U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF NEWBERRY COUNTY, SOUTH CAROLINA.

BY

W. J. LATIMER, IN CHARGE, T. M. MORRISON,
AND F. Z. HUTTON.

W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1918.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1921.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., April 7, 1920.

SIR: In the extension of the soil survey in the State of South Carolina work was undertaken in Newberry County and completed during the field season of 1918.

The accompanying report and map cover this survey and are submitted for publication as advance sheets of Field Operations of the Bureau of Soils for 1918, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. E. T. MEREDITH,
Secretary of Agriculture.

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SOIL SURVEY OF NEWBERRY COUNTY, SOUTH CAROLINA.

By W. J. LATIMER, In Charge, T. M. MORRISON, and F. Z. HUTTON.—
Area Inspected by W. EDWARD HEARN.

DESCRIPTION OF THE AREA.

Newberry County is situated in the northwestern part of South Carolina, about 30 miles northwest of Columbia, the State capital. The county is irregular in form, and much of its boundary is formed by streams. Its area is 601 square miles, or 384,640 acres.

Newberry County occupies part of a fairly high plateau which has been dissected by streams until the surface ranges from almost level to broken and hilly. The broad interstream areas are undulating or gently rolling, but they become rough and broken as the streams are approached. Perhaps the most prominent interstream divide extends in a northwest-southeast direction across the county, followed by the Columbia, Newberry & Laurens Railroad. It is flat to gently rolling, with a few low, well-rounded hills and a few slight depressions. The broader divides constitute the smoothest portion of the county. The roughest and most broken areas in the county occur in the northern part, in the vicinity of Whitmire and for a distance of several miles to the south. Along the rivers and some of the larger creeks there are steep slopes, which in many places have become eroded and broken. These streams are bordered by comparatively narrow strips of flat bottom lands, which are all subject to overflow at times of extremely high water, except for a few areas of second bottoms, or terraces.

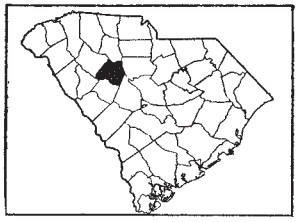

FIG. 1.—Sketch map showing location of the Newberry County area, South Carolina.

Along the southeastern boundary line of the county there is a series of high hills, the most prominent of which, Little Mountain, rises about 200 feet above the surrounding country. The highest point in the county reaches 780 feet above sea level, and this is probably about the general level in the northwestern part of the county. The general elevation throughout the central and southeastern parts is 450 to 500 feet, while in the western part the average is probably about 675 feet. The elevation along the Saluda River at the extreme southeastern corner of the county is 290 feet. The general slope of

the greater part of the county is to the southeast, but that portion lying north of the so-called "backbone" ridge slopes to the northeast.

The southern part of the county is drained into Saluda River through Little River, Bush River, and other main tributaries. The northern part drains into Broad River through the Enoree River, Tiger River, Kings Creek, Cannons Creek, and Hellers Creek. Smaller streams ramify through nearly all parts of the upland, although many of the streams that reach well back into the ridges are intermittent. Practically every farm is served by at least a small stream or spring. The stream bottoms lie 100 to 250 feet below the adjacent ridges. The small streams are actively cutting back into the ridges, but the main streams, on the whole, have reached temporary base level, although some of them are swift enough to develop water power. Numerous small mills are scattered over the county, but they are out of use at the present time. At Parr Shoals, on Broad River, just over the line in Lexington County, a large power plant is operated. There is a drop of 32 feet with a reported development of 10,000 horsepower.

The first settlement within this territory was made by the Scotch, on Duncan Creek, in 1752. Following this, settlers came in large numbers. Dutch established themselves in the southern end of the county. Irish settled in the Mollohon section, and English Quakers in the Little River section. A number of Scotch-Irish came from Pennsylvania and other States. Most of the Quakers became dissatisfied when slavery was introduced, at an early date, and moved to northern and western States. The present white population is descended largely from the original settlers.

The 1910 census gives the population of Newberry County as 34,586, of which 34.2 per cent consists of white persons and 63.7 per cent of colored persons. The greater part of the population is engaged in farming. Settlement is well distributed throughout the county, and the average density, according to the 1910 census, is 49.2 persons to the square mile.

Newberry, the county seat, is situated in the center of the county, at the junction of the Southern and the Columbia, Newberry & Laurens Railroads. In 1910 Newberry had a population of 5,028. It is the principal town in the county and the center of a good agricultural region. Three cotton mills and two oil mills are operated here, and Newberry College is situated at this place. Whitmire is situated in the extreme northern corner of the county, on the Seaboard Air Line Railway. It had a population in 1910 of 1,045. A cotton mill is located at this place. Prosperity, 7 miles southeast of Newberry, on the Southern and the Columbia, Newberry & Laurens Railroads, had a population in 1910 of 737, and is the center of a

thriving agricultural country. An oil mill is operated here. Chappells, Silverstreet, Pomaria, Little Mountain, and Kinards[1] are small railroad towns which have cotton gins.

Newberry County has good railway service. A branch of the Southern Railroad built in 1851 passes through the county in a general east-and-west direction, and the Columbia, Newberry & Laurens Railroad, built to Newberry in 1890 and completed to Clinton in 1901, passes through it in a northwest–southeast direction. The Spartanburg & Columbia Branch of the Southern Railroad extends along the eastern bank of Broad River just across the county line, and bridges and ferries enable this line to be used as an outlet for the northeastern section of the county. The main line of the Seaboard Air Line Railroad, constructed in 1893, passes through the northern corner of the county.

The main wagon roads of the county are kept in fairly good condition, but the secondary roads are poor, little attention being given to their maintenance. During the winter all the roads are in poor condition, and in some places they are almost impassable at times. Telephone service is maintained in all the towns, and party lines that reach many of the farms are operated along the main roads.

Newberry is the principal market for cotton, the chief farm product sold. All the smaller towns along the railroads are local markets at which the near-by farmers deal and from which cotton is shipped. Columbia is the principal outside market for poultry and other produce. Columbia, Greenwood, and Greenville are the places from which most of the farmers' supplies are obtained.

CLIMATE.

The climate of Newberry County is mild and healthful and well suited to general farming. The mean annual temperature, as recorded at Newberry, is 62.2° F. There is not a very wide range in the mean temperature for the different seasons. The mean seasonal temperatures are 44.1° F. for the winter, 62.4° F. for the spring, 79.5° F. for the summer, and 63.1° F. for the fall.

The winters are comparatively short, cold weather occurring only from the latter part of November until the middle of March. The winters are generally mild and open, but cold spells of a few days duration, when the thermometer may drop to 10°, are not uncommon. Zero weather is of rare occurrence. The lowest temperature on record is —8° F., in February. The snowfall in this region is light,

[1] Since this report was written the preliminary announcement of the population of Newberry County and its civil divisions in 1920 has been issued by the Bureau of the Census, as follows: Newberry County, 35,552; urban, 5,894; rural, 29,658; Chappells, 207; Helena, 435; Kinards, 1,527; Little Mountain, 399; Newberry, 5,894; Pomaria, 288; Prosperity, 748; Silverstreet, 297; Whitmire, 1,955.

the fall in many winters amounting to only a few inches and in others to only a trace.

The summers are long and hot. Warm weather generally begins with May and lasts through September. The highest temperature recorded is 106° F., which has occurred in June, July, and August. The highest record for May is 101° and for September 102°. Periods when the thermometer rises above 100° are rare and of short duration.

The mean annual precipitation of 47.98 inches is well distributed over the year, averaging 12.93 inches for the winter, 10.60 inches for the spring, 14.47 inches for the summer, and 9.98 inches for the fall. This distribution is very favorable, since the heaviest rainfall occurs in the summer, when it is needed by growing crops, and the lightest during the fall months, when dry weather for picking cotton is essential. The precipitation in the driest year on record (1904) was 36.11 inches, but it was so distributed that during the winter and spring the rainfall was only slightly below normal, and during the summer it was about normal, a pronounced drought occurring only in the fall. During the wettest year (1888) the precipitation amounted to 67.60 inches. The winter rainfall was about normal, and the summer fall was below normal, but the spring and autumn precipitation was excessive.

The average date of the last killing frost in the spring, as recorded at Newberry, is March 30, and that of the first in the fall, November 1. This gives an average growing season of 215 days, or practically 7 months. The dates of the last recorded killing frost in the spring and the first in the fall show that there is a possibility of the growing season being cut to about six months, or extended to a period of eight months. Killing frost has been recorded at Newberry as late in the spring as April 28, and as early in the fall as October 1.

The following table gives the normal monthly, seasonal, and annual temperature and precipitation as recorded at Newberry:

Normal monthly, seasonal, and annual temperature and precipitation at Newberry.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1888).
	° *F.*	° *F.*	° *F.*	*Inches.*	*Inches.*	*Inches.*
December	44.8	75	10	4.24	3.73	3.63
January	43.6	77	9	4.08	3.66	3.86
February	43.8	77	−8	4.61	4.18	6.43
Winter	44.1	77	−8	12.93	11.57	13.92

Normal monthly, seasonal, and annual temperature and precipitation at Newberry—Continued.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1888).
	° *F.*	° *F.*	° *F.*	*Inches.*	*Inches.*	*Inches.*
March	54.6	92	17	4.67	3.18	8.40
April	61.2	94	24	2.56	1.16	1.85
May	71.4	101	36	3.37	2.76	7.90
Spring	62.4	101	17	10.60	7.10	18.15
June	78.8	106	45	4.35	1.47	3.21
July	80.5	106	56	4.75	5.96	2.19
August	79.3	106	56	5.37	6.78	4.62
Summer	79.5	106	45	14.47	14.21	10.02
September	74.1	102	42	4.32	.30	17.90
October	62.5	94	25	2.82	.37	4.51
November	52.7	90	12	2.84	2.56	3.10
Fall	63.1	102	12	9.98	3.23	25.51
Year	62.2	106	−8	47.98	36.11	67.60

AGRICULTURE.

