

UNITED STATES DEPARTMENT OF AGRICULTURE

Soil Survey
of
Macon County, North Carolina

By

R. E. DEVEREUX

United States Department of Agriculture, in Charge
and

E. F. GOLDSTON and W. A. DAVIS

North Carolina Department of Agriculture and
North Carolina Agricultural Experiment Station



Bureau of Chemistry and Soils

In cooperation with the
North Carolina Department of Agriculture and the North Carolina
Agricultural Experiment Station

BUREAU OF CHEMISTRY AND SOILS

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SOIL SURVEY

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J. W. McKERICHER, *in Charge Map Drafting*

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O B. WILLIAMS, *in Charge Soil Survey*

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SOIL SURVEY OF MACON COUNTY, NORTH CAROLINA

By R. E. DEVFREUX, United States Department of Agriculture, in Charge, and E. F. GOLDSTON and W. A. DAVIS, North Carolina Department of Agriculture and North Carolina Agricultural Experiment Station

COUNTY SURVEYED

Macon County lies in the southwestern corner of North Carolina. The southern boundary of the county is formed by the Georgia State line. (Fig. 1.) The other boundaries for the most part follow the mountain ranges, thereby giving the county a very irregular outline. Franklin, the county seat, is 60 miles southwest of Asheville, N. C., and 120 miles northeast of Atlanta, Ga. The county includes an area of 520 square miles, or 332,800 acres.

Macon County lies in the Appalachian Mountain region, in a cross-range country between the Blue Ridge Mountains and the Great Smoky Mountains, the important ranges being the Nantahala Mountains and the Cowee Mountains. Spurs from these ranges extend in all directions. For the most part, the mountains are narrow crested and the slopes are steep. Narrow stretches of comparatively smooth land form a few high plateaus, and in places near the bases of the mountains and in the coves the surface relief is smoother. The relief of the foothills, which occupy the central part of the county along Little Tennessee River Valley dividing the Nantahala and Cowee Mountains, forms a striking contrast to that of the surrounding rough mountainous country. This area of smoother land, ranging from a few hundred feet to about two miles in width, has a rolling or hilly relief, somewhat resembling that of the piedmont plateau. Along the stream courses are belts and small areas of first-bottom land, ranging in width from a few feet to one-fourth mile, with level or undulating surface relief. Most of these bottoms are subject to overflow. The wider first bottoms occur along the flood plain of Little Tennessee River. The mountain valleys are for the most part deep and narrow, and the streams are swift-flowing. Nantahala River and Little Tennessee River, flowing parallel to one another, together with their dendritic tributaries, reach out and drain every part of the county.

The elevation, as shown by the United States Geological Survey topographic sheets, ranges from 1,840 to almost 6,000 feet above sea level. There are 17 mountain peaks having an elevation of more than 5,000 feet each, and 27 peaks with elevations between 4,000 and 5,000 feet. Some of the more prominent peaks are Wayah Bald, 5,400 feet, Standing Indian, 5,562 feet; Satulah, 5,000 feet; Shortoff Mountain, 5,054 feet, Yellow Mountain, 5,240 feet; and Wine Spring Bald, 5,500 feet. The lowest part of the county is along Little Tennessee River Valley, where the average elevation is about 1,970 feet above sea level.



FIGURE 1—Sketch map showing location of Macon County, N. C.

Chestnut constituted 50 per cent of the original tree growth; hemlock, yellow poplar, red oak, and some black locust were fairly common along streams; Virginia scrub pine, ash, yellow poplar, basswood, maple, black gum, silverbell, black walnut, and butternut grew along the lower slopes; varieties of hickory grew on the ridges; scarlet oak, red oak, chestnut oak, and table mountain pine were fairly abundant on the upper slopes; and beech, birch, and sugar maple commonly grew on the highest elevations, about 4,000 feet. The undergrowth consists mostly of dogwood, shadblow (service berry), laurel, and rhododendron, rhododendron being more common at the higher elevations, 3,000 feet and more, and laurel at 3,000 feet and less. Chestnut is rapidly becoming extinct. It is being replaced by yellow poplar along the lower slopes and by white pine in the highlands section of the county. The main species of grasses are redtop, orchard grass, broom sedge, and crabgrass.

The land of which the present Macon County was a part was acquired by treaty from the Cherokee Indians in 1817 and 1819.¹ White settlers, mainly from Virginia, Georgia, and farther east in North Carolina, came in amongst the Indians shortly afterwards, but it was not until 1829 that Macon County was separated from Haywood County and organized. The early settlers located mainly in the Little Tennessee River Valley, now the most important part of Macon County. The present inhabitants are for the most part descendants of the original settlers, although during the last 10 years some people have come in from the North and settled in and near Franklin and Highlands. There are only a few foreign-born and negro residents, most of whom live in Franklin and Highlands.

According to the 1930 census,² Macon County has a population of 13,672, all of which is classed as rural, and of which 9,591 persons are classed as rural farm and 4,081 as rural nonfarm. The average density of the population is 26.6 persons a square mile. The population is very unevenly distributed, the county being most thickly settled along the Little Tennessee River Valley. Other settlements are scattered over the county where small belts of agricultural land occur, mainly along the stream valleys.

Franklin, the county seat, has a population of 1,094. Highlands, in the southeastern corner, has a population of 443. These are the only incorporated towns, but a number of small settlements, such as Otto, Aquone, Tellico, and Cullasaja, are scattered over the county.

The Tallulah Falls Railway, which connects with the Southern at Cornelia, Ga., is the only railroad. There are three State highways. They form the main arteries of travel and afford means of transportation by truck and bus lines. The county roads are not surfaced, and in rainy weather and during the winter they are difficult to travel.

Telephone service is available in many parts. Two consolidated schools, with bus service for the pupils, are located at Highlands and at Franklin, and rural schools and churches are located at convenient places. Nearly all the county is served by rural mail routes, and a number of post offices are located at convenient points.

Franklin is the principal local market for the products of the county. Practically all the beef cattle raised are sold on the local

¹ SMITH, C. D. A BRIEF HISTORY OF MACON COUNTY.

² Soil survey reports are dated as of the year in which the field work was completed. Later census figures are given whenever possible.

markets. The few that are sold on the northern markets are usually shipped to Atlanta, Ga., as feeders. Some cabbage and a few apples are hauled by truck to points in Georgia and South Carolina. A considerable quantity of lumber is shipped out, mainly to Virginia and Ohio. Tanbark is hauled by truck either to Andrews or Silva, N. C.

There are numerous deposits of valuable minerals. The pigeon's-blood ruby, said to be the world's most costly gem, is found in the Cowee Valley. Mica, kaolin, feldspar, and garnet are the more important minerals in the county. Of these, mica is the most widely distributed. At present three plants are grinding scrap mica and mining and washing kaolin. More than 30 small mica mines have been worked somewhat extensively, and a few are under operation. The price ranges from 5 cents to \$3 a pound for sheet mica, depending largely on the grade, and from \$15 to \$20 a ton for scrap mica. A limestone deposit is on Knights Creek near Oak Grove Church, but owing to inaccessibility it is not being worked.

In the Nantahala National Forest, the trees are protected from fires by the United States Forest Service which has constructed fire lookout stations and about 160 miles of telephone lines used in the detection and suppression of fires. In connection with the lookout system, fire-fighting tools, such as shovels, axes, forks, and water bags, are located throughout the forest at convenient points.

CLIMATE

Macon County has a continental climate; in other words, the climate is not affected by the ocean or any other large body of water. Both the temperature and the rainfall are influenced by the high altitude of the mountains in this and bordering counties.

There is a wide difference in temperature between the growing season and the midwinter months. The summers are comparatively short. Owing to the altitude, the summer days are never sultry or extremely hot and the nights are prevailingly cool. The winter months in general are not excessively cold, and some farm work can be carried on during a part of this season. The climate is considered healthful, and the towns of Franklin and Highlands are visited each summer by a large number of tourists.

