roads crossing valleys have too steep grades to allow heavy hauling without difficulty. Within the last few years some of the worst grades have been done away with, and more improvement is expected in this line as the agricultural development goes forward. Another incentive to better roads is the rural free-delivery service, which now covers all but the remotest sections in the mountains.

The railroad facilities, though not extensive enough, are fairly good. The main line of the Southern Railway crosses the south-central part of the county in a general east and west direction, affording quick and direct service to all points west and north. The Blue Ridge Railway, terminating at Walhalla, is a short line operated as a branch of the Southern. This gives a direct outlet to the South. Better facilities are very much needed in the northern, western, and southern parts of the county.

Walhalla, Seneca, and Westminster, each with a population between 1,000 and 2,000, are the principal towns and trading centers. Newry, Madison, Richland, and West Union are some of the smaller railroad towns. Fair Play is a small place in the southern end of the county, and Salem, a town of about the same size, is 12 miles north of Walhalla. Clemson College is situated in the extreme eastern end of the county. The cotton crop is handled partly by mills at Newry, Seneca, Walhalla, and Westminster, and the remainder is shipped to outside markets. Practically all of the beef cattle that can be had for miles around are consumed at Clemson College. The mountain trade, even from points in Georgia and North Carolina, is conducted at Westminster and Walhalla.

CLIMATE.

Oconee County has a mild, pleasant climate, adapted to a great diversity of farming crops. The condition in the nonmountainous areas are very well represented in the tables below, which were compiled from records of the Weather Bureau stations at Walhalla and Clemson College, both places being in the county. The fact that Walhalla is about 200 feet higher than Clemson College makes the summer months a few degrees cooler at that point. On the other hand, the winter months are slightly warmer at Walhalla on account of the sheltering influence of the nearby mountains in protecting it from the cold north and northwest winds. The summers are long and warm, but they are not attended by hot, oppressive periods, except sometimes during the months of July and August, and even then the nights are cool. The winters are mild and usually attended by a light snowfall. In the mountains there is a greater range of temperature and the nights are quite cool even during the growing season, a condition very unfavorable to the successful growing of cotton. The mountains, as well as the nonmountainous areas extending north from a point 2 miles north of Tamassee and Salem, may be considered as out of the cotton belt. The pleasant climate and picturesque scenery of the mountains are attracting quite a number of tourists to this section each summer.

Normal monthly and annual temperature and precipitation.

Month.	Walhalla.		Clemson College.		Month.	Walhalla.		Clemson College.	
	Temperature.	Precipitation.	Temperature.	Precipitation.		Temperature.	Precipitation.	Temperature.	Precipitation.
	°F.	*Inches.*	°F.	*Inches.*		°F.	*Inches.*	°F.	*Inches.*
January	42.1	4.14	41.9	4.63	August	76.7	5.92	80.1	4.92
February	44.8	4.32	41.8	5.45	September	70.4	4.78	73.3	3.93
March	50.0	6.78	52.7	4.47	October	59.6	3.40	63.1	3.10
April	.....	.....	59.2	3.90	November	49.6	3.41	51.2	3.21
May	67.3	2.94	70.3	3.21	December	44.3	2.98	42.5	3.54
June	75.3	4.92	77.1	5.76	Year	.....	.....	61.0	51.33
July	76.5	5.30	79.0	5.21					

Dates of first and last killing frosts.

Year.	Walhalla.		Clemson College.		Year.	Walhalla.		Clemson College.	
	Last in spring.	First in fall.	Last in spring.	First in fall.		Last in spring.	First in fall.	Last in spring.	First in fall.
1899.....	Apr 10	Nov. 3	Apr. 9	Nov. 4	1903.....	.....	Oct. 24	Apr. 4	Oct. 25
1900.....	Apr. 13	Nov. 9	Apr. 13	Nov. 9	1904.....	Mar. 29	Oct. 24	Apr. 5	Oct. 24
1901.....	Apr. 10	Nov. 6	Mar. 22	Nov. 5	1906.....	Mar. 25	Oct. 11	Mar. 21	Oct. 29
1902.....	Apr. 8	.....	Mar. 20	Nov. 27	Average	Apr. 6	Oct. 28	Mar. 31	Nov. 4

It will be seen from the first table above that the annual precipitation is a little more than 50 inches. This is very well distributed throughout the year, but occasional droughts during the summer months cause an immense amount of damage. On the other hand, prolonged wet spells are just as harmful. As a whole, however, the temperature and moisture conditions are very favorable to plant growth. Not much can be done to prevent the harmful results of excessive rainfall, except to stop erosion and prevent overflows as much as possible, but the effects of droughts can be largely overcome by proper methods of tillage and cultivation and the exercise of care in selecting crops adapted to the different soils. The mountains have quite a local modifying influence upon rainfall during the summer months. Rain will fall along the edge of the mountains, but a mile or so away the crops may suffer from drought, the effect being very much the same as that exercised by swamps or bodies of water in diverting the course of showers. The fall months are the driest of the year, the weather being usually very favorable for gathering the cotton crop.

At Walhalla the average date of the last killing frost in the spring is April 6 and of the first in fall is October 28, while at Clemson College the corresponding dates are March 31 and November 4. The growing season is about seven months long, or about two weeks shorter than in the Coastal Plain region of the State. The shorter season makes it more difficult to grow heavy yields of cotton, as very often the late bolls are frost-bitten before they reach maturity. This is especially true on the clay lands. The erratic occurrence of frosts in the spring makes the peach crop somewhat uncertain, and other fruits are affected to a less extent.

AGRICULTURE.

The early settlers confined their efforts largely to the cultivation of the fertile bottom lands, as at that time the rolling uplands were not considered of much value for farming. This idea was due probably to the fact that many of the settlers came from leveler sections, or because corn, the chief crop, gave much better yields on the bottom

lands without much care and with little deterioration of the soil after years of careless tillage.

Gradually, however, settlements extended all through the uplands, many of the farms including little or no bottoms. The leveler sandy lands were first occupied, then the more rolling tracts, and lastly the mountainous areas, which are still very sparsely settled. Even at the present time the best and most extensive developments are found on the moderately rolling sandy loam types. The individual holdings, as a rule, were rather large, but the land brought under cultivation depended upon the supply of labor at hand.

Being far from markets, the settlers turned their attention to producing corn, oats, wheat, and such other crops as could be consumed at home or easily exchanged. Nearly every farmer raised hogs for pork and lard, and a great many kept at least a few cattle and sometimes small herds of sheep. Much of the spinning and weaving was done at home. Cotton, although grown to a limited extent, did not play an important part in the agriculture of the county until after the civil war. Land being cheap and plentiful, the farmers gave very little attention to keeping the soil in a productive state by means of good tillage or the proper rotation of crops. If a field became very much run down after some years of cultivation, it would be abandoned and new lands cleared to take its place. The farmers were for the most part out of debt, but there was, in general, no great degree of prosperity.