Newberry County has been essentially agricultural since its early settlement. An early chronicle[2] states that following the Revolutionary War, and until about 1810, the county produced on a commercial scale flour, bacon, beef, live cattle, beeswax, and skins (raccoon, fox, rabbit, mink, and muskrat), which were shipped to Charleston. About 1800 cotton and tobacco began to be shipped. At this time the county was occupied by small farms, each producing its own supply of necessities. The plantation system soon developed, and as the farms were enlarged tobacco production declined, cotton became the leading crop, and the exportation of foodstuffs and live stock was discontinued. The farms continued to produce much of their own food supply until after the Civil War and the building of the railroads, when it became difficult to compete with the Western States in the production of foodstuffs and feed, and the farmers gradually drifted to cotton as the main source of income, many of the food crops, and, finally, certain crops necessary for the maintenance of the work stock being eliminated.

As early as 1889 cotton was by far the most important crop, occupying 72,333 acres as compared with 56,295 acres in all other crops. According to the census, the area in cotton increased from

[2] Chapman's History of Newberry County.

57,447 acres in 1879 to 75,662 acres in 1909, while the area devoted to corn decreased slightly, from 34,005 acres in 1879 to 33,343 acres in 1909. Oats have remained practically stationary since 1880, occupying 11,940 acres in 1909. Wheat shows a marked decrease, from 9,258 acres in 1879 to 1,679 acres in 1909. Notwithstanding the decrease in the growing of subsistence crops, the total area in cultivation increased from 105,404 acres in 1879 to 135,756 acres in 1909.

Much damage was done by erosion in the upland during and immediately after the Civil War, when extensive areas under cultivation were abandoned. Much of this eroded land has grown up in pine, but many of the deep gullies still remain. Terracing has done much to protect and reclaim some of these waste areas.

The bottom lands were extensively cultivated at one time, but, following the clearing of large bodies of the upland, floods became so destructive that much of the bottom land was abandoned for crop production and devoted to grazing.

At the present time (1918) cotton is practically the only money crop, and it is grown on even a larger acreage than in 1909. Corn, oats, and cowpeas, the chief subsistence crops, are grown largely to maintain the work stock. The hay consists mostly of cowpeas, crimson clover, bur clover, vetch, and wild grasses. Alfalfa is grown on a few farms in an experimental way. Rye, barley, sorghum, and corn are cut green to supply feed for work stock and milk cows. Rye, beans, peanuts, sorghum, Irish potatoes, sweet potatoes, and other vegetables are grown in small fields. Nearly every farmer has a garden producing the usual vegetables, and there are numerous strawberry patches. Melons also are grown in small patches, both for home use and for sale on the local markets.

Small mixed orchards of peaches, plums, pears, and summer apples are found on most farms. The 1910 census reports 29,502 peach trees and 17,337 apple trees in the county. There were also 1,180 pecan trees in the county in 1909, and on many farms small vineyards, comprising a number of varieties of grapes.

The following table gives the acreage and production of the leading crops of Newberry County as reported in the 1910 census:

Acreage and production of leading crops in 1909, Newberry County.

Crop.	Area.	Production.	Crop.	Area.	Production.
	Acres.	*Bales.*		*Acres.*	*Tons.*
Cotton	75,662	31,961	All vegetables	1,008	.....
		Bushels.	All cultivated grasses	1,612	1,199
Corn	33,343	341,422	Wild grasses	602	620
Oats	11,940	163,346	Grain and forage (cut green)	3,211	3,040
Wheat	1,697	13,205	Sorghum and sugar cane	426	593
Cowpeas	5,062	13,088			
Sweet potatoes	778	71,951			

The live-stock industry of Newberry County is not well developed. According to the census of 1910 there were 7,765 head of cattle, 10,378 hogs, and 2,088 sheep and goats in the county in 1910. Cattle raising is mainly developed on farms in the larger stream bottoms. Some cattle are fattened on cottonseed meal and hulls, particularly on farms near towns, where the haul of the feed is not great. The cattle are sold for beef. Animals sold or slaughtered in 1909 were valued at $136,531. Hogs are kept on nearly every farm. They are raised both to supply the home with meat and lard and for sale on the local markets. The few sheep and goats kept range on the areas of broken land near the larger streams.

There were 3,735 dairy cows on the farms in 1910. Two small commercial dairies are in operation near Newberry. The remainder of the dairy stock is distributed on farms throughout the county. The dairy products are used largely to supply the home, though the local markets draw a part of their requirements from this source. In 1909 the dairy products sold amounted to $57,903.

In certain sections, notably in the vicinity of Prosperity and Little Mountain and in the surrounding country, large numbers of poultry are kept, the surplus poultry and eggs being sold on the local markets or shipped to Columbia. In 1909, according to the census, poultry and eggs were sold to the amount of $95,457.

The distribution of crops appears to be influenced to a greater extent by the physiography and topography than by the character of the soil. The broken areas naturally are not as extensively used for crops as the more nearly level areas. Little Mountain, the most prominent elevation in the county, includes at present little cultivated land. The bottom land is used to a small extent in growing corn and hay, but mainly as pasture land. Cotton is rarely planted in the bottoms. The farmers recognize that some soils are best adapted to certain crops, but in general the crops are grown on all the upland soils in about the same proportion. It is realized that with the present shortage in potash fertilizers the heavy soils produce more cotton than the sandy soils, and some of the sandy soils have been temporarily abandoned for this crop. Clover is found to do better on the heavier red soils than on other types, and the former are also better adapted to wheat. It is considered that the soils in the section of the county underlain by granite are better suited to wheat than those in which slate is the basal formation.

Clean cultivation has resulted in depleting the organic content of the soils over large areas, and little attempt is made to build them up by turning under cover crops, sod, or stubble. In many cases cotton and corn stalks are broken and removed from the land before plowing. Cotton stalk choppers, however, have come into common use.

This machine reduces the stalks to a condition in which they can readily be plowed under.

Cowpeas and velvet beans are grown in many of the cornfields, the seed being planted at the last working of the corn. In many cases they are sown broadcast, and cut for hay. Cowpeas and sorghum are sometimes sown together as a forage crop. Vetch as a rule is seeded with oats. Bermuda grass in some instances is sown for pasture, but in many cases the native grasses are depended upon. Carpet grass comes in naturally on wet soils, as does lespedeza in abandoned fields, and these crops furnish considerable pasturage.

The houses on the farms of Newberry County are fairly substantial. In addition to a central dwelling there are on most of the farms a number of cabins used by the tenants or farm hands and outbuildings consisting of a barn for housing the work stock, with a small loft for hay and fodder; a feed and harness room, and in some cases a corn crib and cotton house. There is little need for large or tightly built barns, as the hay crop is small and the winters are not severe enough to require close shelter.

The equipment of the average tenant farmer includes a 1-horse turning plow, scraper stocks with an assortment of sweeps, bull-tongue plow, and shovels, side cultivators, a fertilizer distributer, cotton planter, and cradle. The larger land owners usually have in addition 2-horse plows, middle busters, a smoothing harrow, and some of the more progressive, disk plows, a manure spreader, and a reaper and binder. Many of the small fields of grain are still harvested with the cradle. Tenants often depend upon the owner to furnish the more expensive implements. Mules are used almost exclusively for farm work Horses are used mainly for travel. Oxen are occasionally employed for farm work on some of the tenanted farms.

In preparing the seed bed the plowing is usually shallow. The depth is only 3 to 5 inches on the heavier soils, or upon rented land, but the better farmers and those on the sandier soils usually plow 6 to 8 inches deep. Cotton and corn land is usually left during the winter with the stalks standing. In early spring the ground may be plowed and harrowed, or if in good condition only disked, and in many cases, whether the soil is in proper condition or not, the beds for the new crop are made upon the old ones, the latter being opened with a middle buster. The fertilizer is applied with a distributer or with a "guano horn," about two weeks before planting time, and then bedded in.

Cotton is planted upon raised beds, the tops of which are smoothed with a drag. The seed is put in with a planter. The crop is reduced to a stand and the weeds chopped out of the rows with the hoe. The

first middle cultivation, made with 18 to 24 inch sweeps, is shallow. Later cultivations are made with 24 to 30 inch sweeps at intervals frequent enough to keep down weeds. The crop is often "laid by" as soon as the weeds are under control, but the best farmers realize the importance of continuing cultivation until the growing and fruiting season is past. Legumes or cover crops are seldom grown with cotton.

In preparing the seed bed for corn, especially on the sandier soils, the middles are thrown up high, leaving a deep furrow in which the seed is placed. In some cases a planter is used. The crop is worked with the hoe to some extent, the high middles being thrown to the plants from time to time to cover grass and keep the roots from being exposed. On the heavier soils corn is planted on a more nearly level seed bed. Cultivations are made with a spike-tooth or spring-tooth side cultivator. In some cases the rows are "sided" with a turning plow when the crop is "laid by." Manure or fertilizer is usually applied before planting corn, but on the sandier soils a modification of the Williamson method is followed, in which part of the fertilizer is applied at the second working.

The ground for winter oats is plowed and harrowed, unless oats follow a crop such as cowpeas, where the soil has been thoroughly prepared, in which case it may simply be disked. The fertilizer and seed are usually put in with a drill, but on many small farms it is still sown broadcast. Nitrate of soda is applied as a top dressing in some cases.

No systematic crop rotation is followed in this county, and large areas have been devoted to cotton continuously for 20 years or more. In certain sections, as that south of Prosperity, where the farms are small and the agriculture more diversified, changes are made more often. Crimson clover or vetch is sometimes seeded after oats or corn, but this succession is not very popular, as there is uncertainty of getting the crop off in time for cotton the next spring. Cowpeas as a following crop are more popular. There is some shifting from cotton to corn, but the relatively large acreage in cotton makes a proper rotation all but impossible.

The use of commercial fertilizers increased rapidly during the 20 years 1889 to 1909. The census shows an expenditure of $74,876 for fertilizer in 1889, $90,340 in 1899, and $238,604 in 1909. From 200 to 1,000 pounds per acre of an 8–3–3 [3] fertilizer is used for cotton, 200 to 500 pounds for corn, and 200 to 350 pounds for oats and wheat. From 75 to 150 pounds of nitrate of soda is used as a side dressing for corn and a top dressing for oats. Manure is occasionally applied to the soil, usually on small fields or gardens. Pine needles have been used to some extent for fertilizing cotton, since as a result of

[3] Respective percentages of phosphorus, nitrogen, and potash.

the war a shortage of potash has existed. The fertilizers used in the last few years have analyzed 8–2.5–0 and 8–2.5–1.5. Cottonseed meal is used to some extent as a fertilizer for corn and acid phosphate is sometimes used for grain. Little home mixing is done. In 1909, 2,691 farms, or 70 per cent of the total number in the county, reported the use of fertilizer. Lime is employed by a few farmers to sweeten the soils and improve their structure.