Rainfall is bountiful and for the most part well distributed throughout the growing season. The heaviest rainfall comes in the spring and summer, but there is considerable difference in the amount of rainfall and in the temperature in different parts of the county. Some of the higher mountains are covered with snow during the midwinter months.

The agriculture is limited to a comparatively few crops, owing partly to the short and rather cool growing season. This cool climate with its high rainfall, however, is ideal for the growing of pasture grasses. Where domestic grasses have been seeded, cattle thrive when left on pasture the year around. A thermal belt passes through Macon County, and recently a number of apple orchards have been set out in this belt where the danger of killing frosts is almost negligible. In the highest parts the climate is such that a fine quality of summer cabbage is produced.

The average date of the last killing frost is April 17 and of the first is October 28, giving an average frost-free season of 193 days. Killing frost has been recorded as late as May 15 and as early as September 30.

Table 1 gives the normal monthly, seasonal, and annual temperature and precipitation, as recorded by the United States Weather Bureau station at Rock House.

TABLE 1.—Normal monthly, seasonal, and annual temperature and precipitation at Rock House, Macon County, N. C.

[Elevation, 3,100 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1925)	Total amount for the wettest year (1906)	Snow, average depth
	°F	°F.	°F	Inches	Inches	Inches	Inches
December.....	39 6	72	-5	7 90	2 76	7 67	2 1
January.....	38 1	73	-8	6 81	8 53	12 94	3 7
February.....	38 3	71	-13	3 69	3 34	1 70	3 6
Winter.....	38 7	73	-13	18 40	14 63	22 31	9 4
March.....	46 6	84	-1	7 52	3 78	9 95	1 0
April.....	53 5	87	21	6 31	8 38	3 91	3
May.....	62 0	89	30	6 10	5 05	4 09	(¹)
Spring.....	54 0	89	-1	19 93	12 21	17 95	1 3
June.....	63 0	93	35	7 00	3 41	8 83	.0
July.....	70 4	91	48	9 30	3 41	15 30	.0
August.....	70 0	92	50	8 35	86	12 09	0
Summer.....	67 8	93	35	25 55	7 68	36 22	0
September.....	65 5	83	33	6 70	67	22 46	.0
October.....	58 0	82	19	5 40	7 69	8 80	(¹)
November.....	46 8	73	5	4 06	7 81	6 11	.5
Fall.....	56 1	83	5	16 76	16 17	37 37	.5
Year.....	54 2	93	-13	80 61	50 69	113 85	11 2

¹ Trace

AGRICULTURE

Agriculture has always been the chief industry of the county. Even before the county was occupied by white settlers, the Cherokee Indians used small patches of bottom land for growing corn, tobacco, and pumpkins. The first white settlers located along the Little Tennessee River Valley and grew the crops necessary for home consumption. At that time practically no farm products were bought or sold because of the long distance to markets and lack of transportation facilities. Later, as more settlers came in, lands were taken up in the mountain valleys, in coves, and on the smoother parts of the mountain slopes and tops.

In 1880, according to the United States census, there were 1,182 farms with an average of 33.3 acres of improved land on each farm. The chief crops at that time were corn, wheat, rye, oats, hay, potatoes, and sorgho. Orchard fruits were valued at \$4,101 and forest products at \$18,578.

By 1900 both the acreage and yield of corn had increased about 50 per cent and of wheat had decreased considerably. The number of farms remained about the same. More potatoes were grown, and orchard fruits, livestock, dairy products, and poultry showed a decided gain. The acreage of both potatoes and sweetpotatoes had considerably increased.

The progress and changes which have taken place in the agriculture can best be shown by data in Table 2, compiled from the census reports, giving the acreage and production of the important crops at 10-year intervals, from 1879 to 1929, inclusive.

TABLE 2—Acreage and production of important crops in Macon County, N. C., in stated years

Crop	1879		1889		1899		1909		1919		1929	
	Acres	Bush-els										
Corn	14, 123	222, 865	18, 427	376, 122	21, 169	337, 340	16, 414	229, 208	14, 681	269, 512	12, 278	226, 673
Wheat	5, 565	27, 038	5, 798	28, 007	4, 307	10, 680	3, 488	21, 083	5, 271	42, 211	1, 164	14, 322
Oats	1, 621	12, 209	3, 456	34, 278	1, 491	12, 780	757	4, 814	562	7, 711	146	2, 215
Rye	1, 823	6, 734	986	4, 865	420	1, 650	778	4, 024	1, 485	7, 043	549	3, 273
Potatoes		11, 315	231	17, 436	278	16, 415	478	23, 585	436	34, 703	529	37, 617
Sweet potatoes	102	11, 214	116	12, 731	177	11, 233	194	16, 275	1, 3	18, 104	165	14, 607
Hay and forage	1, 820	1, 719	3, 551	3, 193	1, 925	1, 849	5, 105	4, 342	13, 987	11, 852	3, 634	4, 040

In 1880, 66.4 per cent of the total area was in farms, whereas in 1930 only 39.7 per cent was classed as farm land. The number of farms increased from 1,182 in 1880 to 1,847 in 1930, but the average size decreased from 184 acres in 1880 to 70.6 acres in 1930, of which slightly more than 21 acres was classed as improved land, including crop land and plowable pasture.

According to the United States census, in 1929, 40.3 per cent of the farms reported an expenditure of \$13,956 for fertilizer, or an average of \$18.76 a farm.

In 1928, according to the county agricultural agent, 1,100 tons of commercial fertilizer were used for all crops. About 90 per cent of the fertilizer used was 16 per cent superphosphate (acid phosphate) which cost \$18.50 a ton. The other 10 per cent was mainly a 3-8-3³ mixture for truck crops. Practically all the fertilizer is bought ready mixed.

Most of the farm labor is supplied from the white population and is usually adequate to the needs. Farm hands are paid from \$1 to \$1.50 a day or from \$30 to \$35 a month. When hired for any length of time, the house rent, fuel, and in some cases, a cow are furnished in addition to the monthly wage. The 1930 census reports an expenditure of \$24,455 for hired farm labor, or \$59.21 a farm for the 413 farms reporting.

The farms range in size from 5 to 500 acres, most of them ranging from 20 to 100 acres, only 13 farms including more than 500 acres each. Most of the smaller farms are located in the mountain coves, and the larger ones are in the foothills along the Little Tennessee River Valley. Most of the very large individual landholdings consist of cut-over or timber land. Approximately 65 per cent of the area of the county is in the Nantahala National Forest.

Owners operate 76.5 per cent of the farms. Of the 431 tenant farmers reported by the 1930 census, 25 are cash tenants and the rest operate on the share system. Only four farms are operated by managers. The mountain farms are customarily rented for one-half the farm products, when the owner furnishes the implements and work animals. If the tenant furnishes the work animals and imple-

* Percentages, respectively, of nitrogen, phosphoric acid, and potash.

ments the owner receives one-third of the products. On farms along the Little Tennessee River Valley, where farming conditions are better, the tenant receives only one-third of the farm products unless he furnishes the work animals and implements, in which case he receives one-half the products. When the owner furnishes the land only, he usually receives one-fourth of the products and the renter three-fourths.

Most of the farmhouses are well built and roomy, and the barns are substantial and usually large enough to meet the farm needs. Some farmhouses are equipped with lights and running water, and some barns are large and modern. The tenant houses and many of the farmhouses in the more mountainous parts of the county are small and unattractive. Most of the fences are made of barbed wire.

The ordinary farm equipment includes single plows, turning plows, harrows, cultivators, a mowing machine, a hayrake, sweeps, scrapes, and a grain drill. Some of the better farms have in addition corn harvesters, reapers, manure spreaders, and tractors. There are a few silos. The equipment of the mountain or cove farms is simpler and less varied.

The work animals are mainly horses and mules. Oxen are used in some places to haul logs and poles, also to pull sleds. In general, each farm has at least one cow, two hogs, and some poultry.