As the necessity for a ready-money crop was strongly felt after the civil war, cotton began to be grown on an increasing scale until it became the most important crop throughout the county where it could be grown successfully. In the mountains, which are out of the cotton belt, corn continued to be the most important crop. Wheat continued to be grown, but with the increase in the acreage of cotton less and less attention was given to other lines of farming. As a result, in the Piedmont section, although it is admirably adapted to stock raising, dairying, and the growing of a great variety of forage crops, practically nothing is being done in these lines. The average farmer does not produce a running supply of corn. Cowpeas, which thrive on any of the soils and afford excellent feed and the cheapest means of improving the soil, are not grown nearly as extensively as they should be, nor do they play an important part in the rotation of crops. The whole system is that of devoting the best energies to producing cotton and subordinating all the other crops. Instead of depending upon cotton almost exclusively as the money crop, and buying the necessaries that could be produced more cheaply at home, a more diversified farming will lead to better results and keep the farms in a higher state of productiveness. The necessity for diversification is being more fully realized every year. Some have begun

growing small patches of tomatoes for canning. These command a good price in the local markets. Quantities of sweet potatoes are also canned for the market, going largely to outside points.

The farmers in the mountains, with few exceptions, are operating on a small scale. In addition to corn, some of which is marketed, small patches of cabbage, Irish potatoes, and onions are grown to be sold in the late fall months. These, with some apples and chestnuts, are brought down from the mountains and sold in the towns and country districts for miles around. Some of the owners supplement their incomes by the sale of cross-ties and lumber. Practically all of the best timber has been removed, and what is still standing is held largely by lumber companies. With the cotton growers there has been a decided change for the better within the last ten years, due to better prices paid for cotton. The home surroundings are being improved, and better methods for farming are gradually coming into favor, although there is still room for considerable improvement. The scarcity of labor could be offset in many instances by adopting the better types of farm implements and machinery, which can be bought at quite reasonable prices.

An idea of the extent and relative importance of the different crops can be had from figures given in the Twelfth Census. Of the 333,038 acres in farms only 99,891 acres were reported as improved. There were 35,080 acres in corn, producing 414,150 bushels; 25,612 acres in cotton, producing 10,148 bushels; 5,858 acres in wheat, producing 30,720 bushels; 2,810 acres in oats, producing 15,880 bushels; and 1,165 acres in grasses, producing 1,391 tons of hay. The other crops had less than 1,000 acres each. Among these may be mentioned cowpeas, sorghum, sweet potatoes, Irish potatoes, and miscellaneous vegetables.

The orchard products were valued at $8,308 and the forest products at $35,406. In the mountains and the thinly settled sections there is considerable merchantable timber, but this is being removed rapidly, and it is only a question of time when the supply will be practically exhausted. Since 1900 there has been an appreciable increase in the acreage of cotton.

Cotton and corn lands are left bare during the winter months and very little plowing is done in early spring. Where cotton follows cotton, a common practice is not to plow broadcast, but to run center furrows between the old rows, apply the fertilizers, and bed with four furrows. If cotton follows corn or some other crop the land may be broken before the rows are laid off. Most of the after cultivation is done with sweeps and scrapes, which require three trips to the row to complete a cultivation. The crop is laid by in July and early August, while the plants are still growing and fruiting rapidly. Cultivation is done more with the idea of keeping grasses and weeds down

than to conserve the soil moisture for the use of plants. Shallow cultivations in the middles, at least, would prove very beneficial as long as the plants are setting fruit.

Lands intended for cotton should be given a deep breaking during the winter or early spring, and the beds should be made very low, so that the cotton can be cultivated practically on a level. The crop would stand droughts better and less hoeing would be necessary. In late fall rye should be sown broadcast over the cotton fields to act as a cover crop and to afford pasturage during the winter months. More attention should be given to selecting varieties of cotton best adapted to the different soils. Cotton suited to the shallow, rolling soils is rarely well suited to moist, loamy lands, where the habits of growth are entirely different. The crop has a tendency to mature later on clay than on sandy soils. The fall frosts are too early as a rule to encourage late growing, so that an early and rapid fruiting variety would prove best for the clay lands. A large plant growth is an unnecessary drain upon the land, unless the stalks have time to fill out well with bolls.

The methods of planting and cultivating corn are quite variable and do not apply to any particular type of soil, but in all of them there is a general lack of thoroughness which in most cases means a poor crop. On the bottom lands the average yields are not over 30 bushels per acre, whereas if the crop were properly planted and cultivated from 60 to 75 bushels per acre could be obtained. The upland soils used for corn culture ought to yield on an average about 30 bushels per acre, but the general average is less than 15 bushels, although a great many farmers make applications of commercial fertilizers. On the bottom lands the rows are from 3½ to 4 feet apart and the hills from 15 to 24 inches in the drill, one or two stalks being allowed to stand in the hill.

The planting is done on level ground or on low flat beds. On the uplands more space is allowed. The rows are from 4 to 5 feet apart and the hills from 2 to 3 feet. Usually not more than one plant in the hill is allowed to stand. The upland soils being drier and warmer, the furrow method of planting is more generally practiced. This system gives the plants a deeper root development, which is very desirable during dry seasons, and makes it easier to keep down grasses and weeds between the plants without the use of the hoe. Cultivation is done with scooters, light turning plows, sweeps, etc., which require several trips to the row to complete a single cultivation. Much time and labor would be saved by using a cultivator. The practice of "pulling fodder" is followed throughout the county.

Large quantities of commercial fertilizers are used. In 1900 the expenditures for this purpose amounted to $53,870. With the increase in the acreage of cotton more fertilizers are being used each

year, despite the fact that the price is rising. They are also coming into more general use for corn on the uplands. For cotton the applications range from 150 to 600 pounds per acre, some using as much as 1,000 pounds apparently with good results. It is argued that if twice as much, or even a third more, cotton can be grown with 800 or 1,000 pounds as with 400 pounds per acre, the heavier application is a good investment. It is doubtful if the heavy applications will give satisfactory results unless the soil is prepared deeply so as to allow an extensive root development. There is a general lack of knowledge as to the manurial requirements of the soils, except that they respond in greater or less degree to any fertilizer. As a matter of economy it pays to buy only the best grades, preferably the different ingredients, and mix them at home. Some use complete fertilizers, some just the acid phosphate, others a mixture of cotton-seed meal, acid phosphate, and kainit in varying proportions. Where stable manure is applied some farmers omit the cotton-seed meal. The soils in general give less response to potash than to either nitrogen or phosphorus. In addition to the usual applications of fertilizers at planting time, some give a top dressing of nitrate of soda after the crop has some size. It is not good economy to use the cotton seed as a fertilizer. They should be exchanged for cotton-seed meal, as in this way a good price is obtained for the oil, which is useless as a fertilizer. The meal being fine, it acts more readily than the seed, which require some time to rot.