In some sections of the county much of the work is performed by the farmer and his family, but in general the farm labor is done by negroes. Labor is not as plentiful as in former years, many of the former laborers having become tenants. The pay in former years was 50 to 75 cents a day, but it has advanced to about $1.50 a day, and even at this price labor is difficult to obtain in some sections. About $20 a month and housing is paid regular laborers, but very few of this class can be obtained. Day labor is hired for hoeing cotton, pulling fodder, and for other work in rush seasons. The price paid for picking cotton was formerly 50 cents per hundred pounds, but it had advanced in 1918 to $1 per hundred. In 1909 a total of 1,387 farms used hired labor, at an average expenditure of $184.15.

According to the 1910 census, 32 per cent of the farms are operated by owners, 67.4 per cent by tenants, and 0.6 per cent by managers. Most of the farms operated by tenants are rented on a share basis, the owner furnishing the fertilizer, the tenant furnishing the tools, stock, and labor, and each receiving half the cotton. The other crops, being unimportant and going mainly to the upkeep of the work stock, are not considered. Variations of this arrangement are made to suit conditions, in some cases the owner furnishing everything but the labor and in others the tenant supplying everything but the land. Some land is rented for a specified amount of lint cotton per acre, according to the quality of the soil, 50 pounds per acre being a fair average. Very little land is rented for cash.

Of the total area of Newberry County, according to the 1910 census, 82.2 per cent is in farms. The average size of the farms is 82.1 acres, but in this average each tenancy has been considered a "farm." In some sections, as in the region south of Prosperity, the farms are small, but over much of the county, especially in the outlying sections around Chappells, in the section northeast of Newberry and northeast of Kinards and in the Maybinton section, the plantations as a rule are large and contain from 400 to 1,000 acres or more. In 1909, 48.7 per cent of the area of the average farm was improved land.

The census gives the average valuation of all farm property per farm in 1910 as $2,274, of which the land represented 65.9 per cent, buildings 18.7 per cent, implements 3.5 per cent, and domestic ani-

mals 12 per cent. In the sections around Newberry and Prosperity farm values are high, improved land selling for $65 to $100 an acre. Ordinary farm land over the county is valued at about $40 to $45 an acre. In some of the rougher sections values range from $15 to $25 an acre.

SOILS.

The soils of Newberry County fall into three natural divisions, viz, upland or residual soils, terrace or old-alluvial soils, and first-bottom or recent-alluvial soils. For convenience in classification the soils are arranged into series, the members of which are of similar origin and color (especially of the subsoil), and have the same general topographic and drainage conditions. The types within the series differ in texture—that is, the relative percentages of gravel, sand, silt, and clay making up the soil.

The upland soils are derived from the weathering, in place, of igneous and metamorphic rocks. These rocks fall into two groups, crystalline rocks and slate, the boundary between the two running in a general east and west direction from Little Mountain to Bauknight Ferry (abandoned) on the Saluda River. The slate belt is found south of this line and the crystalline area to the north, the latter comprising about four-fifths of the county.

The crystalline area is composed of granite, gneiss, schist, diorite, gabbro, and other rocks. The area in which granite predominates is a broad strip extending southwest from Broad River to Newberry, between Clayton Ferry and Ashford Ferry on Broad River, and between the headwaters of Kings Creek and a point 1 mile north of Prosperity. The remainder of the extensive crystalline area is made up largely of gneiss, with narrow belts of hornblende-schist and of trap and porphyries, usually in the form of oval-shaped areas varying from one-fourth to 1 mile in width and from 1 to 5 miles long. The areas of trap and porphyries occur just south of Newberry and northwest and north of Pomaria. The hornblende-schist is developed from Prosperity west to the Saluda River, in the vicinity of Whitmire, and north and west of Maybinton. Mica schist is found north of Little Mountain and east of Pomaria. Numerous veins of quartz are found in the region just north of the slate belt, giving rise to the so-called "stone hill" section.

The slate belt consists largely of clay slates of the Carolina slate formation, and contains numerous thin veins of quartz, especially along the northern border of the formation. In a triangular area skirting the base of Little Mountain to the south, extending as far west as Camping Creek, and crossing the Lexington County line near Boland Crossroads, the slate formation seems to contain some talc slate. Little Mountain consists of quartzite, which is hard and resistant to weathering.

The crystalline formations of the county give rise to six series of upland soils, viz, the Cecil, Appling, Wilkes, Davidson, Iredell, and Worsham. The slate formations give rise to the Georgeville and Alamance series.

The surface soils of the members of the Cecil series range from gray, with a reddish or brownish tint, to brown or red, depending on the texture. The subsoils are always a bright-red, compact, brittle clay. One of the characteristics of this series is the occurrence of sharp, angular quartz sand scattered through the subsoil. The Cecil soils are derived from granite, gneiss, and occasionally schist, the rocks usually having weathered to a great depth.

The Appling series is characterized by gray to grayish-brown or grayish-yellow surface soils and yellow, compact, but usually friable subsoils, which are mottled or streaked with red. These soils are derived principally from light-colored gneisses and granites, but in some places they owe their origin to schist.

The Wilkes series is characterized by gray to brownish-gray or yellowish-gray surface soils. The subsoil consists of yellowish to brownish-yellow or mottled red and yellow sandy clay in the upper portion, and brownish-yellow, olive-green, or whitish, plastic, sticky clay in the lower part. In many places the upper subsoil is similar to that of the Appling series, and the lower subsoil to that of the Iredell. The Wilkes soils are derived from an admixture of rocks consisting of aplitic granite and hornblende-schist, cut by dikes of diorite and other diabasic rocks.

The Davidson soils are reddish brown or dark red, with deep-red or maroon-red subsoils which have a characteristic friable structure and a smooth, slightly greasy feel, being free from quartz sand. These soils are derived from dark-colored, quartz-free basic or metamorphic rocks such as diabase, gabbro, diorite, hornblende-schist, and basalt, and the parent rocks have usually weathered to a great depth.

The surface soils of the members of the Iredell series are brown or grayish brown to dark yellowish brown, frequently carrying small dark-brown iron concretions. The subsoil is a brownish-yellow to greenish-yellow or olive-colored, extremely plastic, waxy, impervious clay. Disintegrated rock of a greenish-yellow color is usually reached within the 3-foot section. The Iredell soils are derived principally from diorite, and other dark-colored igneous as well as dark-colored metamorphic rocks.

The Worsham series is distinguished by its gray to whitish surface soils, and whitish or mottled yellow and gray or bluish-gray, plastic clay subsoils, sometimes mottled with red. These soils are derived from granite, gneiss, and schist, and occur in poorly-drained basins around the heads of streams.

The soils of the Georgeville series range from grayish or brownish gray to red. The subsoil is invariably a red, compact, brittle silty clay loam to clay. The Georgeville soils are derived from areas of Carolina slate in which the iron content is high. Thin quartz veins are of frequent occurrence, and small, blocky quartz fragments are found scattered over the surface, in addition to thin platy fragments of slate in places.

The members of the Alamance series have gray to whitish surface soils, silty and floury in structure. The subsoil is a yellow, friable silty clay loam to silty clay, usually becoming mottled with red, drab, or gray in the lower part. In poorly drained places the deep subsoil shows light-gray and white mottlings, while on the ridges the red mottling extends throughout the subsoil. Fragments of quartz are scattered over the surface, and give rise to a few gravelly areas. Thin platy pieces of shale are also scattered over the surface, forming occasional slaty knolls.

The terrace or second-bottom soils along the streams consist of old alluvium washed down from the upland drainage basins, and deposited on the flood plains which existed when the streams flowed at a higher level than at present, subsequent cutting of the channel having left the deposits well above overflow. The terrace soils of Newberry County are classed in the Wickham series.

The members of the Wickham series have mellow, gray to grayish-brown or reddish-brown surface soils, and a red to reddish-brown or yellowish-red, fairly compact and friable subsoils. These soils are developed along streams whose drainage basins are almost entirely confined to the Piedmont region.

The soils of the first bottoms represent the present flood plains of the streams. As the drainage basins from which the material has been derived are fairly uniform, the variations in texture and composition are due to differences in the velocity of the currents making the deposits. The first-bottom soils are correlated with the Congaree series and Meadow (Congaree material).

The Congaree soils are uniformly brown to reddish or chocolate brown in color, with very little change in texture or structure throughout the 3-foot profile. Drab mottling may occur in the subsoil in poorly drained places. Mica scales are noticeable throughout the entire depth.

The Meadow (Congaree material) consists of bottom-land soils similar to the Congaree, but having such a wide range in texture as to make separation impracticable. The type is developed mainly along the small streams, where the currents are swift and cross-bedding is of frequent occurrence.

The following table gives the name and the actual and relative extent of each of the soils mapped in Newberry County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil sandy clay loam	111,936	42.4	Georgeville silty clay loam	3,584	2.7
Broken phase	51,072		Gravelly phase	7,104	
Cecil sandy loam	31,232	12.2	Georgeville silt loam	10,432	2.7
Gravelly phase	15,936		Congaree silty clay loam	9,152	2.4
Appling sandy loam	40,576	10.9	Alamance silt loam	8,320	2.2
Gravelly phase	1,408		Congaree fine sandy loam	4,288	1.1
Wilkes sandy loam	35,584	10.2	Davidson clay loam	3,712	1.0
Smooth phase	3,456		Iredell sandy loam	1,856	0.5
Cecil clay loam	19,456	6.7	Wickham fine sandy loam	896	0.2
Gravelly phase	4,032		Rough stony land	704	0.2
Broken phase	2,048		Worsham sandy loam	576	0.1
Meadow (Congaree material)	17,280	4.5	Total	384,640	

CECIL SANDY LOAM.