The better farmers of the county realize that the red soils are low in organic matter. Manure is applied when available, but as comparatively few cattle are raised, the practice of growing leguminous crops, such as soybeans, cowpeas, and clover, to improve the land, is carried on by a few farmers. According to the State experiment station, if these leguminous crops are turned under, the amount of nitrogen needed to be added in the fertilizers may be less than that recommended in Table 3.

TABLE 3—Recommended fertilizer mixtures for the more important crops grown on soils of Macon County, N. C.¹

Soil type and crop	Acres application	Fertilizer mixture
<i>Congaree fine sandy loam and Congaree loam</i>		
	<i>Pounds</i>	<i>Formula</i>
Corn.....	300	10-4-1
Small grains.....	300	10-4-1
Potatoes.....	600-800	8-4-6
Legumes.....	300	10-2-4
	2,000	Limestone
<i>Porters loam and Porters stony loam</i>		
Corn.....	400	10-5-3
Wheat.....	400	10-5-3
Potatoes.....	800	8-4-6
Legumes.....	400	10-2-4
	2,000	Limestone
<i>Davidson clay loam and Rabun clay loam</i>		
Corn.....	300-400	10-5-3
Small grains.....	300-400	10-5-3
Legumes.....	300-100	10-2-1
	2,000	Limestone
<i>Cecil clay loam</i>		
Corn.....	400-500	10-5-3
Small grains.....	400-500	10-4-1
Legumes.....	400	10-2-1
	2,000	Limestone
<i>Ashe loam and Ashe sandy loam</i>		
Corn.....	400	10-1-6
Small grains.....	400	10-1-6
Legumes.....	400	10-2-4
	2,000	Limestone.

¹ Compiled by the North Carolina Agricultural Experiment Station and the North Carolina College of Agriculture and Engineering.

These mixtures, based mainly on carefully planned and conducted field experiments with different crops on different soils, may in some cases be modified slightly from time to time as more information from field experiments being conducted in the State becomes available and as the soils are improved by the growing and turning under of legumes and crop residues. These fertilizer mixtures have been carefully tested, and their use for the different crops mentioned, when grown on the types of soil listed, will give far better paying results than many farmers are now obtaining from the fertilizer combinations they are using. The wise use of the right kinds of fertilizers used in the proper quantities and in the proper manner, where needed, will give as large or larger returns for money invested than can be obtained in any other way and at the same time will make the money expended for labor in the production of the crops count in the most effective way.

Deep plowing, from 6 to 8 inches, has proved beneficial in the cultivation of the heavier-textured red soils in the Little Tennessee River Valley. All the soils in the county need lime, as the amount of lime present increases the effectiveness of the fertilizer material used. Where lime has been used on corn and wheat land, higher yields have resulted.

A crop rotation practiced by a few of the better farmers consists of clover for two years, then corn, followed by wheat, and back to clover. The North Carolina Department of Agriculture recommends the following 3-year rotation: First year, corn, with soybeans drilled in the row at planting or first cultivation; second year, wheat, red clover; third year, red clover. A 4-year rotation is as follows: First year, corn; second year, oats and soybeans or crimson clover and soybeans; third year, wheat, followed by red clover; fourth year, red clover.

Some of the steeper areas of soils that are not used for forestry are kept in permanent pasture. The grasses generally used for this purpose include various mixtures of orchard grass, redtop, and Kentucky bluegrass. The favorite mixtures for hay are clover and timothy or redtop, timothy, and clover.

Grass mixtures suggested for permanent pastures by the North Carolina Department of Agriculture consist of redtop, 10 pounds; orchard grass, 12 pounds; red clover, 10 pounds; and white clover, 3 pounds—a total of 35 pounds an acre. Another mixture is orchard grass, 10 pounds; tall oat grass, 10 pounds; Kentucky bluegrass, 5 pounds; and red clover, 5 pounds—a total of 30 pounds an acre. For sheep grazing, from 4 to 6 pounds of sheep fescue is added to the second mixture.

Some recognition is given to the adaptation of certain crops to particular soils. Cecil clay loam and Davidson clay loam are considered good wheat, corn, oats, and grass soils, and the Davidson soil is good for alfalfa. The Congaree soils are esteemed for the production of corn and hay. Porters loam and Ashe loam are suited to the production of apples, pasture grasses, potatoes, cabbage, and corn.

A common practice is to sow clover, soybeans, or cowpeas at the last cultivation of the corn. Wheat is usually planted on corn, oat, or clover land. The land is broken at some time during August or September and the seed sown during October. On the smoother land

in Little Tennessee River Valley grain and hay are harvested by machinery, but in the mountains on the steep slopes hand cradles are used.

For people desiring further information on farming practices in North Carolina the following publications will be useful:

Soil Acidity and Lime for North Carolina Soils. (N. C. Agricultural College Extension Service Agronomy Information Circular 4.)

Results of Soil Building Demonstrations in North Carolina. (N. C. Agricultural College Extension Service Agronomy Information Circular 11.)

Wintering and Summer Fattening of Steers in North Carolina. (N. C. Agricultural Experiment Station Bulletin 243.)

Fertilizer Recommendations for Important Crops of Agricultural Region No 8 of North Carolina (N. C. Agricultural College Extension Service Agronomy Information Circular 41)

SOILS AND CROPS

Only a small proportion of the land in Macon County is under cultivation, owing largely to the fact that a large part of the county is so rough and mountainous as to preclude its use for general-farming purposes. As has been stated, approximately 65 per cent of the county is included in the Nantahala National Forest, which comprises much of the rougher mountain lands. A large part of this area is in forest.

According to the United States Forest Service, probably the most varied flora in the East is found in this locality, with a forest growth unparalleled in richness and variety. Some of the important varieties of trees growing here are yellow poplar, white pine, yellow pine, red oak, white oak, chestnut, hickory, white ash, hemlock, black cherry, red maple, black gum, yellow buckeye, birch, beech, and black walnut. The inaccessibility of this region with regard to transportation facilities is the principal reason for the low value of the timber crop.

Most of the agricultural land is in Little Tennessee River Valley, on the more gentle mountain slopes, in the coves, and on some of the flatter tops of the mountains. The population, therefore, is largely confined to these localities and not well distributed over the county. Areas of tilled land are small throughout the mountainous region.

The agriculture is typical of that of many mountain counties in North Carolina. It is centered around the production of subsistence crops. It is primarily a self-sufficing agriculture, in which the principal crops grown are for home consumption and there is no dominant cash crop. The soils and climate are well adapted to the growing of apples, berries, cabbage, potatoes, string beans, and other crops, and to use as grazing land. The crops mentioned have not been grown on a commercial scale, mainly because of lack of available local markets and the long and inconvenient haul to distant markets.

A short distance east of Macon County, cotton is grown extensively as a cash crop. It is not grown, however, in this county because of adverse climatic conditions; that is, the growing season is too short and the climate too cool for its production.

Corn is the most important crop grown. In 1928, according to the North Carolina Farm Forecaster,⁴ 16,481 acres were planted to corn and the yield averaged about 19 bushels an acre. Most of the corn

⁴ NORTH CAROLINA DEPARTMENT OF AGRICULTURE. NORTH CAROLINA—1928-29 [N. C. Dept. Agr.] Farm Forecaster 53, Ann. summary issue, 44 p., illus 1929

is used on the farm as feed for work animals and poultry and to fatten hogs. Some is ground into meal for bread, and a small quantity is sold on the local markets. Corn probably occupies 60 per cent of the cultivated acreage of farming land, and nearly every farm has from a small patch to several acres in this crop.

Wheat ranks next to corn in acreage. Slightly more than 3,000 acres were devoted to this crop in 1928, and the yield is about 12 bushels an acre. The total value of the crop amounted to nearly \$60,000 in that year. All the wheat grown is consumed on the farms or sold locally. Not enough wheat is produced to supply the local demand for flour. Therefore, this crop can not be considered a money crop. The red soils in the Little Tennessee Valley are considered the best wheat soils in the county.