The practice of a rotation of crops is the exception rather than the rule. In a great many instances cotton follows cotton for a number of years. Again, cotton and corn alternate in an irregular way. With the two-crop system a good plan would be to grow cotton two years and corn one year. At laying-by time cowpeas should be broadcast or sown in rows through the corn. The peavines would add a great deal of humus to the soil and put it in better shape for the next crop. A better plan would be to plant in cotton one or two years, in corn one year, and in oats and peavines the next. By the proper rotation of crops it would be possible to grow good corn without commercial fertilizers, and the quantity used for cotton could be greatly reduced. Every effort should be made to keep the soil well supplied with humus.

A few general soil adaptations are recognized. In so far as possible the corn crop is confined to the bottom lands and the cotton to the uplands. The clay lands are better adapted to cotton than to corn. The tendency with every farmer is to grow the general line of crops, regardless of the kind of soils on his farm. It has been found that the sandy lands grow good peaches, but only a few efforts have been made to extend the industry on account of the erratic spring frosts, which make the crop very uncertain.

On an average the farms in Oconee County contain between 100 and 500 acres, and there are few with more than 1,000 acres. At least a part of each large plantation is rented out in tracts of 25 to 75 acres. According to the Twelfth Census the average size of farms was 102.5 acres, but the tenant holdings were counted as farms in this report. About 33 per cent of the farms are operated by the owners, the remainder being rented.

Land is rented in a number of ways. If the owner furnishes the land and fertilizers he usually gets half of the crop; if only the land, he gets a third or fourth. Another popular plan is to rent a house and so many acres of land for a stipulated amount of lint cotton, ranging as high as 3 bales for a one-horse crop. Cash rentals range from $2 to $7 an acre, depending upon the character of the land. A great part of the labor is absorbed in the tenant system, but where hired by the day farm hands get 60 to 75 cents a day, and by the month $12 to $16, with board or house and rations.

The better lands through the Piedmont section sell for $25 to $50 an acre, although near Walhalla, Westminster, and Seneca as much as $75 an acre is asked. Less desirable areas can be bought for $10 to $20 an acre. The bottom lands are held at higher prices than the uplands on account of their natural productiveness and level surface. The rough mountain lands are valued chiefly for the timber they support, the price ranging from a nominal amount to $5 an acre, while the cultivable areas sell for $5 to $20 an acre. The value of the cotton lands has almost doubled in the last ten years, and no doubt will go higher if cotton continues to bring a good price.

With the growing scarcity of labor the farmers are finding it necessary to confine their efforts to smaller areas than heretofore. The lands that can not be kept up are either rented or abandoned. Better conditions could be brought about by better agricultural methods. More attention should be given to forage crops and pasturage, which do not require a great deal of labor. The section is admirably adapted for cattle, sheep, and hog raising, and these animals command good prices in the market. This line of farming would not only lead to a substantial prosperity among the farmers, but it would afford a cheap and efficient means of keeping the soils in a productive state. More intensive farming would be practicable if a good class of immigrants could be obtained and were allowed to take up lands in small tracts of 25 to 50 acres. The immigrant farmer and his family could do nearly all the work on such an acreage, thus affording a solution of the labor problem.

SOILS.

The soils fall naturally into two general groups, the alluvial bottoms and the residual uplands. The latter group may be further

divided into the soils of the rolling lands of the Piedmont Plateau and those of the rough mountainous areas, both divisions having nearly the same geological formations, but differing widely in topography and climatic conditions. All of the upland soils in the Piedmont section have red subsoils and belong to the Cecil series. Those of the mountains, with one exception, are members of the Porters series. The alluvial lands, which are very limited in extent, have been mapped as the Congaree fine sandy loam.

The residual soils are derived from the weathering of very ancient metamorphic, igneous, and sedimentary rocks, most of which are highly crystalline.[a] Granites, gneisses, and mica schists are by far the most important. The sedimentary rocks are confined to one formation known as the Brevard schist and occupy a strip from 1 to 2 miles wide across the county, entering North Carolina just west of the Toxaway River. A few small areas are found to the east of this strip, capping Poor Mountain and some of the other near-by peaks. The formation consists of dark-gray to black slates and schists, with occasional lentils of marble and irregular thin layers of sandstone. To the west of the Brevard schist is an extensive area of the Carolina gneiss, which is a highly metamorphic formation consisting for the most part of interbedded fine-grained gneiss and mica schists. Immediately east of the Brevard schist there is found a broad strip of the Henderson granite, this being interstratified in places with the Roan gneiss. The largest area of the Roan gneiss, however, occurs in a long strip along the eastern border of the Henderson granite. The Henderson granite is a light-gray granite rather poor in iron-bearing minerals. The Roan gneiss, on the other hand, is a dark-gray to nearly black heavy rock consisting of hornblende gneiss, hornblende schist, and diorite, interbedded with other rocks of minor importance. The remaining half of the county is occupied by a gray medium-textured gneiss (Whiteside granite), through which are interspersed occasional small patches of the Carolina gneiss, narrow bands of the Roan gneiss, and possibly local areas of massive granite. The acidic or lighter colored rocks weather into the lighter textured soils, which vary from loam to sandy loam in texture, and the darker colored or basic rocks weather into the clay loams and clays.

The Brevard schist and the Carolina gneiss are almost wholly within the mountains. The Henderson granite and the Roan gneiss are partly in the mountains and partly in the Piedmont, while the large area of gneiss in the eastern half of the county is entirely in the Piedmont Plateau. In the Piedmont the gneiss or Whiteside granite gives the Cecil sandy loam and a sandy phase of the Cecil

[a] The geological names are those used in the Pisgah Folio, U. S. Geological Survey.

clay, the Henderson granite gives the Cecil fine sandy loam, and the Roan gneiss gives the typical Cecil clay. In the mountainous and semimountainous areas the Henderson granite gives the Porters fine sandy loam, the Brevard schist gives the Porters clay loam, and local areas of the Porters clay, the Roan gneiss gives the Porters clay, and the Carolina gneiss in the roughest areas gives the Porters loam, and in the semimountainous plateau lands the Pilot loam. Small areas of Porters clay are also derived from the Carolina gneiss.

The alluvial lands are derived from wash from the different formations and they vary somewhat with the adjacent uplands, depending upon the size of the streams.

Nine types of soil were recognized, the name and extent of each being shown in the following table:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil sandy loam	176,640	42.5	Porters fine sandy loam	24,128	5.7
Cecil clay	48,448	11.6	Congaree fine sandy loam	23,360	5.6
Cecil fine sandy loam	37,248	8.9	Porters clay	13,504	3.2
Pilot loam	33,792	8.1	Total	417,216	.....
Porters loam	33,664	8.1			
Porters clay loam	26,432	6.3			

CECIL SANDY LOAM.