The surface soil of the Cecil sandy loam is a mellow, yellowish to light-yellow, loamy sand to light sandy loam, with a reddish or brownish-red tint. The subsoil is encountered at 8 to 12 inches as a compact but friable, red sandy clay, which quickly changes to a red clay containing some sand particles. The type is derived from both granite and gneiss, but principally the former. Weathering has taken place to a great depth, but a few bowlders and quartz fragments are found on the surface in places.

In some areas the sandy surface soil is about 15 inches deep and the deep subsoil occasionally has a tendency toward yellow mottling, such as characterizes the Appling soils. Bowlders of granite are of common occurrence in such areas. They occur most prominently along the Whitmire Road, 9 miles from Newberry.

Scattered over the greater part of the type are places, usually on slopes, where sheet erosion has removed the surface soil and brought the clay subsoil so close to the surface that it has been mixed with the soil by the plow. The surface here has a reddish color, and the fields present a spotted appearance.

The Cecil sandy loam occurs scattered over the crystalline section of the county in irregular developments ranging from small rounded or oval areas capping the crests of ridges to extensive areas reaching over the hills and valleys. The largest single bodies are found north of Newberry between Kings and Hellers Creeks, and in the vicinity of Glymphville. Some of the ridge tops are fairly smooth and gently rolling, but part of the type is hilly, although it has not suffered from erosion to as great an extent as the other Cecil soils.

The drainage is naturally well established and both soil and subsoil are well aerated.

This is one of the most important agricultural soils in the county. Most of it is cleared and under cultivation. The forested areas are largely covered with a second growth of old-field pine and a scattered growth of hardwood, white oak and red oak predominating. Cotton is by far the most important crop, with an acreage four times that of corn. Oats, wheat, cowpeas, crimson clover, and bur clover are of secondary importance. Rye, sorghum, sweet potatoes, and melons are grown in patches, and garden vegetables are produced on nearly all the farms. Most farmers have a small orchard containing peaches, plums, pears, summer apples, and grapes. Coarse forage and vetch and peavine hay are produced to some extent. Little use is made of this soil for live-stock farming. Two dairies are situated upon it, but areas of other types are used for pasture.

This soil forms part of some of the best farms in the county, and it is well handled considering the one-crop type of agriculture. It is easy to plow, requiring only light draft, and no difficulty is encountered in working up a good seed bed. The soil dries out sufficiently to cultivate soon after rains. It is usually kept well terraced. Commercial fertilizers are largely depended upon to maintain yields, and during the present shortage in potash there has been a marked falling off. Formerly, when complete fertilizers were available, cotton yielded one-half to 1 bale per acre, and corn 20 to 40 bushels. Oats and wheat give fairly good results. Peavine hay yields 2 to 3 tons per acre. In normal times 500 to 1,000 pounds per acre of an 8–3–3 fertilizer is an ordinary application, and about the same amount of the best grade that can be obtained is used at the present time. No attention is given to liming the soil. Very little manure is used, and organic matter of any kind is seldom turned under. The manure is usually applied to small fields or gardens. Pine needles are used as a fertilizer by some farmers.

This soil is valued very highly, as it is easy to handle, has a fairly smooth surface, and in general is favorably located. The average selling price is about $50 an acre. Areas highly improved or close to towns will bring close to $100 an acre.

The Cecil sandy loam like nearly all the other upland soils is deficient in organic matter, and cover crops, such as cowpeas, clover, vetch, or rye, should be turned under. Where a rotation including these crops is followed and some of them are turned under, liming will prove beneficial. Lime should be applied at the rate of 500 to 1,000 pounds per acre every four or five years to hasten the decomposition of organic matter and improve the soil structure. The type is rarely sour and a very little lime will correct any acidity that exists.

Cecil sandy loam, gravelly phase.—The Cecil sandy loam, gravelly phase, has a surface soil of light-brown to light-yellowish, rather mellow fine sandy loam, passing at 6 to 10 inches into red sandy clay or clay which is fairly compact but friable. The gravel, which consists of quartz fragments ranging in diameter from about 1 inch to several inches, is confined to the surface soil, very little being found in the subsoil. In some places the surface is entirely covered with gravel while in others there are only scattering pebbles, and many small low places or swales are fairly free from any gravel or stones. In many fields the larger stones have been removed and piled along the margin or thrown on the hillsides, which are usually in woods or pasture.

This soil is derived from schist and gneiss in which there are numerous veins of quartz. The latter, being harder, has escaped disintegration by weathering and is left as a residue. The other parent-rock material is deeply weathered and is rarely encountered within the 3-foot profile.

The Cecil sandy loam, gravelly phase, is encountered in what is known as the "stone hill section," several miles wide, lying north of the slate belt, just south of Prosperity and about 6 miles south of Newberry. The phase occupies rather flattened or smoothly rounded ridges and hilltops, and to some extent gently sloping hillsides. The area has a rapid run-off, but the stone protects the surface from erosion. The gravel and stone also serve as a mulch to retain moisture in the soil.

The Cecil sandy loam, gravelly phase, is not an extensive soil, but it is fairly important in the agriculture of the county, as most of it has been cleared and placed in cultivation. The uncleared areas are forested with shortleaf pine and a scattering of hardwoods, mainly white and red oak. The system of farming is fairly well diversified, but cotton is still the leading crop, with corn and oats next. Wheat, crimson clover, vetch, and cowpeas are grown quite extensively, and sorghum, sweet potatoes, and forage crops are produced in small fields. The farms generally have a garden and a home orchard. Hogs are kept in small numbers, and the poultry industry is of some importance.

This soil is fairly productive, owing in considerable measure to the natural mulch formed by the gravel. Cotton yields one-half to 1 bale per acre, and corn, wheat, oats, and clover all give good yields.

Where the larger stones have been removed this soil is easily plowed, and disk harrows and cultivators can be used to advantage. In stony areas, however, plowing is sometimes difficult, and spring-tooth harrows must be used. Some attention is given to improving the productiveness of the soil by turning under organic matter,

such as a crop of rye or clover or clover stubble. Manure is used only occasionally, as the supply is barely large enough for the gardens. None of the farmers apply lime. Commercial fertilizer of an 8–3–3 grade is used in normal times, at the rate of 200 to 700 pounds per acre. Most of it is applied to cotton.

This soil has a fairly high value, as it is located in a community where the farms are small. It is held for $45 to $75 an acre.

Farming methods on this phase are better than the average for the county. More leguminous crops are grown, and green vegetation is turned under at shorter intervals. A larger acreage could profitably be devoted to crimson clover, cowpeas, velvet beans, and vetch. Good results would follow the use of lime, which should be applied at the rate of about 1,000 pounds per acre every four or five years.

CECIL SANDY CLAY LOAM.

The Cecil sandy clay loam is a brown to reddish-brown sandy loam to sandy clay loam, mellow to friable in structure, grading at 4 to 8 inches into red, friable sandy clay to clay which becomes heavier and more compact with depth. The variations in the depth of the sandy surface material causes the fields to have a spotted appearance, the places where the clay comes close to the surface showing up red against the gray to grayish-brown spots where the sandy material is deeper. This spotted appearance is due to some extent to included patches of sandy loam and clay loam. This soil is derived from granite and gneiss, which have weathered to a great depth. Only a few scattered fragments of quartz are found on the surface in places.

The Cecil sandy clay loam is the most extensive soil in the county. It occurs in large areas in nearly all parts of the granitic section, occupying ridge tops, hillsides, and gentle slopes, with a topography varying from fairly level or only gently rolling to hilly. The drainage is everywhere thorough. Owing to its wide distribution and large extent, this is an important soil. About 80 per cent of it is cleared and cultivated. In the forested areas there is largely a second growth of shortleaf pine, with a scattering of oak and other hardwoods. Cotton is grown on an acreage about twice that of all other crops combined, and corn occupies an acreage about one-fourth that of cotton. The remainder of the cultivated land is devoted to oats, wheat, clover, and cowpeas. Sorghum, potatoes, and forage crops are grown in small fields. Home orchards of peaches, plums, pears, and grapes are found on most farms. Hogs are raised by nearly every farmer, but few cattle are kept.

Good yields are obtained on this soil wherever any attempt is made to keep up the productiveness. Cotton in an ordinary season yields one-half to 1 bale per acre, corn 25 to 40 bushels, wheat 13 to 20

bushels, and oats 20 to 30 bushels. As much as 40 bushels of wheat per acre have been obtained. Alfalfa is reported to yield 2 to 3 tons per acre. Cowpeas make heavy yields of hay. On some of the run-down farms not more than one-fourth to one-half bale of cotton per acre is obtained, and yields of corn are correspondingly low.

This soil is almost as easily handled as the Cecil sandy loam, and it is readily worked into a good tilth with the disk harrow. The plow reaches the subsoil in most places, bringing some of the clay to the surface. As most of the type is put in cotton each season, little rotation is possible. The clean cultivation that is given leaves the fields comparatively free from weeds, but in the process vegetable matter that otherwise would be incorporated is lost to the soil, so that the latter is deficient in humus. Little effort is made to plow under green crops or even clover stubble. The ground is left bare during the winter except for the cotton stalks, which are broken in the spring with a chopper or by hand, and turned under when the land is prepared for the coming cotton crop. Fertilizer is used for most crops, about 300 to 700 pounds per acre being applied for cotton and a smaller amount for corn. Nitrate of soda is used in small quantities as a top dressing for oats. None of the farmers make a practice of liming the soil, although it would be considerably benefited by the application of 1,000 pounds of lime per acre every four or five years. Manure is used to a small extent, mainly for corn and on small patches around the house.

The selling price of this land varies according to the location and the state of productiveness. Some of the "worn-out" farms in remote sections of the county sell for $15 to $25 an acre, but the average valuation is $40 to $45 an acre. Improved land and areas near towns are held for $50 to $100 an acre.