Hay is the third crop of importance. This includes hay and forage, locally classed as tame grass and wild grass, respectively. Very little of the hay is sold, most of it being used on farms for feeding the work animals and cattle.

Rye and oats are grown but to less extent than either wheat or hay crops. Soybeans and cowpeas are planted by some farmers, but the acreage devoted to these crops is usually very small.

As there is no main cash crop, the farmers, through necessity, produce a wide variety of crops and products for sale. Late potatoes and cabbage are grown to greater or less extent throughout all parts of the county. In 1928, according to the county agent, 918 acres of potatoes yielded about 75,000 bushels and sold for \$66,000. Cabbage was grown on more than 500 acres and brought in considerable revenue to the farmers. Several farmers in the vicinity of Highlands make a specialty of cabbage. Both the climate and soils are suited to the production of cabbage and also a large variety of other truck crops. Tomatoes, sweet corn, snap beans, and other garden vegetables of excellent quality are grown for home needs. Some beans and tomatoes are sold to the cannery in Franklin. Apples are a rather important special crop, and there are several small commercial orchards and trees around the homes. The 1930 census reported 42,190 trees of bearing age yielding 27,851 bushels, in 1929. In addition, 12,368 trees of nonbearing age were reported. Most of the apples are sold as soon as mature. They are either shipped out or hauled by truck to points in Georgia and South Carolina. Some are stored in specially constructed buildings and sold later. About 16,000 peach trees furnish fruit to many farmers, and the surplus is sold.

Probably 60 per cent of the annual net income of the best farms is derived from the production of butterfat, eggs, and poultry. Nearly every farm has from one to six milk cows. Butterfat is sold to the creamery at Franklin, and more than \$70,000 was paid for this product to the farmers during 1928. Poultry raising is rapidly increasing in importance, and cooperative shipping of poultry was begun in 1926. Regular cooperative sales are held, so that a market is brought direct to the farmer. Practically all the feed for the livestock and poultry is produced on the farm.

In 1928, according to the county agent, 5,968 hogs were sold and slaughtered. Corn-fed hogs are trucked to Asheville or shipped to Atlanta and sold for immediate slaughter. Beef cattle are raised on a small scale. Most of these animals are sold at the local markets, although some are shipped to Virginia and Maryland as feeders.

In addition to the crops mentioned, considerable revenue is derived from the sale of timber, crossties, tanbark, acid wood, spokes, and staves; in fact this is the main source of cash for some of the people dwelling in the mountains. Many kinds of medicinal herbs, which grow naturally, are gathered from the mountains. They are dried and sold at a fair profit in the local markets. In a few places medicinal herbs are cultivated under shade.

Considered agriculturally the soils may be divided into the following three groups: (1) Farming soils of the Little Tennessee Valley, (2) farming and grazing soils of the mountains, and (3) nontillable or forest soils of the mountains.

In the following pages of this report the soils are described and their agricultural relationships are discussed; their location and distribution are shown on the accompanying soil map; and their acreage and proportionate extent are given in Table 4.

TABLE 4—Acreage and proportionate extent of the soils mapped in Macon County, N. C.

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Cecil clay loam.....	20,032	6.0	Ashe sandy loam.....	7,360	2.2
Davidson clay loam.....	1,920	.6	Rabun clay loam.....	3,648	1.1
Congaree loam.....	7,872	2.3	Rough stony land.....	105,536	31.7
Congaree fine sandy loam.....	354	.1	Porters stony loam.....	42,240	12.7
Porters loam.....	110,400	33.2	Rock outcrop.....	806	.3
Porters loam, alluvial phase.....	2,044	.9			
Ashe loam.....	20,568	5.9	Total.....	332,600	

FARMING SOILS OF THE LITTLE TENNESSEE VALLEY

The farming soils of the Little Tennessee Valley include all the soils of the Cecil, Davidson, and Congaree series mapped in the county. These soils occur only in the Little Tennessee Valley and along some of the larger creeks. They occupy a very small area but are important agriculturally, the greater part of the wheat and corn grown in the county being produced on them.

The Cecil and Davidson soils occur on smooth or rolling and hilly areas of the intermountain valleys. They have the smoothest surface relief of the upland soils. The Congaree soils are developed in the first bottoms and have almost level or gently sloping surface relief. The drainage of the Cecil and Davidson soils is good, and even the greater part of the Congaree soils is well drained for soils occupying a first-bottom position.

Soils of this group may be termed the red-land soils. The Cecil and Davidson soils have light-red or reddish-brown surface soils and red or dark-red stiff but brittle clay subsoils. These soils, when plowed to a reasonable depth, take up considerable rainfall and are retentive of moisture. The subsoils, although heavy, are not heavy enough to retard internal circulation of water or to prevent penetration of plant roots. The soils are rather low in organic matter and even in the wooded areas have only a shallow covering of leaf mold. The surface soils, and particularly the subsoils of the Cecil soils, are high in potash. The Davidson soils are not so high in potash as the Cecil soils, but they are higher in lime.

Included with soils of this group are narrow strips of first-bottom land along Little Tennessee River, Cowee Creek, and other streams. These soils are Congaree loam and Congaree fine sandy loam. The largest areas are along Little Tennessee River. These soils are of small extent but are valued highly for their productivity, and practically all of them are under cultivation or in permanent pasture. They are subject to overflow during periods of high water but under normal conditions are fairly well drained. They consist of materials which have been washed from the upland Cecil and Davidson soils and from the mountain soils of the Porters and Ashe series. Excellent yields of corn and hay are obtained from these soils without the use of fertilizers. The Congaree soils are well-balanced soils as regards plant-food elements. They can be built up to a high state of productivity, as they hold moisture well, and the effects of turning under green-manure crops or the addition of barnyard manure may be noticed for several years.

A large percentage of the soils of this group is under cultivation, owing to the fact that they have smooth surface relief and are accessible as regards transportation facilities, roads, and markets. They are the main wheat and corn soils of the county. The relief in most places is such that improved machinery can be used, and the climatic conditions are favorable for the growing of wheat, corn, pasture grasses, and vegetables.

Cecil clay loam.—Cecil clay loam, locally known as "red clay land," occupies the largest acreage of the valley soils. It is the most important soil type in the Little Tennessee River Valley. The largest areas are south of Franklin, extending to the Rabun County line, and other large areas are north of Franklin and along the foothills bordering the first bottoms of Cowee Creek and other large creeks.

Cecil clay loam consists of light-red or reddish-brown clay loam to a depth ranging from 5 to 8 inches. The soil is much redder when wet and freshly plowed. The surface layer contains sufficient sand to render it friable and crumbly and the soil, when plowed under proper moisture conditions, breaks up into fairly good tilth. The subsoil is red stiff, but brittle, clay which extends to a depth ranging from 40 to 50 inches. It grades into lighter-colored and more friable clay which, at varying depths, grades into partly decomposed light-colored rock. On the steeper slopes, that have been under cultivation and are unprotected, erosion is noticeable and in many spots the red clay is exposed. Such spots, because of their heavy texture, are more difficult to cultivate than the typical soil.

About 65 per cent of Cecil clay loam is in cultivation or in permanent pasture. Probably 50 per cent of the farmed land is devoted to corn, and the yields range from 15 to 35 bushels an acre, the larger yields being obtained by an application ranging from 200 to 400 pounds of 2-8-2 or 4-8-2 fertilizer and 200 pounds of superphosphate an acre. Where green-manure crops have been plowed under and superphosphate added, as many as 50 bushels of corn an acre have been harvested. Wheat yields from 15 to 20 bushels an acre. This crop is usually given about 200 pounds of superphosphate or from 200 to 400 pounds of a 2-8-4 fertilizer. A small quantity of oats and rye is produced. Soybeans, cowpeas, red clover, sorgo, and late vegetables have been produced with success. The steeper slopes should be kept in pasture or wood lots.