The Cecil sandy loam, to a depth of 5 to 8 inches, is a brown medium-textured sandy loam, rather low in organic matter in the cultivated areas. Strewn over the surface and mingled with the soil are varying quantities of angular quartz fragments, but except in very small areas the quantity present is not sufficient seriously to interfere with proper methods of tillage or to render the soil unduly droughty. The subsoil is a strong, red sandy clay, extending to a depth of several feet without much change in color or texture. Lower down the clay grades into soft, weathered material which in an undisturbed condition has much of the original gneissoid structure of the parent rock. Quartz veins ranging from less than an inch to a foot or so in thickness are of frequent occurrence throughout the subsoil. The soil is easily tilled and responds readily to good methods of treatment.

In nearly every field are found local clay areas, or "gall spots" produced by erosion. The same agency is also responsible for a shallow phase of the type occurring on most of the farms to some extent.

A phase of the type which is not considered very desirable is found on some of the high knolls and steeper hillsides, where the parent rock is not weathered to any great depth below the surface. Ledges and loose fragments of a porous, rotten stone occur in the subsoil and fragments of the same material with the usual quantity of quartz are

found strewn over the surface. Some areas are too stony to be farmed successfully to cultivated crops, while a great many others can be handled with a fair degree of ease. The soil is a reddish-brown rather heavy sandy loam 4 or 5 inches deep and the subsoil is a deep-red sandy clay. The rolling topography causes most of the rainfall to run off at the surface, and what is absorbed rapidly disappears in the porous rotten stone below. As a consequence the soil is too droughty to produce good crops unless the rainfall is well distributed. Areas similar to the above also occur in narrow, ill-defined strips extending generally in a northeast-southwest direction. This phase of the type is referred to as "Rotten-stone land." The sandiest phase is found on some of the crests of the gentler drainage divides and occasionally in small areas along the lower slopes. The soil to a depth of 8 to 12 inches is a brownish-gray sandy loam, underlain by a red sandy clay or by 6 to 12 inches of a yellowish-brown clay below which is the typical red clay. This phase of the type is sometimes called gray sandy land in contradistinction to the areas with a shallow brown soil and a deep red subsoil.

A phase of minor importance is found on some of the low-lying gently rolling areas or table-lands near the larger stream courses. These areas represent old terraces left by the streams in the process of deepening their valleys. Practically all of the fine alluvial deposits have long been removed, but many of the waterworn gravels and bowlders have been left scattered over the surface. The soil is a shallow, brown sandy loam, overlying a red sandy clay. This phase is considered better land than the high, rolling areas back from the streams.

In the southern and eastern parts of the county the Cecil sandy loam covers large areas almost to the exclusion of any other upland type. The topography consists of long drainage divides with numerous laterals. This gives a general rolling topography, with occasional quite rolling broken areas along some of the streams. The streams are from 25 to 200 feet lower than the crests of the adjacent ridges. The areas between Little and Keowee rivers in places are quite rolling, and some parts of them are broken and undesirable. This is also true of some parts of the area west of Chauga River, and in local areas along the Tugaloo River farther south. Here the streams in places are bordered on one side or the other by steep slopes, often rising into knolls considerably higher than the surrounding country. The stony phase of the type is most in evidence through the rolling and broken areas. The principal body of the sandy phase described above is found around Fair Play. Another area extends along the Westminster road just south of Walhalla.

The Cecil sandy loam is a residual soil derived from a gray gneiss or gneissoid granite consisting of orthoclase and plagioclase feldspars,

quartz, and muscovite and biotite mica, named in the order of their importance. Local areas, no doubt, are derived from a massive granite of about the same color and composition. Small schistose areas may have been formed from the Carolina gneiss. Here and there are found occasional narrow bands of the Roan gneiss, which generally weathers into the Cecil clay. The Cecil sandy loam typically is derived from the more massive rocks, while the schists usually weather into a slightly heavier soil. Small areas of the " Rotten-stone land " are merely the result of erosion. Others follow a certain phase of the gneiss, which allows the feldspar and mica to weather and leaves the quartz grains cemented together with oxides of iron.

The timber growth consists mainly of shortleaf pine, Spanish, red, white, and post oaks, and an undergrowth of dogwood. About all of the merchantable timber has been removed.

The Cecil sandy loam is the most desirable soil in the area for general farming purposes and is well adapted to a number of crops not now grown. It is quite probable that a good grade of tobacco could be produced, as the same soil is used extensively for this purpose in North Carolina and Virginia. In Georgia, where the climatic conditions are favorable, it is highly prized as a peach soil. A few orchards have been started in Oconee County, but they have not been given the proper care. The uncertainty of profitable crops on account of spring frosts no doubt will prevent an extensive development of the industry. Stock raising and dairy farming are two other promising industries that are not followed on a commercial scale. Cotton is the first crop in acreage and importance and corn is the second. So far as practicable the corn crop is confined to the bottom lands and the cotton to the uplands. Oats are grown at least to a limited extent by a majority of the farmers, and many plant wheat as one of their important crops. The oat crop is intended almost exclusively for home use. Peanuts are being grown in a limited way for the market. Among other crops for home consumption may be mentioned sorghum for sirup, and forage, sweet potatoes, and cowpeas, besides a number of miscellaneous vegetables. A number of farmers plant small patches of tomatoes for canning purposes. The canning of sweet potatoes is also receiving considerable attention. Ordinarily these two industries prove very profitable and can be handled with little or no outside help. Under the prevailing system of management the average yield of cotton is between one-fourth and one-half bale; corn yields from 10 to 25 bushels, and wheat from 6 to 10 bushels per acre. Some of the best farmers find it just as easy to make a bale of cotton per acre and correspondingly larger yields of corn. Commercial fertilizers are freely used, especially with the cotton crop, and very often without the application of any rough manures.

The soil needs deeper and more thorough tillage than is now generally practiced, and a system of rotation should be followed that will keep it well supplied with humus. The present system of planting continuously to cotton, or any other crop for that matter, and applying commercial fertilizers alone will never be attended with the best results. To insure profitable returns a greater diversity of crops should be grown, thus not only increasing the resources of the farm, but affording an easy means of permanently improving the soil. Areas that can not be properly protected from erosion should be devoted to pasturage, sowing Bermuda grass or some other grass that will make a tough sod and at the same time provide good grazing. The South Carolina experiment station farm at Clemson College consists very largely of this type of soil.

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

Mechanical analyses of Cecil sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
18229, 18231.....	Soil	6.9	18.8	12.3	28.7	6.7	19.6	6.9
18230, 18232.....	Subsoil.....	3.3	10.6	6.9	14.1	4.2	16.1	45.1

CECIL FINE SANDY LOAM.