The Cecil sandy clay loam is naturally a strong soil, but the greater part of the type needs more organic matter and lime to improve the physical condition and make more plant food available. The soil is well suited to the ordinary crops, but more legumes should be grown. Alfalfa does well where the seed bed is properly prepared, and cowpeas, crimson clover, bur clover, vetch, and velvet beans are well suited to the type. The surface soil should be deepened by slightly increasing the depth of plowing each season. Care should be exercised, however, as the plow reaches the clay subsoil in most places, and causes puddling or the formation of a "hardpan," just below the depth of plowing, if the ground is too wet. This hardpan prevents plants from drawing water from the subsoil. Shallow cultivations seldom cause damage, as the clay content in the surface material to a depth of a few inches is not very high.

Cecil sandy clay loam, broken phase.—The broken phase is essentially the same as the typical Cecil sandy clay loam, except that it

occupies hillsides and broken areas along streams, and has suffered severely from erosion. The phase is most extensive in the northern part of the county, around the headwaters of Indian Creek and Gilders Creek, and in the Whitmire and Maybinton sections. Eroded and gullied places are common, but over large areas the phase has not suffered seriously from erosion. Some areas of Wilkes soil too small to map are included with the phase as mapped.

Most of this soil remains in forest, largely second-growth pine with a scattering of hardwoods. The cleared areas are cultivated to cotton and corn, the former occupying by far the larger acreage. The cultivated fields are usually well terraced, but the terraces are difficult to keep up. This soil can be used to best advantage by leaving the roughest areas in forest. Fields which are most subject to erosion or most difficult to keep terraced should be seeded to Bermuda grass and used for pasture. Where this soil is to be cropped it would be well to keep the terraces sodded, and cover crops should be kept on the ground at all times. In most respects the phase can be improved by the same methods as the typical Cecil sandy clay loam.

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

Mechanical analyses of Cecil sandy 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.*
243034	Soil	3.0	16.3	10.4	35.2	9.8	12.6	12 8
243035	Subsoil	2.6	6 7	3.4	11.0	3 7	20.8	51.9

CECIL CLAY LOAM.

The surface soil of the Cecil clay loam is a red to reddish-brown, somewhat mellow clay loam, grading at 3 to 6 inches into a compact but fairly friable subsoil of red clay. Both soil and subsoil contain some sand. The type is derived from granite, gneiss, and diabasic rocks which contain a few thin quartz veins, but the parent rock is deeply weathered, leaving only a few quartz fragments scattered on the surface.

The Cecil clay loam is scattered over the crystalline section of the county, in rather isolated areas. The largest are situated in the vicinity of Pomaria, to the north of Cannons Creek and south of Crimes Creek, and between Pomaria and Kibler. Fairly large areas are found in the Maybinton section, and smaller areas are scattered over other parts of the county. The type has less surface relief than most of the Cecil soils, the topography ranging from gently undulating to rolling or gently sloping. Owing to the close structure of

the subsoil, most of the rain water is forced into surface drainage channels, and during heavy rains considerable washing takes place.

This is an important soil type, although it is not so extensive as some of the other Cecil soils. It is naturally a strong soil, but owing to its heavy texture it has not been popular with tenant farmers until the recent shortage in potash. It produces about as well without potash fertilizers as it did when they were used.

The greater part of this type has been cleared and is under cultivation. The forested areas support a second growth of shortleaf pine. There was originally a heavy growth of hardwoods, as is shown by the few trees that remain of the original forest. White oak, red oak, poplar, hickory, walnut, ash, and dogwood are found in places.

Cotton is the chief crop on this soil, corn occupying a much smaller acreage. Oats and wheat are grown more extensively than on the other Cecil soils. Small fields are devoted to cowpeas, bur clover, vetch, sorghum, and forage crops, and all the common vegetables are grown in gardens. The live-stock industry is not well developed, few cattle being raised.

Cotton ordinarily yields one-half to 1 bale per acre. Very little of this land fails to yield one-fourth bale. Corn yields 15 to 35 bushels per acre, depending on the productiveness of the field and the cultivation given. Wheat and oats do fairly well, and clover gives fairly good yields where a stand can be obtained.

Most of the farmers keep the terraces on this soil in good condition, repairing and plowing out the water furrows each spring. Very little manure is used except for small, intensively farmed fields or gardens, and lime apparently is not used at all. Fertilizer is employed in small quantities, but never to the same extent as on the sandier soils. About 300 to 500 pounds of a good grade of fertilizer is applied for cotton.

Land of the Cecil clay loam sells for $40 to $45 an acre except where the farm is "run down" or is located in the less desirable situations, in which case the price is $15 to $30 an acre. Some farms well improved or desirably situated sell for as much as $100 an acre.

The Cecil clay loam is deficient in organic matter, and it needs this material more urgently than do the lighter soils. The farmers should make a practice of turning under cowpeas, clover, vetch, or rye, the mere growing of which adds nitrogen to the soil. Lime should be applied at the rate of one-half to 1 ton per acre every four or five years, to loosen up the soil and make more of the potash available to plants. With proper farming methods and the plowing under of organic matter little or no fertilization would be necessary. This soil is difficult to handle, and more care should be taken in plowing and cultivating, since clodding results from plowing when the soil is too wet, and the injurious effect is felt for

many seasons. The plowing done is usually too shallow to give best results, and should be gradually deepened.

Cecil clay loam, broken phase.—The broken phase differs from the typical Cecil clay loam in occupying slopes and steep positions along streams, where severe erosion and gullying have taken place. The largest and most characteristic areas are found in the Maybinton section fronting upon Tiger, Broad, and Enoree Rivers, where gullying has reached to the backbone of the ridges in many cases. Much of this land has been washed and gullied through neglect.

Most of the Cecil clay loam, broken phase, is covered with a second growth of pine, interspersed with a heavy stand of hardwood in places. The cleared areas are devoted mainly to cotton. Crops give lower yields than on the typical Cecil clay loam, although the farming methods are essentially the same. Terraces are difficult to keep up on this soil, and badly gullied areas should be left in forest. Where erosion is becoming active the soil should be seeded to Bermuda grass and used for pasture. In cultivated areas the terraces should be sodded and cover crops grown as often as practicable.

Cecil clay loam, gravelly phase.—The gravelly phase of the Cecil clay loam contains a quantity of quartz gravel and stones scattered over the surface and through the upper few inches of soil, the subsoil being fairly free. Most of the gravel is tarnished with red and rusty colors. The stones are usually larger on the hillsides than in the more nearly level places. The phase occurs where numerous quartz veins were left as a residue when the softer parent rock weathered. It is mapped in small areas scattered throughout the typical Cecil clay loam, occupying rounded elevations standing slightly above the general level. Between Little Mountain, Pomaria, and Kibler the surface soil contains a noticeable amount of fine sand in many places. In the "stone hill" section, south of Prosperity, where the phase occupies depressions and to some extent flattened ridge tops in the Cecil sandy loam, the surface soil contains some medium to coarse sand. The quartz fragments in the "stone hill" section are larger and whiter than elsewhere.

The Cecil clay loam, gravelly phase, is spoken of locally as "grit cotton land," and it is recognized as well suited to cotton. Most of it is cleared and under cultivation, devoted to about the same crops as the typical Cecil clay loam. It is slightly more productive than the typical soil, and it is not so susceptible to erosion, as the gravel prevents washing to some extent. It also forms a mulch that helps conserve moisture.

APPLING SANDY LOAM.

The Appling sandy loam has a light-yellow to yellowish-brown loamy sand surface soil, about 6 to 8 inches deep, grading into a

transition zone of yellow, friable, fairly heavy sandy loam. The subsoil is encountered at 12 to 20 inches and consists of a yellow, compact, and friable sandy clay to clay, mottled with red. The subsoil becomes somewhat tough in the lower part of the 3-foot profile. There is very little gravel in this soil.

Small areas are encountered north of Newberry, usually on the caps of ridges, where the surface soil consists of 20 to 26 inches of loamy sand to sand, separated by only a few inches of yellow sandy loam from the characteristic mottled yellow and red subsoil. In small areas elsewhere the surface soil is a gray, heavy sandy loam, 4 to 6 inches deep, underlain by a yellow, friable sandy clay loam, which passes quickly into the characteristic subsoil. These heavy areas are widely scattered and usually occur in slight depressions.

The Appling sandy loam is derived principally from granites and is extensively developed over the granitic section of the county. The bedrock is deeply weathered, but a few granite bowlders are found in places, and where sufficiently abundant are indicated on the map by stone symbols. Small areas over the northern three-fourths of the county are derived in some cases from gneiss.

The type occurs in some rather large areas, as north of Newberry along the road to Kinards for about 3 miles and along the Whitmire Road for 7 miles. It covers wide stretches of fairly level to gently rolling upland, and only a very small part of the type is hilly, broken, or rough. Drainage is well established, owing to the sandy nature of the soil, and in some places might be considered excessive, but erosion is less active than upon any of the other upland soils. Small drainage ways, with shallow basins, reach well back into the type.

The Appling sandy loam is one of the principal agricultural soils in the county, nearly all of it being cleared and under cultivation. The uncleared areas are forested largely with a second growth of old-field pine. In other woodlots there is a predominance of oak, with a scattering of other hardwood trees. Some scrub oak is found in the sandier places.

Cotton is grown upon a larger acreage than all other crops combined. Corn and oats come next in importance. Wheat, crimson clover, cowpeas, velvet beans, vetch, rye, sorghum, coarse forage, sweet potatoes, and melons are grown in small patches. As there are many homesteads on this soil, gardens and small orchards of peaches, plums, pears, and summer apples are numerous.

Under normal conditions, when potash fertilizers are available, this soil yields about one-half to 1 bale of cotton per acre. Corn ordinarily yields only 10 to 30 bushels per acre, and yields of small grain are not very heavy as a rule. Cowpeas, vetch, and velvet beans make

good returns. Grasses have a tendency to "burn out" in dry seasons.

This soil is easily handled, as it requires only light draft, and plowing and cultivation can be done relatively soon after rains. The farmers seldom turn under cover crops or use manure, and the soil is deficient in organic matter. No lime is used, and most of the type is sour, as is evidenced by the growth of sour grass (sorrel?) in fallow fields. A large part of the type is rented and has been allowed to run down, fertilizers being relied on to keep up the yields. As much as 500 to 1,000 pounds per acre is used in some places.

Owing to its location near towns and main roads, this soil has a high selling value. It is held for $20 to $75 an acre, according to the location and state of improvement.