Davidson clay loam.—Davidson clay loam, or so-called "red land," differs essentially from Cecil clay loam in color, structure, and origin. The surface soil of Davidson clay loam is red or dark reddish-brown clay loam to a depth ranging from 6 to 10 inches, and the subsoil is dark-red or maroon clay which is heavy and smooth but brittle. It does not contain so much quartz sand as the subsoil of Cecil clay loam. In most places it extends to a depth ranging from 50 to 60 inches, where it grades into lighter-colored clay which has some ochreous or brownish-yellow blotches. The underlying material is a dark-colored basic rock. The surface soil does not scour from the plow so well as the surface soil of Cecil clay loam, and for this reason the soil is often referred to as "push land."

Davidson clay loam is intimately associated with Cecil clay loam and occurs in several fair-sized areas, the largest of which are south and north of Franklin in the Little Tennessee Valley. The land possesses good surface features, and all areas of it are cultivable. The crops grown and yields obtained are about the same as those obtained under similar treatment on Cecil clay loam. On account of its higher lime content, the Davidson soil is, perhaps, a little better suited to the production of wheat and by far preferable for clovers than the Cecil soil. In some sections of North Carolina and South Carolina, Davidson clay loam has been used successfully in the production of alfalfa.

Congaree loam.—The surface soil of Congaree loam to a depth ranging from 10 to 18 inches is brown or dark-brown mellow loam. It is underlain by lighter-brown or brownish-yellow silt loam or fine sandy loam, which extends to a depth of 30 or more inches, where it grades into gray or bluish-gray clay loam containing brown sandy material. A few small poorly drained areas are associated with this soil, and these have a very dark gray or black silt loam or loam surface soil which extends to a depth ranging from 10 to 18 inches, the dark color being due to its high organic content. The subsoil is gray silty clay loam splotted with rust brown. These areas are typical Toxaway soil, but owing to their small extent were not separated on the map. They are poorly drained in their natural condition, but when artificially drained make excellent grazing land, yield good crops of hay, and when limed produce good yields of corn and cabbage.

Congaree loam is more extensive than Congaree fine sandy loam in Macon County. The largest areas lie along Little Tennessee River. This is a strong productive soil and is used mainly for corn, cabbage, potatoes, and truck crops. Corn yields from 30 to 60 bushels an acre, cabbage from 20,000 to 30,000 pounds, potatoes from 100 to 200 bushels, and hay from 1 to 2 tons. The hay is mostly timothy, alsike clover, and red clover. Little or no fertilizer is used on this soil, except for cabbage and truck crops.

Congaree fine sandy loam.—Congaree fine sandy loam differs from Congaree loam in that it is slightly lighter in color, has a fine sandy loam or loamy fine sand surface soil, and a light-brown or dark-brown fine sandy loam subsoil. Both the surface soil and subsoil contain an appreciable quantity of finely divided mica flakes. In a few places the subsoil grades into blue or gray fine sandy clay. A few small areas of Congaree fine sand near the streams are included in mapped areas of this soil.

Nearly all the land is under cultivation and the same crops are grown as on Congaree loam, but yields are in general slightly lower

unless the soil has been given an application of fertilizer or manure. The soil is better suited to watermelons and garden vegetables than Congaree loam, because it warms up earlier in the spring and has better drainage throughout.

FARMING AND GRAZING SOILS OF THE MOUNTAINS

The second group, or the farming and grazing soils of the mountains, includes Porters loam; Porters loam, colluvial phase; Ashe loam; Ashe sandy loam; and Rabun clay loam. These soils cover a large part of Macon County. They are distributed over all parts of the county, except the area occupied by soils of the first group and a large area of rough stony land in the southwestern corner. They occupy the mountain slopes, tops, and ridges and are naturally well drained. Were it not for the vegetal growth of trees and grasses, erosion would be very pronounced.

These soils may be termed the brown soils of the county, that is, the surface soils are dominantly brown in the Porters soils and yellowish gray or light brown in the Ashe soils. The subsoils of the Porters soils are dominantly reddish brown or yellowish brown and those of the Ashe soils are mainly yellow. A characteristic feature of these soils is the dominant loamy texture and the friable consistence. These factors produce a condition that allows the soils to absorb a large amount of rain water. It is probably owing to the absorptive character of these mountain soils that they do not erode so easily as the heavy-textured soils in Little Tennessee River Valley. Because of their mellowness they are very easily tilled under varying conditions of moisture. These soils are naturally productive, but they are barred from the production of certain crops because of adverse surface relief. The smoother areas are used for general farming, that is, for the production of corn, wheat, hay, cabbage, potatoes, and apples. Throughout the areas of soils of this group, patch farming, so to speak, is common practice; that is, small areas near the bases of the slopes, in the coves, on the less steep mountain sides, and on flatter tops are cultivated.

Only a small percentage of the soils of this group is under cultivation. Extensive areas could be cleared and used for pasture or for the production of apples, but large areas are too rough for farming or grazing under present economic conditions, and such areas can best be used for forestry. Grasses, especially bluegrass, timothy, and clover, grow well on these mountain soils, and the areas of mountain land which are too steep for cultivation can be seeded to grasses and used for pasture. These soils are better suited to the production of grasses than the Cecil and Davidson soils of the valley. The climate is humid, that is, the rainfall is heavy, averaging about 70 inches annually in the mountains, and the mean temperature is low, as even in the summer the nights are cool, and during the summer and fall there is usually considerable fog.

These mountain soils are suited to the production of apples, cabbage, potatoes, snap beans, pumpkins, and other crops. The soils themselves are naturally productive, and they have not been leached or oxidized to so great an extent as the red soils of the valleys. They contain more organic matter throughout than the valley soils, and usually more plant food is near the surface and available for the shallow-rooted crops than in the Cecil and Davidson soils.

The North Carolina Agricultural Experiment Station, in its experimental work in connection with raising beef cattle in the mountain sections of North Carolina, learned that good pastures could be established in the steep and rough mountainous land with very little effort or expense. The best method to produce such a pasture is to burn over the cut-over timberland in the spring. When the ashes are cool, the grass mixture, composed of 3 parts orchard grass and 1 part bluegrass, is sown by hand. Orchard grass grows exceptionally well on the steep mountain sides, begins to grow earlier in the spring, and continues to grow later in the fall than any other grass. The ashes cover the seed and the rain beats them into the ground. Pastures thus established may be grazed lightly the first summer, and they make good pasture the first winter.

As this section is in the trade area of Atlanta, Ga., and Asheville, N. C., and as large areas of cut-over timberland are suited for grazing purposes, and even much of the hillside and mountain land now under cultivation is best suited for pasture, it would seem practical to raise more beef cattle than are raised at present. This is especially true, when it is considered that generally only a small quantity of supplementary winter feed is necessary for the maintenance of beef cattle in this section of the country. Probably one reason that more beef cattle are not raised in Macon County is the fact that competition in this industry from other sections is greater than it is in the production of butterfat, pork, and poultry, which are at present the main livestock enterprises of the county.

Porters loam.—Porters loam is an extensive and important member of this group of soils. Large areas occur in all parts of the county except the southwestern corner. Some of the largest continuous areas are north and northwest of Franklin.

The surface soil of Porters loam to a depth ranging from 6 to 10 inches consists of mellow and friable brown loam. The subsoil to a depth ranging from about 20 to 24 inches is reddish-brown friable and crumbly clay loam or clay. Below this is mottled gray and yellow or, in some places, brownish-yellow or light-gray soft disintegrated rock. In some places, the light-colored soft rock lies immediately under the subsoil, whereas in other places broken rock or bedrock occurs.