The soil of the Cecil fine sandy loam, to a depth of 3 to 5 inches, is a light-gray fine sandy loam carrying a small quantity of angular quartz fragments and only a small percentage of organic matter. Material of the same texture, but of a light-yellowish or yellowish-brown color, extends to a depth of 6 to 12 inches, where it grades into a light fine sandy clay, mostly of red color. Some of the sandiest areas have a yellowish-brown subsoil to a depth of 15 to 18 inches, and from this fact they have been called "Mulatto lands." The clay becomes lighter colored and less coherent with depth, and passes gradually into soft weathered rock. The light clay subsoil and the incoherent underlying material makes the type very susceptible to deep and destructive erosion. Even where the clay is reddest it does not have the strong red color characteristic of the subsoil of the Cecil sandy loam. It also differs from the latter in that it does not contain a noticeable quantity of mica. The type as a whole has a high quartz content and is naturally less productive than the Cecil sandy loam, and is not so responsive to improvement.

The Cecil fine sandy loam occurs in strips and irregular areas coincident with nonmountainous bodies of the Henderson granite. The largest strip extends almost across the county in a general northeast-southwest direction, passing about 2 miles to the west of Walhalla.

The surface features in general are rolling and some areas where the drainage is excessive are rather too badly broken to be farmed successfully. Some areas near the mountains have a somewhat hummocky appearance in addition to the general rolling topography. The natural drainage is perfect.

The Henderson granite, from which this type is derived, is a light-gray or light bluish-gray siliceous granite. In most places it is fine-grained and has a slight gneissoid banding. The small percentage of mica present does not show up to any extent in the weathered material. Ledges of the hard rock are to be seen on many of the steeper slopes.

The native timber growth consists largely of oak and pine, as on the Cecil sandy loam, but the growth, especially of oak, is more scrubby.

Not more than 10 per cent of the soil is under cultivation. Around Salem, along Fall Creek and the upper tributaries of Little River, and to the west of Walhalla are some of the best farms on the type. Cotton is the chief crop, the average yield being about one-third of a bale per acre. Corn yields are very light, unless the land is well fertilized. A few other crops are grown on a limited scale for home use. Very few of the farmers have orchards of any consequence. Of the small grains, rye would prove profitable, although very little is grown.

By using rough manures and commercial fertilizers liberally, cotton can be made to produce a bale or more to the acre. Instead of planting continuously to cotton, however, a system of rotation should be practiced, namely, planting to cotton one or two years, then to corn, following this with rye; after the rye is cut in early summer broadcasting to cowpeas, which will give a good crop of hay. Cowpeas should be planted between the rows of corn and a row of peas in every other cotton middle. The pea stubble and vines improve the texture of the soil and increase its productiveness. The soil needs more organic matter or humus. All systems of cropping should, therefore, be planned with a view of keeping the soil well supplied with humus, otherwise farming on this type will not prove very remunerative.

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

Mechanical analyses of Cecil fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
18235	Soil	0.9	6.3	8.8	41.2	12.9	24.2	5.5
18236	Subsoil	.6	6.0	6.9	25.2	15.4	14.6	31.5

CECIL CLAY.

The soil of the Cecil clay to a depth of 3 to 6 inches is a reddish-brown clay loam or heavy fine loam. A small quantity of quartz fragments are usually found strewn over the surface of the type, and in a great many places partially weathered fragments of the parent rock. The subsoil to a depth of 3 to 10 feet is a deep-red heavy clay. The upper 2 feet of the subsoil are comparatively free from stone fragments, but below this depth stone is more in evidence, occurring mostly in ledges. The stoniest areas, being hard to handle, are not in general use. When viewed across the field the soil appears quite red.

A sandy phase of the type occurs through the Cecil sandy loam belt. Some areas here are the direct result of erosion, while others represent the original soil as left after the process of weathering. Some of the "Rotten-stone lands" referred to under the Cecil sandy loam, where the soil was almost a clay, were mapped with this phase of the Cecil clay. The soil may be described as a reddish-brown heavy sandy loam, 2 to 4 inches deep, overlying a deep-red clay considerably more sandy than the typical subsoil. The comparatively level areas are not very stony as a rule and they are considered first-class land. Areas with a great deal of stone at the surface and through the subsoil can be made to produce good crops during wet seasons, but all crops suffer during droughts and sometimes the yields are very poor.

"Red land" and "Chocolate land," or even "Black land," are descriptive terms commonly applied to this soil.

The typical areas occur to the west of the Cecil sandy loam, principally in strips alternating with the Cecil fine sandy loam. The largest strip extends from about 3 miles southwest of Walhalla beyond the county line north of Fall Creek Church. Smaller areas occur in the Tomassee and Longnose Creek neighborhood. The principal areas of the sandy phase are found north of Richland and north and east of Walhalla. The small bodies near Madison are semimountainous and undesirable, except for pasture lands. The surface of both phases ranges from moderately undulating to quite rolling, with local badly broken areas along some of the streams. Numerous areas are being ruined by erosion.

The sandy phase of the type is derived largely from gneiss. The narrow strips with a heavier soil are no doubt derived from dikes of diabase. A great many areas of the sandy phase occur all through the Cecil sandy loam, and nearly every farmer has his clay spots or red lands, which in many places are deeply eroded. The typical areas are derived from the Roan gneiss, which is a dark-colored rock consisting very largely of hornblende gneiss, hornblende schist, and diorite.

The principal tree growth consists of shortleaf pine and a variety of oaks, the latter being more plentiful than on the sandy types.

The best areas of the sandy phase are farmed to the same extent as the Cecil sandy loam, and in very favorable seasons the yields are somewhat heavier than upon that type. Taken as a whole, the Cecil sandy loam, however, is considered the safer soil, because crops are not so much affected by droughts on it as on the Cecil clay. The reason for this, however, is due more to cultural methods than to any characteristic of the soil itself. If the clay is plowed deeply so as to form a deep seed bed, even though it does not contain much humus, it will tide crops over long droughts without much injury. The stony areas or " Rotten-stone lands " are so influenced by droughts that the crop yields are very variable. The heavy phase is less generally farmed than the sandy phase. It has been avoided in preference for the sandy lands on account of its being hard to handle satisfactorily with the implements in general use. With the introduction of heavier and better types of plows the desirability of the clay lands is beginning to be more generally recognized.

The system of farming on this type is essentially the same as that practiced on the Cecil sandy loam, corn and cotton being the only crops grown to any great extent. It is recognized as a better soil for cotton than for corn. The average yield of cotton is less than one-half bale and of corn 10 to 25 bushels per acre. Where the soil is well prepared and properly fertilized it yields a bale or more of cotton and from 25 to 40 bushels of corn. The stony and eroded areas that are not now used should be seeded to grass and clover. Many of the hillsides now considered worthless could be converted into good grazing lands by sowing Bermuda grass. Wheat could be grown on the best areas, especially if a proper rotation of crops were practiced.

Being so near the northern limit of the cotton belt the farmers should plant only early maturing varieties of cotton on the Cecil clay. The crops normally mature considerably later on this soil than on the sandy lands.