In addition to plowing under organic matter, this soil should be limed once in every four or five years, especially where it is difficult to get a stand of clover. The type is well suited to the legumes, and cowpeas, velvet beans, and vetch should be grown much more extensively. The type is used successfully in some sections for the production on a large scale of a high grade of light tobacco. Complete fertilizers should be used for nearly all crops. Such fruits as peaches, apricots, plums, and grapes are well suited to this soil.

Appling sandy loam, gravelly phase.—In the gravelly phase of the Appling sandy loam a large quantity of blocky and angular quartz fragments, ranging from less than 1 inch to several inches in diameter, are scattered over the surface and throughout the soil, almost covering the surface in places. The phase occurs mainly in small, oval areas along the northern edge of the "stone hill" section. The surface is more rolling or hilly than that of the typical Appling sandy loam, and drainage is well established, although there is no active erosion.

A large percentage of this phase is forested. The tree growth is practically the same as that on the typical soil, except that there is more hardwood. Cotton and corn are grown on most of the cultivated areas. Yields compare favorably with those on the typical soil, as the gravel does not materially interfere with cultivation and forms a mulch that helps conserve the moisture.

WILKES SANDY LOAM.

The Wilkes sandy loam has a surface soil of grayish-yellow or light-yellow loamy sand, containing some small quartz fragments, small pieces of blocky feldspar, and small rounded iron concretions. The subsoil is encountered at 6 to 12 inches, and consists of a mottled light-gray and red, plastic clay which often loses its mottled appear-

ance below 20 to 24 inches, passing into a whitish, plastic, sticky clay which contains a few red streaks. Partly decomposed aplitic granite, representing the parent rock, is usually encountered below 30 inches.

A number of variations are encountered in this soil. In a few places, mainly south and southwest of Newberry, areas containing a quantity of quartz gravel are scattered along the northern edge of the "stone-hill" belt, while in other places, usually near the Davidson and Iredell soils, the type contains a quantity of small iron concretions. In the northern part of the county, northeast of a line from Pomaria to Whitmire, the surface soil seems to have a brown tinge and there is more red and brown in the subsoil, this part of the type resembling the Mecklenburg soils. In the general region of Cannons Creek, south of St. Phillips Church, and also in the Maybinton section, the soil has a noticeable content of mica, and is known as "isinglass land."

The Wilkes sandy loam is derived from aplitic granite (quartz and feldspar) and schist, cut by dikes of diorite, gabbro, and diabase. It is developed in nearly all parts of the county north of the slate belt in irregular areas ranging from more or less broken to rolling. The type occupies hillsides that in most cases are fairly steep, and in places it is found on rolling ridge crests and hilltops. Surface drainage is well established, but the underdrainage in places is restricted by the close texture of the subsoil, so that seepage comes out farther down the slope. Erosion is fairly active, and many of the steeper slopes are gullied.

About half of this type is cleared and either cultivated or in pasture or fallow. The growth in the wooded areas is made up of pine and oak, with a scattering of other hardwood trees. The type is of little importance as an agricultural soil. About one-third of the cleared area is in pasture, which consists of Bermuda grass and the native grasses. Possibly another third is lying idle, covered with a growth of weeds and sour grass. These fields have been abandoned only since the beginning of the present potash shortage, since there are no briers or brush such as is common on fields abandoned for more than a year or two. Cotton is still the leading crop, corn being grown on a much smaller acreage. Oats, wheat, rye, cowpeas, and sorghum are grown to a very small extent. Some cattle and hogs are kept.

Yields on this soil have fallen off to a very marked degree since the beginning of the present potash shortage. Cotton yields one-fourth to one-half bale per acre, whereas formerly, with high fertilization, the yields ranged from one-half to three-fourths bale. Corn gives 15 to 25 bushels per acre, and yields of wheat and oats are cor-

respondingly low. Most of this land is rented, and since potash fertilizers became scarce tenants have been hard to find. Little or no attempt is made to build up the soil by turning under cover crops, sod, or stubble, and very little manure is plowed in. About 250 to 500 pounds per acre of any good fertilizer that can be obtained is used for cotton at present. Complete fertilizers are depended upon in normal times to keep up the productiveness. Pine needles are occasionally plowed under as a substitute for fertilizer. The cultural methods on this type are essentially the same as on the other sandy soils. Terraces are used to check erosion, but they are not always kept in the best condition.

The soil in general is not valued very highly, selling for $15 to $20 an acre. Some of the better improved areas run as high as $35 an acre.

The Wilkes sandy loam is deficient in organic matter, and generally sour. About 1 ton of lime per acre should be used every four or five years to sweeten the soil. Liming would enable the legumes to do much better. Cover crops, preferably the legumes, should be turned under occasionally to increase the content of organic matter. A complete fertilizer should be used for all crops when it is available, but with proper liming and the addition of organic matter the amount of fertilizer used can be materially reduced. The steeper areas of the type, especially when deeply gullied, should be left in forest. Where a field is being eroded it should be seeded to Bermuda grass and used for pasture. Many areas that are now cultivated would do better in pasture, as the grass carpet would serve to check erosion and in this way protect the higher lying soils (usually the Cecil) from ultimate erosion. By using this soil for pasture more stock can be kept, and the smoother soils can be more intensively cultivated.

Wilkes sandy loam, smooth phase.—The smooth phase is practically the same as the typical Wilkes sandy loam in texture and structure, except that the sandy surface material is somewhat deeper. The phase, however, is smooth, in contrast to the broken surface of the typical soil. It occupies fairly level to gently rolling ridges and hilltops and gently sloping hillsides. It usually occurs in rounded or oval-shaped areas marking the outline of the ridges or hills. Surface drainage is usually well established, but the under drainage is not so thorough. The phase is found in its largest and most typical development in the vicinity of Prosperity. Nearly all of it is cleared and under cultivation, although there are a number of abandoned fields. The soil is better suited to cultivated crops than the typical Wilkes sandy loam, and yields range slightly higher, owing to better handling and more liberal fertilization. The same general farm crops are grown, but a relatively larger acreage is devoted to legumes,

such as clover, cowpeas, and vetch, and to small grains. The selling price of most of this land ranges from $20 to $45 an acre. A few farms near towns are held for as much as $75 an acre.

The same methods should be used for improving this soil that are suggested for the Appling sandy loam, and even more lime should be used.

DAVIDSON CLAY LOAM.

The Davidson clay loam has a surface soil of dark reddish brown to chocolate-brown, mellow clay loam, 5 to 10 inches deep, underlain by a subsoil of reddish-brown or maroon-colored, smooth, brittle clay, fairly compact and containing small dark spots due to disintegrated fragments of hornblende.

The Davidson clay loam is derived from basic igneous or quartz-free rock and hence contains very little sand or quartz fragments. The surface soil in places, however, contains some sand and quartz, derived from the granites which give rise to the associated types. This kind of material is most noticeable in the smaller areas or along the margins of the larger ones. Black fragments of the parent rocks, diorite, gabbro, hornblende schist, and other diabasic rocks, are often scattered over the surface, and are almost characteristic of this soil. Quantities of small iron concretions are found in places, and bowlders occasionally outcrop. The parent rock, however, is seldom encountered in the 3-foot profile, as it is deeply weathered.

The Davidson clay loam occurs principally in small, scattered areas south of Newberry. Fairly large developments are found in widely removed places, probably the largest and most typical area being that between Mollohon Mill and Ebenezer Church. Other areas are found 1 mile south of Silverstreet, 2 miles north of Oldtown, on the south side of Little River, near the road from Bush River Church to Vaughnsville, along the road from Chappells to Dysons Bridge, and west of Kibler.

The type has a fairly uniform gently rolling surface, and is one of the few upland soils that is not accompanied by a broken phase. It has good drainage. Practically all the type has been under cultivation, even the few wooded areas showing evidence of former tillage. Some fields are said to have been in constant cultivation since the Civil War. The forested areas support a second growth of shortleaf pine, but the few remaining trees of the original forest, found along roads and in yards, attest to the once heavy growth of oak and other hardwoods.

This soil is used extensively for cotton, only a small acreage being planted to corn. Of the minor crops, clover and cowpeas probably occupy the largest acreage. Wheat and oats have been grown more

extensively this season than formerly, but their acreage is still almost negligible as compared with that of cotton. Very few gardens are set out on this soil.

Cotton yields from one-half to 1 bale per acre, depending upon the season, the fertilizer used, the cultural methods, and the condition of the soil. On some of the old plantations where the soil has been cropped to cotton for many years, on most of the rented farms, and on areas that are considered "worn out," the yields scarcely reach one-half bale. Corn ranges from 20 to 45 bushels per acre. No accurate estimate can be made as to the yields of the other crops, but they all apparently give good returns.

The Davidson clay loam is known locally as "push land," from the way it pushes from the plow. On account of its heavy nature it has not been very popular with renters until the present shortage of potash, during which it has been found to yield much better than the sandy soils without the use of this ingredient. Much of the type has been depleted of organic matter by the one-crop system of farming until it is not only much harder to handle, but the yields are low. This is particularly true of the rented farms, where cotton is grown continuously and no effort is made to build up the land. On some of the better farms where clover or cowpeas have been grown yields are much higher. The type is handled in about the same way as the heavier soils of the Cecil and Georgeville series. Fertilizers are used in about the same proportion, about 300 to 600 pounds per acre of an 8–3[4] mixture being applied in 1918. Some farmers report that yields are practically the same as when an 8–3–3 grade was used. Some stable manure is plowed under for corn, in addition to 250 to 500 pounds of the same grade of fertilizer that is used for cotton.

Land of the Davidson clay loam is valued at $45 to $65 an acre throughout most of the county. Near towns, however, even where it is in a run-down condition, it is valued at $65 to $75 an acre. Improved farms near towns are valued as high as $100 an acre.

This soil needs more organic matter, and cowpeas, clover, or some cover crop should be turned under. The soil can be improved by liming, and about 1,000 pounds of lime per acre should be applied every three or four years. If this is done and leguminous crops are included in a proper rotation, very little fertilizer will be needed. The addition of organic matter and lime will make the soil more loamy and more easily cultivated. Alfalfa has been successfully grown on this soil in other sections of the State, and there is every reason to believe that it would succeed on areas in this county that are not too low in organic matter. Inoculation, however, might be necessary.