As this soil has such a wide range in surface relief, the color and thickness of the soil over any extensive area are variable. In some places the surface soil is reddish brown or red and is underlain by a light-red clay subsoil. In a few places the surface soil or a shallow subsoil rests directly on the hard rock at a depth of 18 or 20 inches below the surface. Angular rock fragments occur locally in both surface soil and subsoil, and outcrops of bedrock occur in places. The surface soil in the coves is very dark brown and is slightly thicker than on the slopes, and in a few places the surface soil to a depth of a few inches is black loam.

Porters loam is considered one of the good agricultural soils of the county; and if it occupied more favorable relief probably all of it would be cultivated, but under existing conditions only a small part is in cultivation. The principal crop is corn, and the yields range from 15 to 40 bushels an acre, depending on the season and the fertilizer used. About 200 pounds of superphosphate, or from 200 to

400 pounds of 4-8-2 fertilizer, an acre is applied. Cabbage, potatoes, snap beans, and pumpkins do well. Potatoes are given an acre application ranging from 600 to 1,000 pounds of 4-8-6 or 5-7-5 fertilizer and cabbage from 500 to 1,000 pounds of 4-8-2. Yields of wheat range from 8 to 12 bushels an acre. Porters loam is one of the good pasture-grass soils of western North Carolina. Buckwheat does well on this soil, yielding from 10 to 25 bushels an acre. Summer, fall, and winter varieties of apples do well.

Porters loam, colluvial phase.—Porters loam, colluvial phase, occurs as narrow strips at the heads of some of the drainage ways or at the bases of the mountain slopes. This soil is similar in color to typical Porters loam, but it is much deeper and in some places practically no difference exists between the surface soil and the subsoil. Locally this soil has a high content of rock fragments which have rolled down from the mountain sides. Soil of the colluvial phase is used for the production of corn, cabbage, and potatoes, and the yields are about the same as those obtained on typical Porters loam.

Ashe loam.—Ashe loam differs essentially from Porters loam in the color of its surface soil and subsoil. Large areas of Ashe loam lie in the southeastern part of the county around Highlands, and smaller areas are southwest and north of Kyle. In most places Ashe loam occupies slightly higher elevations than Porters loam. The area around Highlands is comparatively smooth.

Ashe loam, to a depth ranging from 6 to 10 inches, consists of brownish-yellow, grayish-yellow, or light-brown mellow friable loam. In wooded areas the surface soil has a 2 to 4 inch layer of dark-gray or almost black loam highly charged with organic matter, but in some places there is only a thin covering of leaf mold. The subsoil to a depth ranging from 20 to 30 inches is deep-yellow or brownish-yellow friable clay which readily crushes to a crumbly granular mass. It is underlain by light-gray or mingled light-gray and yellow soft partly decomposed rock. In some places hard rock immediately underlies the subsoil. Outcrops of rock occur here and there, and a few loose stones are on the surface in some places. Locally, at the bases of some of the slopes, the material, to a depth ranging from 4 to 5 feet, shows no marked difference between the surface soil and the subsoil.

Only a small percentage of Ashe loam is cultivated, most of it being in forest or used for pasture. Some corn, potatoes, cabbage, and small grains are grown on the smoother areas, and crop yields and fertilizer treatments are about the same as those on Porters loam. Ashe loam is well adapted to pasture grasses, and in other counties of western North Carolina it is the principal bluegrass soil. In some of these counties, particularly Ashe and Alleghany, large areas of these mountain ridges and knobs have been cleared and are used for grazing purposes. Apples do well on this soil in some localities. Most of the cabbage is produced on Ashe loam. Cabbage land receives an acre application ranging from 600 to 1,000 pounds of 4-8-2 fertilizer.

Ashe sandy loam.—Ashe sandy loam is one of the less extensive and unimportant soils in the county. It occurs in the southeastern part along the Rabun County line southwest of Highlands and along the Jackson County line east of Highlands.

Ashe sandy loam is similar to Ashe loam in color, but both the surface soil and subsoil contain a higher percentage of sand, which gives the surface soil a sandy texture and a more open and porous struc-

ture than the surface soil of Ashe loam. The subsoil is more friable and in many places grades, at a slight depth, into the underlying soft rock material.

The surface relief of most of this soil is so rough and steep that only a few small areas are used for general farming. Some of the land has been cleared and is used for pasture and for the production of apples. This is a good soil for pasture grasses, and in some places the native grasses furnish good pasture on the open range. Garden vegetables and truck crops do well.

Rabun clay loam.—Rabun clay loam, which occurs in the mountains, is somewhat similar in color to Davidson clay loam of the valleys. However, it differs from the Davidson soil in its rough surface relief and also in the structure and development of the subsoil. The surface soil is brown or reddish-brown heavy loam or clay loam from 4 to 8 inches thick. It grades into red or dark-red clay which, in most places, is friable and crumbly and extends to a depth ranging from 15 to 30 inches, where black shiny rock is present or fragments of the rock are mixed with the subsoil. In a few places the surface soil to a depth of an inch is dark colored, owing to the accumulation of coarse organic matter. In places the bedrock lies near the surface, and outcrops of this material are not uncommon.

This is one of the inextensive and unimportant soils of the county. It occurs in several scattered areas, the larger ones lying west of Onion Mountain and southwest of Pleasant View Church. On account of the unfavorable surface relief of this soil, only a few patches are used for farming. Most of the land is in forest or has been cut over. This soil is not so easy to cultivate as either the Porters or Ashe soils, owing to its heavier texture and structure. If cleared, erosion would be more active than on those soils. The best uses for Rabun clay loam are for grazing or for forestry.

NONTILLABLE OR FOREST SOILS OF THE MOUNTAINS

This soil group includes rough stony land, Porters stony loam, and rock outcrop. These soils are called the nontillable or forest soils because the areas are steep and broken, occupying as they do the highest mountain knobs and peaks and the steepest mountain sides. Such areas are therefore nontillable under present economic conditions. They are classed as forest soils, not because they are especially suited or as well suited to forestry as the better soils but because forestry is the only use to which the larger part of them can be devoted. Rough stony land is second to Porters loam in extent. An area including about 40 square miles lies in the southwestern part of the Nantahala Mountains. Other large areas are in the western and northwestern parts of the county, along the northern and northeastern borders, and in the south-central part. Throughout the soils of this group are small areas here and there, occurring at the bases of slopes, in the coves, or on top of some of the mountains, which have a sufficiently smooth surface to be cultivated or used for pasture land, or even for orchards, but most of this land can best be used for forestry.

Rough stony land.—Rough stony land includes those areas which have rough, steep, or precipitous surface relief and on which are many large boulders and many outcrops of bedrock. In places where boulders and ledge rock are not present, the surface soil is very thin and the underlying rock is only a few inches below the surface. Areas

in which the soil material has considerable depth, within areas of rough stony land, are either Porters or Ashe soils.

Rough stony land lies mainly at elevations of more than 3,000 feet above sea level, occupying the highest elevations. This land is nonagricultural. Practically all of it is in forest or has been cut over, that is, most of the merchantable timber has been removed and second-growth trees have grown up. Most of the rough stony land in the southwestern part of the county is included in the Nantahala National Forest.

Porters stony loam.—Porters stony loam occurs in all parts of the county, in scattered areas ranging from 1 to 3 square miles in size. The longest and most continuous belt of this soil is in the northeastern part bordering the Cowee Mountains.

The surface relief is steep and mountainous, a large quantity of stone is on the surface, and in places the solid rock outcrops. In most places the soil is very shallow over the rock, but where any surface soil or subsoil has developed it has the characteristics of Porters loam.

Only small spots of Porters stony loam are cultivated, and only a few small areas are used for pasture or orchards. Patches here and there could be farmed, but as a whole this soil seems best suited to forestry.

Rock outcrop.—Rock outcrop includes bare exposures of solid rock. A few scrub trees and bushes grow in the crevices where a slight development of soil has formed, but the areas have no agricultural value. A few small scattered areas were mapped, associated with rough stony land or occurring as sheer rock walls within areas of some of the soil types.