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

Mechanical analyses of Cecil clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
18237, 18239.....	Soil	1.3	3.9	3.2	15.7	32.8	24.6	18.4
18238, 18240.....	Subsoil.....	.4	2.1	1.8	7.8	19.1	30.5	37.6

CONGAREE FINE SANDY LOAM.

The Congaree fine sandy loam is a brown mellow fine sandy loam or loam with a depth of 3 feet or more. It is found along swift-flowing streams, and varies considerably in texture. Some areas tend to become sandier with depth, while in others the reverse is true. Along some of the streams subject to frequent overflow the soil to a considerable depth is chiefly a slightly coherent brownish-gray sand. Local modifications have resulted from colluvial wash from the adjacent slopes. Broader differences occur as a result of wash from the different upland soils. Throughout the Cecil fine sandy loam areas the bottom lands are generally sandier than elsewhere and carry very little mica, while throughout the Cecil sandy loam they are quite micaceous. Wherever the soil of the uplands is mainly a red clay, the bottom lands, too, are rather heavy and have a reddish-brown color. Such differences are not so noticeable along the large streams.

A local difference in the river bottoms worth mentioning is found in the form of second terraces above overflow. The soil is a brown fine sandy loam or loam from 8 to 12 inches deep. This rests upon a brown to yellowish-brown clay loam or clay.

The largest areas mapped are along the Whitewater, Keowee, Seneca, and Tugaloo rivers. These bottoms are naturally well enough drained to produce good crops, but they are subject to occasional overflow during very wet weather. In the small bottoms overflows are more frequent and are often destructive. On account of obstructions in the drainage channels the bottoms of Beaverdam, Little Beaverdam, and a few other creeks are so waterlogged that they can not be used for anything except pasturage.

The Congaree fine sandy loam is extensively farmed to corn, and to a less extent to a few other crops. Corn yields from 25 to 70 bushels per acre, depending upon the seasons and the methods of tillage and cultivation. Sorghum and grasses give heavy crops. Cotton does not do well on the overflow strips, but the small second terraces referred to above are good cotton lands, yielding as much as a bale to the acre.

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

Mechanical analyses of Congaree fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
18243	Soil	0.1	0.8	1.5	22.1	23.8	40.2	10.8
18244	Subsoil	.0	2.2	3.1	44.8	16.5	27.5	5.6

PORTERS FINE SANDY LOAM.

The Porters fine sandy loam, to a depth of 6 to 12 inches, is a gray or pale-yellowish fine sandy loam. In local sheltered areas the soil is deep and dark-colored, while on the steep slopes rock outcrops extensively and the soil gives way at very shallow depth to partially weathered rock. Areas less broken have a yellowish-brown heavy fine sandy loam or light fine sandy clay subsoil which extends to a depth of 2½ to 5 feet and grades into the parent rock, which is in various stages of weathering. Where the normal quantity of sunshine is obtained the soil does not retain much organic matter, and its producing capacity is low.

The type occurs for the most part in two large areas, one of which extends from about 5 miles northwest of Walhalla in a southwesterly direction to the Tugaloo River. The other is found in the northern end of the county. These areas are mountainous except locally. One of the leveler areas is found in the upper extension of the strip to the west of Walhalla. Farther south along the Chauga River and between the Chauga and Tugaloo are some very broken areas. Here and there the streams are bordered on one side by cliffs and precipitous bluffs of almost bare rock. The local differences in elevation are from 100 to 500 or more feet. The peaks and ridges have an elevation of 1,500 to 2,700 feet above sea level.

The Porters fine sandy loam is of the same origin as the Cecil sandy loam, that is, derived from the Henderson granite, which is a gray granite consisting of quartz, feldspar (both orthoclase and plagioclase), and a small percentage of small mica. The small percentage of quartz fragments in the soil and subsoil was left in the process of weathering from veins of quartz occurring through the granite. The scarcity of iron-bearing minerals in the parent rock is responsible for the light color of the weathered material, a characteristic of this and the Cecil fine sandy loam types.

The Porters fine sandy loam is fairly well forested with oak and shortleaf pine. Blackjack oaks are more in evidence and the timber is more scrubby than on the other mountain soils. In the hollows and along some of the shaded slopes which are kept constantly moist, hemlock and a dense undergrowth of mountain laurel and rhododendrons flourish, as well as a scattering of tulip, maple, and other deciduous trees. A few chestnut trees are found on the high ridges in the northern end of the county.

Being mountainous and naturally unproductive for the general crops of the area, practically none of the type is farmed, and it is valued chiefly for the timber it supports. The present valuation ranges from a nominal amount to as much as $10 an acre. Within the last few years large tracts have been bought by lumber and timber companies.

The efforts to farm this soil have been very limited and primitive. Corn, the chief crop, gives very light yields. The seasons are so modified by the altitude and the proximity to high mountains that cotton can not be successfully produced even if properly fertilized. Small patches of cabbage and Irish potatoes are grown to be sold in the near-by towns and cities. These and sweet potatoes, which are planted to a less extent, do well if given the proper care. Nothing has been done in the way of growing fruits, but it is quite probable that good peaches could be grown in places least subject to late frosts. The type should remain timbered and be included in a National Forest Reserve.

The following tables give the results of mechanical analyses of fine-earth samples of the soil and subsoil of this type:

Mechanical analyses of Porters fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
18251	Soil	1.0	6.6	6.1	31.6	27.4	18.7	8.1
18252	Subsoil	1.5	6.7	6.5	27.9	23.5	12.3	22.1

PILOT LOAM.

The Pilot loam is a brown fine sandy loam to loam soil from 4 to 6 inches deep, grading through a few inches of red clay loam into a red friable clay which extends to a depth of 3 to 5 feet, except where ledges of partially weathered gneiss and schist come nearer the surface. The soil and subsoil contain fragments of mica and quartz, and local areas may have pieces of resistant parent rock strewn over the surface. In cultivated areas the soil, if not subject to excessive erosion, becomes a brownish-gray fine sandy loam, but in the timbered areas it is generally a brown loam. In some of the smaller bodies the soil is reddish-brown in color on account of the very shallow depth to clay. The stoniest areas are confined largely to the high knolls, ridges, and the steeper slopes. The soil is easily handled and responds readily to good treatment.

The type is confined to one large area along the western edge of the county. This area, with parts of the Porters clay loam, occupies part of an intermountain plateau intermediate in elevation between the Piedmont Plateau and the mountains proper. On the east and south it gives way to a slightly higher, broken mountainous rim overlooking the Piedmont and on the north and west to high, broken mountains. The general elevation is from 1,500 to 1,600 feet above sea level. The surface features range from moderately rolling to quite rolling, with stretches here and there too broken to be used for farming. Near the heads of the small streams the topography is

much the same as in the Piedmont Plateau, but as they approach their junction points with the larger streams their valleys become deep and rugged. So far as practicable the broken areas along the river, which represent a true mountainous condition, were mapped as the Porters loam.