[4] Eight per cent phosphoric acid, three per cent nitrogen.

IREDELL SANDY LOAM.

The soil of the Iredell sandy loam is a dark yellowish brown to brown mellow sandy loam, 5 to 8 inches deep, passing abruptly into a subsoil of heavy, plastic, dull-yellow or drab-yellow, waxy clay, which becomes sticky when wet. At 20 to 30 inches a partially decomposed greenish-yellow diabasic rock, dry and friable, is encountered. Unweathered parent rock underlies the type at varying depths. The harder bedrock is sometimes encountered within the 3-foot section, but stone seldom occurs on the surface. In nearly all places small quantities of iron concretions are scattered over the surface and through the soil, and in many places it contains a high percentage of these concretions.

In the more nearly level stretches or in low places the surface material may grade to a loam, but it usually contains enough concretions and sand to resemble a sandy loam. These loamy areas are derived from a less silicious rock, and they are confined to the large development of the type west of O'Neall Bridge. In the vicinity of Maybinton the soil occasionally contains a noticeable percentage of fine sand.

The Iredell sandy loam occurs in isolated areas, usually 20 to 40 acres in extent, scattered over the central and northeastern parts of the county. The largest developments are mapped 4½ miles west of Newberry, at the junction of Little River and Mudlick Creek and adjoining the Union County line west of Maybinton. The type is derived from intrusive dikes of igneous basic rocks, such as diorite, diabase, aplitic granite, and hornblende schist.

A fairly level to gently rolling surface is characteristic of this soil. In only a few places along streams could it be called hilly, and gullies are seldom met with. The surface drainage is usually adequate except in a few low spots and in the flatter areas, but the impervious subsoil causes poor underdrainage. In the northern part of the county little of the type is used for agriculture. It remains forested with shortleaf pine and blackjack oak, with a scattered growth of oak, sweet gum, and other hardwoods. These wooded areas are used to some extent for pasturing cattle. In the central part of the county most of the type is under cultivation, but it is not important from an agricultural standpoint. Some corn, oats, and wheat are grown, but cotton is by far the most important crop. Some difficulty is experienced with both the leading crops. Cotton has a tendency to rust, and corn to french. Cotton ordinarily yields about one-fourth to one-half bale per acre, and corn 10 to 25 bushels. Oats and wheat do not make very good yields except in the loamy areas.

This is the most difficult type in the county to handle on account of its tenacious subsoil, and it is less popular with renters than any

of the other soils. It is cultivated in practically the same manner. In the northern and eastern parts of the county, where much of the type is uncleared, it is valued at $5 to $15 an acre. In the southern part, where it is associated with the Davidson soils, it is valued at $25 to $45, as it forms parts of large holdings that are more desirable and better located.

This soil in general is not properly handled. It is deficient in organic matter, and cover crops should be turned under, followed by the application of about 1 ton of lime per acre every few years. This would correct the acidity and improve the physical condition of the soil. The ground should be plowed in the fall, so as to permit freezing to pulverize the soil and make it absorb as much water as possible. This is necessary because of the shallowness of the layer of soil capable of storing water. Following this treatment fair yields of cotton, corn, oats, and wheat should be obtained without the use of fertilizers, and good yields with the use of small amounts. An application of about 400 pounds of kainit per acre is the best means of preventing rusting and frenching, but it can not be resorted to until normal fertilizer conditions are restored. This soil is not adapted to clover or alfalfa, but cowpeas give fairly good results and should be grown more extensively.

WORSHAM SANDY LOAM.

The Worsham sandy loam consists of a dark-gray to gray or bluish-gray sandy loam, passing at 8 to 12 inches into a light-gray or bluish-gray, sticky sandy clay loam, which is partially water-logged in the lower part. This material approaches a sandy clay or clay in texture and contains whitish, drab, and faint-yellowish mottlings. The surface soil dries out to a light-gray or almost white color. In some places considerable sand has washed in from the higher surrounding soils, and the texture is coarser than the average. In many places near towns the underlying clay material has been used for the manufacture of bricks, and the pits are partially filled with debris and water.

This type occupies low, flat areas or depressions around the heads of streams, in the crystalline-rock section of the county. It occurs in areas of 10 to 20 acres, usually in close association with the Appling soils. The surface is level or gently sloping toward the stream channel, and the type in general is poorly drained. It is usually marked with crawfish holes.

About one-half of the type is cleared, and either in pasture or cultivated. The cleared areas have been ditched but are only fairly well drained owing to seepage from the higher surrounding upland.

Shallow ponds are of frequent occurrence in the uncleared and undrained areas.

The native growth on the Worsham sandy loam consists largely of pine and sweet gum, with a dense underbrush of brambles and briers. Bulrush is found in poorly drained spots in the cleared areas.

This type is of small extent and it is not important agriculturally. Both the cleared and uncleared areas are used largely for grazing cattle and hogs. Most of the cleared areas are in pasture, and the native grass furnishes good grazing even in dry seasons. Corn and oats are the only crops grown. Corn yields 15 to 30 bushels per acre, according to the degree of drainage and the season. During wet weather the crop is occasionally "drowned out."

The soil is not depended on to any extent for the staple crops. Usually all the adjacent upland is used for cotton, forcing the other crops upon the less desirable soils such as this. In a few instances the type has been plowed into "lands" to facilitate surface drainage, but shallow open ditches are usually depended on.

This soil probably can best be used for hog and cattle pasture, which does not involve expense even for drainage further than providing an open ditch to keep water from standing over the entire surface. Most of the type is already supplied with ditches.

GEORGEVILLE SILT LOAM.

The surface soil of the Georgeville silt loam is brown, yellowish-brown, or reddish mellow silt loam, 6 to 8 inches deep. The subsoil is a compact, stiff, red silty clay. It frequently begins as a reddish-brown, friable silty clay loam, but this quickly passes into the typical subsoil material. Small quantities of quartz and slate fragments are scattered over the surface, particularly in the more rolling and sloping areas, where the soil occasionally approaches a gravelly loam. There are extensive areas, however, entirely free from gravel. The slate rock from which this soil is derived has weathered deeply, and it is reached within the 3-foot section only on some of the steeper slopes where erosion has been quite active.

The Georgeville silt loam is scattered over the "slate belt," and rather extensive areas are mapped to the south of Little Mountain, extending west from the Lexington County line to the Steel Bridge Road. The surface varies from almost level, through gently rolling and sloping, to hilly and even broken. Drainage is good except in a few depressions near stream heads.

The Georgeville silt loam is an important soil in the southeastern part of the county, probably 65 to 75 per cent of it being cleared and under cultivation. The forested areas are covered principally with shortleaf pine and oak. Cotton, the leading crop, yields about one-half to one bale per acre, depending upon the amount of fertilizer

used and the methods of cultivation. Corn ranges from 20 to 40 bushels per acre, oats from 20 to 45 bushels, and wheat from about 10 to 15 bushels. Some oats, cowpeas, clover, and vetch are grown, while sorghum, sweet potatoes, and vegetables are produced for home consumption. A small orchard of peaches, plums, pears, and apples is found around every well-established home.

The farming methods on this soil are perhaps better than the average for the county, as the type occurs in one of the most prosperous agricultural sections, south of Prosperity, where the farms are generally small and a diversity of crops is grown. Leguminous crops are plowed under, to increase the organic content of the soil, more extensively than in most parts of the county. About 300 to 800 pounds of commercial fertilizer per acre is applied to cotton, while a top dressing of nitrate of soda is usually given the grain crops.

The selling price of this land varies from $40 to $75 an acre, depending upon the condition of the farm and its location with respect to transportation facilities.

The Georgeville silt loam is well suited to clover, cowpeas, velvet beans, and vetch, in addition to the staple crops. It is naturally a strong soil and capable of being built up to a high state of productiveness. Deeper plowing, more thorough preparation of the seed bed, and the addition of organic matter are necessary for best results. It is probable that a liberal application of lime every three to five years would increase yields. The more broken areas of the type should remain forested, or if cleared should be seeded and used for pasture.

GEORGEVILLE SILTY CLAY LOAM.

The surface soil of the Georgeville silty clay loam is a dark-brown to red silty clay loam to heavy silt loam, 3 to 6 inches deep, underlain by a deep-red, heavy clay loam to silty clay, compact and rather stiff in structure. The slate rocks giving rise to this soil have weathered deeply, and only on slopes and in eroded areas is bedrock encountered within the 3-foot section. Quartz fragments and a smaller amount of slate fragments are scattered sparingly over the surface.

This type is mapped in the southeastern part of the county, occupying rather large, irregular areas which follow in the main the broader ridges and divides. The largest areas are found on the hills some distance back from the Saluda River in the vicinity of Steel Bridge, Big Creek, and Bush River. The surface prevailingly is gently rolling to undulating, becoming somewhat broken and rolling as the streams are approached. The rougher and more broken areas occur along the Saluda River, Bush River, Big Creek, and some of the smaller streams. If of sufficient size they would be

separated on the soil map as a broken phase, to correspond with the broken phase of some of the Cecil soils. The Georgeville silty clay loam is everywhere well drained, and the run-off on the slopes has produced some gullying.

Only a small percentage of this soil, principally the more rolling and broken portion, is in forest, the growth consisting of shortleaf pine and oak. With the exception of small Bermuda-grass pastures, all the smoother areas of the type are under cultivation, devoted largely to cotton.

Yields of cotton range from one-fourth to three-fourths bale per acre. Corn yields 20 to 35 bushels, oats 20 to 45 bushels, and wheat 10 to 20 bushels. Bur clover and cowpeas do well. Some vetch and sorghum are grown. Fertilizer practices are about the same as on the Cecil soils. Some of the farmers report that yields have been fairly good without the use of potash fertilizer.

This land is valued at $20 to $45 an acre, with a few desirable farms ranging as high as $75 an acre.