SOILS AND THEIR INTERPRETATION¹

The greater part of Macon County includes mountain ranges and knobs, whose slopes are steep and in many places precipitous. The elevation ranges from 1,840 to nearly 6,000 feet above sea level. The drainage of all the upland soils ranges from good to excessive.

The land has supported a heavy growth of hardwoods, such as red, white, and post oaks, hickory, maple, ash, spruce, balsam, chestnut, poplar, and old-field pine. The soils have developed under forest cover and are prevailingly light in color, ranging from light brown to brownish red in the surface layers. In some places in the forested areas a thin covering of leaf litter is on the surface and the upper 2 or 3 inches of soil generally contain a noticeable amount of organic matter which has not really become a part of the soil but is more or less mixed with it. After the land has been cleared and cultivated for a short period, a large part of the organic matter disappears. In a few places on some of the highest mountains and in some of the shady coves on the north sides of the mountains are small areas having a black surface soil. This dark-colored soil is caused by the accumulation of organic matter through the decay of mosses, ferns, and other vegetable matter in addition to the forest debris. The organic matter of these soils is acid and soluble.

¹ Cherokee County adjoins Macon County on the west. The soil maps of these counties do not agree along the boundaries. For instance, Porters stony loam in Macon County includes areas of soil mapped as Talladega (late loam) in Cherokee County. This is because of the small extent of the Talladega soil in Macon County. In a few places, Porters stony loam of Macon County is mapped against rough stony land in Cherokee County. This is not an unusual occurrence as one side of the mountain may be rough stony land and the other a stony loam.

The lowest uplands are adjacent to the flood plains of Little Tennessee River. Here the climatic conditions differ greatly from those in the higher mountain regions, and these conditions probably account in large measure for the differences in the organic-matter content of the surface soils in such localities. In the mountainous parts of the county the average temperature is lower, the cold season is longer, the rainfall is greater, the vegetation flourishes to greater extent, and there is less leaching of organic matter than in the lower-lying country along Little Tennessee River.

Gullying and erosion of the soils are not so noticeable in this mountainous region as in the piedmont plateau, because the mountains are covered with vegetation which prevents the rapid run-off of rain water, notwithstanding the steep slopes, and the structure and consistence of the B horizon of the soils is such as to absorb a large amount of rainfall. In many places, however, there has been some translocation of material from higher areas or steep slopes to the bases of the slopes.

The soils have been formed, in a cool climate under a heavy rainfall, from the disintegration and decomposition of the underlying rocks. The greater part of the county is underlain by Carolina gneiss which is cut in places by graphic granite and dikes of dark-colored basic rock. Along the Nantahala gorge the gneiss is mixed with slate and variable rock, and in the northwestern corner of the county there is a small area of schist.

A direct relationship exists between the rocks and the resultant soils, and the influence of the parent material is evident throughout the soil profile. This is especially true on many of the mountain sides where the soil covering is shallow. The solum differs greatly in thickness over the parent rock, being very thin in most places in the mountain soils, and here the effect of the parent material on the soil profile is more noticeable than in the piedmont plateau, where the soils are weathered to a much greater depth.

Only a few small areas have a level or undulating surface, and it is only in these places that a normal soil profile has developed. The characteristics of these normally developed soils are a comparatively light textured A horizon, a heavy uniformly colored B horizon, and a lighter-textured and varicolored C horizon. Most of the soils do not possess this normal soil-profile development but have a young, or immature, profile. No sharp line of demarcation is evident between the different layers in the mountain soils. Erosion has kept such close pace with the soil-forming processes that the development of a normal soil profile on the mountains has been retarded.

Two main groups of soils occur, the red soils in the central part, in the valley of Little Tennessee River, and the light-brown or brown soils in the mountains. The red soils of the valley include Cecil clay loam and Davidson clay loam. They have red or dark-red heavy clay B horizons, the red color indicating a rather complete oxidation of the iron salts. These soils are highly weathered. They occupy gently rolling or hilly areas ranging in elevation from 1,840 to about 2,250 feet above sea level.

A physiographic difference exists between the soils of the second group, or mountain soils, and the red soils along Little Tennessee River Valley. The mountain soils, ranging in elevation from 2,250 to 6,000 feet, have developed under a different climate from the red soils of the valley. Undoubtedly this climatic influence has played a large part in producing a wide difference between the soils of the

mountain group and soils occurring in the piedmont plateau. In the mountainous section the rainfall is heavier, the temperature is lower, and there is more snow, which lies on the ground longer than in the lower-lying country where the red soils occur. The principal differences in the soils of these two groups are in color and structure. The mountain soils contain more organic matter and are lighter in texture, and the subsoils are more friable than the subsoils of the red soils.

The soils of the mountain group include members of the Ashe, Porters, and Rabun series. The Porters soils are closely associated with the Ashe soils, and in many places they are derived from similar parent material. The main difference between the Ashe soils and the Porters soils is in the color of the A and B horizons. The A horizon of the virgin Ashe soils is darker than that of the Porters, but the B horizon is lighter. This may be because the Ashe soils occupy a relatively higher position than the Porters soils, and consequently have developed under a colder climate, and more organic matter has accumulated. The redder color of the B horizon of the Porters soils, as contrasted with the yellow of the Ashe, is probably owing to the more complete weathering of the iron in the Porters.

The Rabun soils have a color profile somewhat similar to that of the Davidson soils. However, the structural characteristics of the Rabun soils are different, in that the B horizon is much thinner and is not so heavy as the Davidson subsoils. In most places the Rabun soils show no normal profile development.

The dominant textures of the soils are loam and clay loam. The soils have been grouped into series on the basis of color, consistence, and origin of material. They have been separated into soil types according to the proportion of sand, silt, and clay that they contain. All the soils range from slightly acid to acid throughout their profiles. They have an average pH value of about 5.5. Table 5 gives the pH values of Cecil clay loam and Davidson clay loam. The pH determinations were made in the laboratory of the Bureau of Chemistry and Soils by the hydrogen-electrode method. A bubbling type vessel was used.

TABLE 5.—Results of pH determinations on two soils of Macon County, N. C.

(3 cm³ soil 1 2 soil-water ratio)

Soil type	Depth	pH	Soil type	Depth	pH
Cecil clay loam.....	<i>Inches</i> 0-1	5.54	Davidson clay loam.....	<i>Inches</i> 0-3	5.20
Do.....	1-3	5.06	Do.....	3-7	4.94
Do.....	4-8	5.32	Do.....	9-13	4.88
Do.....	16-20	5.30	Do.....	20-24	4.95
Do.....	28-32	5.30	Do.....	50-54	4.99
Do.....	56-60	5.30			

Following is a description of the profile of Cecil clay loam as observed in a fresh cut along State Highway No. 286, 3 miles northwest of Franklin:

- (A₁) 0 to 2 inches, brown loam containing a small amount of organic matter and many small roots
- (A₂) 2 to 7 inches, light reddish-brown clay loam which breaks down readily under slight pressure into a fine mass. The lower part of this layer grades in consistence toward the B₁ horizon.

- (B₁) 7 to 38 inches, red stiff but brittle clay which breaks into irregular-shaped lumps. The lumps, in turn, under slight pressure crush into a friable mass. They have no definite cleavage lines. They are uniform in color, outside and inside. A cut surface is yellowish red.
- (B₂) 38 to 48 inches, light-red very friable clay containing a considerable quantity of very fine mica scales.
- (C) 48 to 60+ inches, disintegrated and partly decomposed gneiss rock having a mingled yellow, white, and slightly green color.

A few irregular-shaped quartz gravel occur in the A₁ horizon. The entire profile contains quartz sand grains. The B₁ horizon of this soil is not quite so stiff and hard as the B₁ horizon of the Cecil soils in the piedmont plateau region.

Following is a description of the profile of Davidson clay loam, as observed along State Highway No. 286, 2 miles north of Franklin.