The Pilot loam is a residual soil derived from fine-grained gneisses and mica schists of the Carolina gneiss formation. It is more extensively farmed than any other of the mountain types, but a large proportion of it is still forested, oak and shortleaf pine being the principal growth. There are a number of farms in the Longcreek and Whetstone neighborhoods, as well as around Battlecreek post-office and along the upper forks of the Chauga River. The tendency is to farm the moderately rolling areas where narrow strips of bottom lands generally are found along the small streams. The methods practiced lack the thoroughness necessary to obtain the best returns from the soil. Corn, the chief crop, yields from 10 to 25 bushels per acre. The seasons are too short for the successful growing of cotton. Small patches of cabbage and Irish potatoes are produced by some for market. Sorghum and sweet potatoes are planted to a limited extent, principally for home use. Practically no attention is given to any of the forage crops, of which cowpeas, clover, and grass would all do well.

The best opportunity is cattle raising. Apple trees thrive and produce a good quality of fruit, but the frequency of short crops on account of frost will prevent any extensive development of this industry.

The following table gives the results of mechanical analyses of fine-earth samples of the soil and subsoil of the Pilot loam:

Mechanical analyses of Pilot loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
18245	Soil	3.0	7.5	8.5	34.6	9.4	19.6	18.0
18246	Subsoil	2.7	6.7	8.9	30.5	8.9	17.2	25.1

PORTERS LOAM.

The rough, mountainous topography of the Porters loam causes considerable variation in the depth and color of the soil material and in the stone content of the surface. In areas not very broken the soil is a brown or yellowish-brown loam ranging from 6 to 10 inches in depth. Quartz gravel in limited quantities is strewn over the surface, and loose fragments of the parent rock are found here and there. On some of the higher peaks and steep slopes local areas are little else than rock outcrops. Others are quite stony, but they have accumu-

lated enough weathered material to support a heavy growth of timber. The upper few inches of the soil are well supplied with humus, and the surface is covered with a good coating of leaf mold, except where forest fires have been prevalent. The dense growth thriving in shaded depressions has helped to build up a deep loamy soil of high organic-matter content. The subsoil of the type in general is a yellowish-brown to light-red heavy loam or friable clay, usually not exceeding 2 to 4 feet in depth before giving way to bed rock in a partially weathered state.

A lighter phase of the soil consists of a brownish-gray sandy loam to loam from 6 to 8 inches deep. The subsoil is about the same in color and depth as is typical, but it is somewhat sandier in texture. The high broken areas are very stony.

The Porters loam occurs in the western and northern parts of the county, mainly in one large area extending from near Whetstone to the North Carolina line. This area outlines in a general way the rough mountains of the Chattooga Ridge. Small isolated areas are comparatively level, but the bulk of the type consists of high peaks and numerous narrow hog-back drainage divides, many of which slope rapidly toward the principal water courses. The drainage is through gorges and narrow rugged valleys. Over very limited areas there are differences in elevation of 100 to 1,000 feet. The general elevation of the peaks and ridges is from 2,000 to 3,000 feet above sea level. The light phase of the type is confined to a few square miles in the extreme northern end of the county.

This soil is residual in origin, being derived from gneisses, mica schists, and granites, with modifications from the rocks of minor importance. The typical areas are from the Carolina gneiss formation, which consists mainly of fine-grained gneisses and mica schists, interbedded in layers from a few inches to 50 feet or more in thickness. On the peaks and high ridges the massive varieties of rock fragments predominate, some being coarse grained and porphyritic and others fine grained. The light phase of the type is from a gneiss or gneissoid granite (Whiteside granite), which in the Piedmont Plateau weathers extensively into the Cecil sandy loam. Although a large part of the type is of the same origin as the Pilot loam, the two types differ very materially in topography and in the color and depth of the weathered material. On the Porters loam cultivable land is the exception rather than the rule, while on the Pilot loam a large percentage of the soil can be successfully farmed. The timber growth consists very largely of deciduous trees, especially on the high peaks, oak and chestnut predominating. In the gorges there is a growth of hemlock, tulip, maple, and a thick undergrowth of mountain laurel, rhododendron, etc.

The limited acreage under cultivation is devoted to corn and a few other minor crops. A few cattle and hogs range over the mountain pastures. The yield of corn usually does not exceed 10 to 15 bushels per acre, except in the small depressions, where the soil is deep and loamy. On the better lands grasses and clover do well. By using the best lands for corn and forage and the thinner rolling lands for grazing purposes large tracts of this type could be very profitably used as pasturage for cattle. Some of the sheltered areas of this type could be used very profitably for apple orchards. The roughest areas should remain in forest.

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

Mechanical analyses of Porters loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
18241	Soil	1.6	7.7	7.7	22.7	11.7	27.3	21.1
18242	Subsoil	2.3	8.1	7.7	22.3	9.5	25.2	25.2

PORTERS CLAY LOAM.

The surface soil of the Porters clay loam, to a depth of 3 to 5 inches, varies from a brown silt loam to a reddish-brown clay loam, depending upon the topography. In rolling areas that have not been subjected to severe erosion the soil, though shallow, is a good silt loam, practically free from stone, with the exception of some angular quartz fragments. In the broken areas and locally where the surface is only moderately rolling the soil is a reddish-brown loam to clay loam, carrying partially weathered fragments of stone, besides the usual quantity of quartz. Where the topography is very broken, as is the case along some of the streams, rock outcrops in frequent ledges and large fragments are found scattered over the surface. The soil does not contain much organic matter, except in the shady depressions. It is about as easily tilled as the Pilot loam, which is a grade lighter in texture, but is naturally less productive.

This soil occurs in a strip from 1 to 2 miles wide, extending across the county in a southwesterly direction from the extreme northern end. The greater proportion of the type is rough and mountainous, but in the neighborhood of Tomassee Creek there is an area of 3 or 4 square miles where the land is rolling. Northwest of Walhalla, along the roads radiating to the west and north, are similar undulating areas at a higher altitude. All of the type is naturally well drained.

The Porters clay loam is derived from the Brevard schist, which is a dark-gray to nearly black mica slate and schist with thin layers

of sandstone here and there, and occasional lentils of marble. Very little of the marble is seen at the surface, consequently it has practically no influence on the soil, but the sandstone layers outcrop in places, especially in the broken areas. The rock in places has a colloidal structure and is quite hard. In other places it appears to be softer and more schistose. Scattered throughout the weathered material are usually found small fragments of a soft talclike material, which probably is mica in a hydrated state. The timber growth is about the same as on the other mountain types, oak and pine being the most plentiful.

Farming operations are confined to small areas where the surface is not very broken. Corn, the chief crop, yields from 10 to 25 bushels per acre. Sorghum and a few other crops are grown in a limited way for home use. All but the very broken areas could be used to the best advantage for summer grazing, as grasses and clovers do well. The best areas should be devoted to corn, cowpeas, sorghum, and other forage crops, which could be fed to advantage during the winter months, or sold for a good price. The worst broken lands should remain forested.

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

Mechanical analyses of Porters clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
18247	Soil	0.4	2.2	1.4	13.9	44.6	22.3	15.2
18248	Subsoil	.5	1.6	.8	11.5	32.1	22.8	30.1

PORTERS CLAY.

The soil of the Porters clay, from 3 to 6 inches in depth, consists of a reddish-brown clay loam to a red clay, having a very similar appearance and texture to the Cecil clay. Quartz and other stone fragments are found upon the surface in varying quantities, and small broken areas are little else than rock outcrop. Where the weathered material has considerable depth, as is the case in all but the stoniest areas, the subsoil, to a depth of 3 or more feet, is a rather heavy clay of deep-red color.

This is the least extensive of the mountain soils, being confined very largely to a broken strip along the outer escarpment of the mountains west of Walhalla. Smaller areas with a similar topography occur farther west.

The Porters clay in its typical development is derived from the Roan gneiss, which is a dark-colored rock consisting principally of

hornblende gneiss and hornblende schist. On Poor Mountain and some of the other near-by peaks are remnants of the Brevard schist formation, which gives rise to a lighter textured and stonier phase of the type. The dark schists and slates characteristic of this formation are almost entirely removed, leaving the layers of resistant sandstone and lentils of marble which show up conspicuously in Poor Mountain. The areas near Longcreek and Whetstone post-offices are derived from certain phases of the Carolina gneiss, being to a certain extent the result of erosion.

Only a few small areas are under cultivation, and these are farmed in the same manner and to the same crops as the other mountain soils. The small rolling areas can be made to produce good crops of corn, grasses, and forage crops. The soil is suitable for the production of good apples, but the elevation is not sufficient to protect the trees from spring frosts. Practically all of the type should remain in forest.

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

Mechanical analyses of Porters clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
18249	Soil	1.1	4.2	3.3	14.4	24.2	21.1	31.6
18250	Subsoil	1.3	3.5	2.3	11.7	20.9	18.3	41.2

SUMMARY.

Oconee County has an area of about 652 square miles and is situated in the northwestern corner of South Carolina. About two-thirds of the county is in the Piedmont Plateau, which is characterized by a general rolling topography, the remainder being of a semi-mountainous and rough mountainous character. The general elevation in the Piedmont section ranges from 850 to 1,200 feet and in the mountains from 1,500 to 3,100 feet above sea level. Excellent locations for large power plants are found along the larger streams.

The better sections of the Piedmont are fairly well settled with a mixed population of whites and blacks, the proportion of negroes being less than in any of the counties farther away from the mountains. The rougher undesirable sections, including the mountains, are very sparsely settled. Here the population is almost entirely white.

The county has an extensive system of roads and a very good rural free-delivery service reaching all but the remotest sections of the mountains. The railroad facilities, though not extensive enough, are

fairly good. Walhalla, Seneca, and Westminster are the chief towns and trading centers. A part of the cotton crop is consumed by local mills at Newry, Seneca, Walhalla, and Westminster.

The climate is mild, pleasant, and adapted to a great diversity of farm crops. The growing season is about seven months, or some two weeks shorter than in the Coastal Plain section of the State. Cotton can be grown successfully all through the Piedmont section, except close to the mountains, where the nights are too cool for its successful growth. The occurrence of erratic frosts in the spring makes the peach crop uncertain, also affecting other fruits to a less degree. Some of the mountain soils are well adapted to the culture of apples, but the altitude is not great enough to afford the proper protection from frosts.

The early settlers grew corn, oats, wheat, and such other crops as could be consumed at home or easily exchanged for the necessaries they did not have. The plan was to raise everything for home use and buy as little as possible. Conditions were changed by the civil war. The need of money led to the increased production of cotton, which became the most important crop. Cotton and corn were practically the only crops grown to any great extent.

No system of rotation is practiced at the present time, but commercial fertilizers are extensively used. The necessity for improved methods and a better system of cropping is beginning to be felt.

The general run of the farms contains from 100 to 500 acres. The tenant farms generally range from 25 to 60 acres. About 33 per cent of the farms are operated by the owners, and the remainder are rented to white and black tenants.

Land can be obtained quite reasonably, but the price is gradually rising. The better Piedmont lands can be bought for $25 to $75 an acre, the poorer Piedmont lands from $5 to $20, and the mountain lands from a nominal amount to $20 an acre.

Day laborers get from 60 to 75 cents a day, and regular help from $12 to $16 a month, with board or rations and a house.

The soils fall naturally into two general groups, the alluvial bottoms, which are very limited in extent, and the residual uplands. The upland soils are derived from ancient metamorphic, igneous, and sedimentary rocks mostly of a highly crystalline nature. All but one of the mountain soils were mapped as members of the Porters series, and those of the Piedmont as members of the Cecil series. The bottom lands were classed as Congaree fine sandy loam. Nine types of soil were recognized.

The Cecil sandy loam is the most extensive and best developed type in the county. It is well adapted to all of the crops of the section, as well as several others that are not now grown. Stock raising and

dairying are two industries that should be developed. The rougher areas should be sodded to grasses and pastured.

The Cecil fine sandy loam is naturally a less productive soil than the Cecil sandy loam, and only a small percentage is under cultivation. Cotton and corn are the chief crops, both giving very light yields unless properly fertilized. More cowpeas should be grown. Rye would prove a profitable crop.

The Cecil clay occurs in two phases. The sandy phase, which is associated with the Cecil sandy loam, is more generally farmed than the typical areas. Cotton and corn are the principal crops. The type is best adapted to cotton, clovers, and grasses. The best areas would produce good wheat.

The Congaree fine sandy loam is a productive soil and nearly all of it is under cultivation. It is best adapted to corn and forage crops. Cotton does not do very well on account of overflows and the tendency to go to weed.

The Porters fine sandy loam is a mountainous type of the same origin as the Cecil fine sandy loam. Very little of it is under cultivation. Corn is the chief crop, the yields being very light. Good vegetables can be grown on the leveler areas. The bulk of the type should remain forested.

The Pilot loam is the best of the mountain soils. Corn is the chief crop. Small patches of Irish potatoes and cabbage are grown for fall marketing. The best opportunity on this soil is raising cattle and sheep.

The Porters loam is a rough, mountainous type, very little of which is fit to be cultivated. Some of the best areas could be developed into good pasture lands. Practically all of the type should remain forested.

The Porters clay loam is a semimountainous and rough, mountainous type. Only small areas are farmed, corn being the chief crop. The best areas should be devoted to corn, sorghum, and other forage crops. The less desirable areas could best be devoted to grazing. The rough broken areas should remain forested.

The Porters clay is very broken. Only a few small areas are under cultivation. Practically all of the type should remain in forest. The less broken areas would make good grazing land if sown in Bermuda grass.

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