- (A₁) 0 to 2 inches, dark-brown loam carrying a considerable amount of organic matter.
- (A₂) 2 to 6 inches, dark reddish-brown clay loam which crumbles easily under slight pressure into a fine mass.
- (B) 6 to 60 inches, dark-red or maroon-colored clay which is rather stiff but breaks easily into irregular-shaped lumps and crushes down readily to a fine-granular mass. The clay is uniform in color throughout. A cut surface presents a light-red color.
- (C) 60 inches +, yellow and black altered dark-colored basic rock.

A characteristic feature of this soil is that, on an exposed bank, it breaks into small granules which accumulate at the base of the bank, giving the surface soil where they are deposited a soft spongy feel. The clay in the B horizon is smooth and free from any large quartz grains.

Following is a description of the profile of Porters loam as observed on the north side of the road to Aquone, 9 miles west of Franklin:

- (A₁) 0 to 2 inches, grayish-brown loam carrying a rather large amount of organic matter, mostly leaf mold.
- (A₂) 2 to 8 inches, light-brown mellow and friable loam.
- (B) 8 to 32 inches, reddish-brown friable clay which crumbles and breaks down into a mealy mass having no definite structure.
- (C) 32 inches +, mingled light-gray, white, and yellow soft disintegrated and partly decomposed gneiss rock.

The soil throughout the entire profile is porous and readily absorbs rain water. A few fragments of gneiss rock are on the surface, and the underlying bedrock is near the B horizon.

Following is a description of the profile of Ashe loam as observed in a forested area near State Highway No. 28, one-fourth mile north-west of Highlands:

- (A₁) 0 to 4 inches, dark-brown mellow loam containing a large quantity of organic matter.
- (A₂) 4 to 10 inches, light-brown or brownish-yellow friable loam.
- (B₁) 10 to 30 inches, deep-yellow clay which readily crumbles into a fine mass having no definite breakage. A cut surface has the same color as a broken surface.
- (B₂) 30 to 40 inches, light-yellow very friable loam containing a noticeable quantity of fine mica scales. This is a transitional layer between the B and C horizons.
- (C) 40 to 50 inches +, light-gray mottled white and yellow disintegrated partly decomposed granitoid gneiss.

Narrow strips of first-bottom or overflow land are developed along practically all the streams. The soil materials have been washed from the uplands and deposited by the streams at times of overflow. These materials are young and have in places been water-logged, so that no chance has been given for the development of a normal profile. Fresh

material is deposited at each overflow, and in some places the old material is removed by freshets. Where any uniformity exists in the color, texture, and structure of these soils, the Congaree soils are mapped.

The extensive areas of rough stony land include areas of rough mountainous relief and extremely stony areas. In places the boulders and bedrock may not outcrop, but in most places bedrock lies only a few inches below the surface. The soil materials included in this classification belong mainly to the Porters and Ashe series. The soil covering ranges from a few inches to a few feet in thickness.

SUMMARY

Macon County, which has an area of 520 square miles, is in the southwestern corner of North Carolina. Franklin, the county seat, is about 120 miles northeast of Atlanta, Ga.

The county lies within the Appalachian Mountain region and has a rough mountainous surface relief. The elevation above sea level ranges from 1,840 to nearly 6,000 feet. The drainage ranges from good to excessive. The streams are swift-flowing, and much water power is available.

There are three State highways, but most of the county roads are rather poor. Railroad facilities are furnished by the Tallulah Falls Railway.

The climate is healthful. It is characterized by delightful summers and moderately open winters. The rainfall is abundant and fairly well distributed throughout the year.

About 65 per cent of the county is in the Nantahala National Forest.

No large cash crops are grown. The agriculture consists of general farming, and the important crops are corn, wheat, and hay. Such minor crops as oats, sorgo, potatoes, and sweetpotatoes are produced for home use. Cabbage and potatoes are grown commercially on a small scale, and enough surplus garden truck is grown to supply the cannery at Franklin.

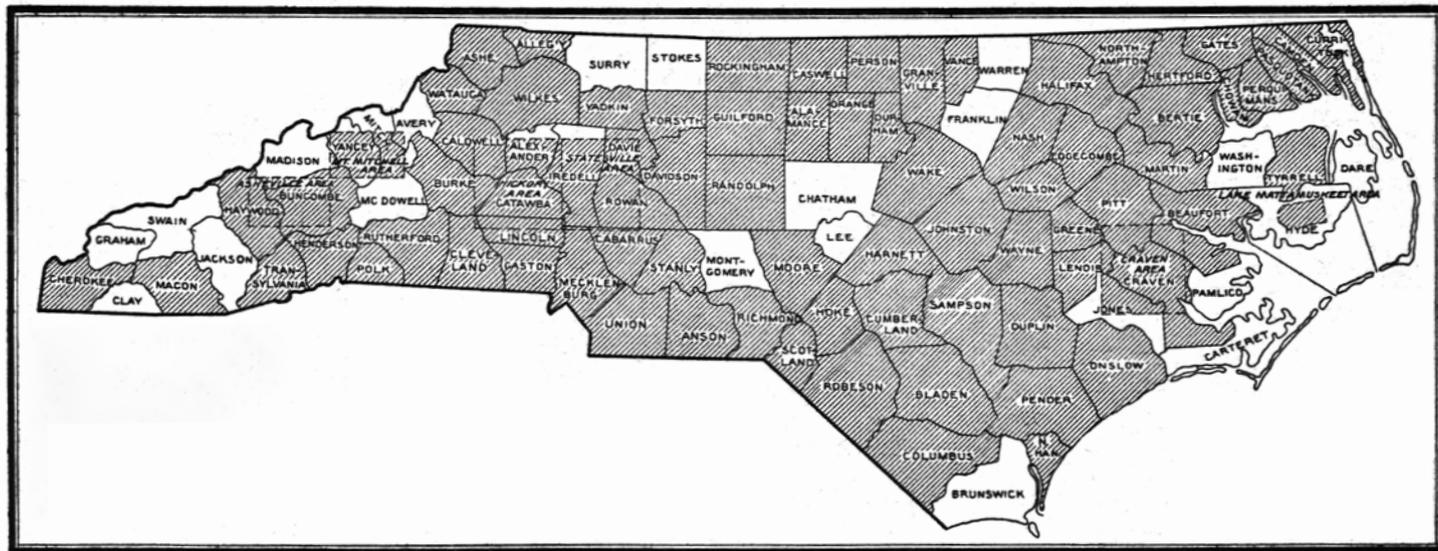
Much of the farm income is obtained from the sale of cattle, hogs, poultry, and dairy products, supplemented by the sale of such forest products as timber, crossties, acid wood, and tanbark.

The important soils are members of the Cecil, Davidson, Porters, Ashe, and Congaree series. Extensive areas of soils are of such rough and rugged surface relief that they can not be profitably farmed. Some of these soils can be used for permanent pastures, but most of them are best suited to forestry. Practically all the soils are low in nitrogen, phosphoric acid, and lime, but they are comparatively high in potash, and their physical characteristics are such that with proper fertilizer treatment they produce good crops. Approximately 77 per cent of the farms are operated by owners.

Opportunities are afforded for fruit growing, especially apples and berries, for truck-crop growing; for the development of the cattle-raising industry; and for increased production of butterfat, pork, eggs, and poultry.

Authority for printing soil survey reports in this form is carried in Public Act No. 269, Seventy-second Congress, second session, making appropriations for the Department of Agriculture, as follows:

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 soil area surveyed by the Bureau of Chemistry and Soils, Department of Agriculture, in the form of advance sheets bound in paper covers, of which not more than two hundred and fifty copies shall be for the use of each Senator from the State and not more than one thousand copies for the use of each Representative for the congressional district or districts in which a survey is made, the actual number to be determined on inquiry by the Secretary of Agriculture made to the aforesaid Senators and Representatives, and as many copies for the use of the Department of Agriculture as in the judgment of the Secretary of Agriculture are deemed necessary.



Areas surveyed in North Carolina, shown by shading

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