The Georgeville silty clay loam is naturally a strong soil and capable of improvement, but owing to its heavy texture and low content of organic matter it is somewhat difficult to handle. The structure could be greatly improved by adding coarse manures or turning under green-manuring crops such as cowpeas and clover. The growing of these legumes would not only supply the necessary organic matter, but would furnish sufficient nitrogen to produce good crops without the use of a nitrogenous fertilizer. This soil should be plowed deeper, thoroughly pulverized, and given liberal applications of lime. Erosion is active on the steeper slopes, and terracing is necessary to prevent the ruining of the fields for general farming purposes. The steep slopes should either be seeded and used for pasture or remain forested.

Georgeville silty clay loam, gravelly phase.—The surface material of the gravelly phase is practically the same as that of the typical Georgeville silty clay loam. The gravel is composed almost entirely of blocky or angular quartz fragments which vary in diameter from less than 1 inch to several inches, but there are some slate fragments in places. The gravel is usually scattered over the surface, and in some places entirely covers the surface, but it forms a very small part of the soil or subsoil mass.

This phase has been developed where quartz veins were large or numerous, and is the predominating soil in a broad strip in the northern part of the "slate belt." Beginning near Little Mountain this strip broadens to the west, the northern boundary following the northern edge of the slate belt, and the southern boundary running in a general direction to the mouth of Bush River. The phase is found in other parts of the slate belt, closely associated with the

typical silty clay loam. Its surface ranges from gently rolling to hilly. The phase is divided by numerous small streams into comparatively narrow ridges with a somewhat flattened or gently rolling crest and fairly steep sides. Drainage is thorough, but the gravel prevents active erosion.

A large part of this phase is cleared and under cultivation, but most of the steep hillsides are still in forest. There is more hardwood than on the typical soil, since the forest on the latter is largely second growth. The phase is known locally as "grit land," and it is considered well suited to cotton. The same crops are grown as on the typical soil, and the yields range slightly higher. Agriculture is more diversified, as the farms are small and the minor crops are more extensively grown. The gravel does not interfere seriously with cultivation, but forms a mulch, which helps conserve moisture and is largely responsible for the increase in yields over the main type.

The more nearly level portions of the Georgeville silty clay loam, gravelly phase, are held at a relatively high price, about $45 to $65 an acre. The rougher areas are much lower in value. The same means can be used to improve this soil that are suggested for the Cecil sandy loam, gravelly phase.

ALAMANCE SILT LOAM.

The soil of the Alamance silt loam is pale-yellow, floury silt loam, passing at 6 to 8 inches into a transition zone of yellow, friable, heavy silt loam to silty clay loam, 6 to 10 inches in thickness. The subsoil consists of a compact, but usually friable, yellow silty clay loam. On ridges and knolls the subsoil is slightly mottled with red and in the depressions with gray. Partially decomposed, gray slate rock is often encountered in the lower part of the 3-foot profile.

Patches are occasionally found, usually in seepage areas on hillsides or around stream heads, where the surface soil is whitish or whitish gray, and others in which the deep subsoil is whitish. In occasional areas the soil contains a noticeable amount of very fine sand. A small percentage of quartz gravel is scattered over the surface and throughout the soil, the quantity in places giving rise to a gravelly loam. Small areas here and there, shown on the map by symbol, contain a large quantity of quartz fragments, varying in diameter from a few inches to 1 foot or more. These fragments vary in number with the frequency and size of the quartz veins in the parent rock. In a few places the outcropping quartz veins are still intact. Slate fragments are less in evidence, but in a few places flaky or splintery, fibrous pieces of slate are found on the surface, and occasionally they give rise to so-called slate knolls. Several of

these occur in the vicinity of the Lexington County line, between Boland Crossroads and the Saluda River.

The Alamance silt loam is mapped in large areas in the southeastern part of the county. It ranges in topography from fairly level to gently rolling or sloping, bordered by a narrow broken strip along the stream channels. Drainage is fairly good except in a few places where the shale comes close to the surface, preventing underdrainage and on some of the slopes where seepage water affects the soil. Erosion is nowhere very active.

This is not an important soil, probably less than half of it being cleared and under cultivation. The wooded areas support a growth of pine and oak, with a scattering of other hardwoods. The second growth in cutover areas is usually blackjack oak, and in abandoned fields, pine. Cotton is the principal crop on this soil, followed by corn, oats, wheat, and cowpeas. Rye, sorghum, forage, and sweet potatoes are grown in small patches. A small number of cattle and hogs are run in the woodland, subsisting chiefly on the products of the forest, as there is very little grass. Yields on this soil are not very high. Cotton yields one-fourth to one-half bale per acre, with a few well-cared-for fields averaging higher. Corn yields 10 to 25 bushels per acre. Oats and wheat make low yields, but cowpeas do fairly well.

Much of this land has not been under cultivation very long, and clearings are being constantly made. Little or no attempt is made to build up the soil by turning under green crops, and where it has been under clean cultivation for a few years it is deficient in organic matter. Commercial fertilizer is depended on to maintain yields, from 200 to 500 pounds per acre being used for cotton.

This land is not very highly developed, and its selling price in general is correspondingly low, averaging $15 to $25 an acre.

It is very important that organic matter be added to this soil. Clovers and other legumes, such as cowpeas, velvet beans, and vetch, could be grown to good advantage, and since manure can not be had in sufficient quantity, cover crops, stubble, and sod should be turned under. Lime could be applied to good advantage where the haul is not too great, and in any case it should be used in small quantities. Complete fertilizer should be employed on all crops when it can be obtained, but with the plowing under of organic matter, the application of lime, and the growing of legumes, the amount of fertilizer necessary can be materially reduced. This soil is used in some sections for the production of bright tobacco.

WICKHAM FINE SANDY LOAM.

To a depth of 10 to 12 inches the Wickham fine sandy loam is a light-brown fine sandy loam, mellow and fairly open in structure.

The subsoil is a yellowish-brown to reddish-brown, compact but friable fine sandy loam, which becomes redder in color and heavier in texture within the 3-foot section. In some places this alluvial material rests upon the residual clays within the 3-foot section. A few small waterworn rocks and quartz pebbles occur in places.

Included with the type is a variation consisting of dark-brown or reddish-brown sandy loam underlain by a dark-red or purplish-red, compact but friable sandy loam. This variation occurs in the extreme southeastern corner of the county, about 1 mile west of Hollys Ferry. It lies higher than the typical Wickham fine sandy loam, and is hilly or even broken in places on the slopes. Another variation in the type is found near Chappells, where the soil is a gray sand underlain by a yellow, friable clay subsoil.

The Wickham fine sandy loam occurs in areas ranging from about 10 to 100 acres or more. It is found principally in the big bend of the Saluda River above Chappell, on the Enoree River below the mouth of Kings Creek, and at Crofts Mill Bridge on Bush River. It occupies terraces and second bottoms lying well above normal overflow. The general surface is 20 to 40 feet above the normal water level and several hundred feet lower than the main upland. The type has a level to gently undulating surface, with here and there low ridges, knolls, and a few slight depressions, the latter being more noticeable nearer the upland. Drainage is well established except in a few of the depressions and swales. This soil consists of sediments brought down from the upland and deposited by the streams when they flowed at considerably higher levels than at present.

Practically all of this type is under cultivation, and it is considered an important soil for general farming. The forest growth on the small undeveloped portion consists of pine, beech, sweet gum, and scattered hardwood. Corn, the principal crop, ranges in yield from 20 to 50 bushels per acre. Cotton yields about one-half to 1 bale, and oats give fair returns. A small acreage is devoted to wheat, rye, and cowpeas.

This land has a selling value of $60 to $100 an acre, but it is seldom sold alone, and the adjoining upland soils, which are not as productive, considerably reduce the selling price of the farms.

The Wickham fine sandy loam is mellow and easily tilled, and it responds readily to the application of fertilizers or manures. In some places the type is heavily fertilized. Like the upland soils, it is benefited by the addition of organic matter.

CONGAREE FINE SANDY LOAM.

The Congaree fine sandy loam as typically developed is a brown to dark-brown, mellow, loamy fine sandy loam, grading at 10 to 12 inches into a brown fine sandy loam which is slightly compact and

somewhat heavier than the soil. The subsoil contains a noticeable amount of small mica scales. Near the upland side of the bottoms there are occasional swales occupied by a heavier soil, usually a silt loam, or a thin film of silty soil may be found overlying sandy material.

The Congaree fine sandy loam occurs as first-bottom, overflow land along the larger streams, such as the Saluda, Broad, and Enoree Rivers. The largest developments are found along the Saluda River in the big bend between Chappells and Dysons Bridge, at Oldtown, and on Henderson Island in the Broad River.

The surface in general is level, but there are swells or ridges near the stream channel and swales near the hills. Except in the case of the swales, drainage is well established. On the swells the soil is inclined to be leachy, but they are not high above water level and crops do not suffer from lack of moisture.

Most of the type is in cultivation, and even the wooded areas are used as pasture for cattle and hogs. Few of the sandier areas are cultivated, however, and the poorly drained swales are usually left in forest. The timber growth consists mainly of tulip poplar, ash, birch, sycamore, and willow. Most of the cleared pasture is seeded to Bermuda grass, but some native grass is found. The woodland pasture contains an abundance of cane and various wild grasses. Corn is the principal cultivated crop. Some oats and cowpeas are grown, and small patches are used for melons, sorghum, and sweet potatoes. A small acreage is devoted to native grasses and redtop for hay. The soil is very productive, but the frequent occurrence of late floods makes crops uncertain. Corn in ordinarily favorable seasons yields about 40 to 60 bushels per acre.

The Congaree fine sandy loam is not valued very highly, on account of the danger of losing crops from overflows. It is held at prices ranging from about $15 to $45 an acre, depending upon the location with reference to transportation facilities.

Corn, sorghum, cowpeas, melons, and vegetables are apparently best adapted to this soil. Practically all the vegetables grown in this section of the country can be successfully produced. Early truck would probably pay better than any other crop in small fields, as it could be taken off before danger of the late August floods, which do so much damage to corn. This land lies well for the use of improved machinery, and it is easily cultivated and handled.

CONGAREE SILTY CLAY LOAM.

The soil of the Congaree silty clay loam is a brown to chocolate-brown, mellow silt loam to silty clay loam, grading at 8 to 10 inches into a subsoil which is similar but slightly lighter brown in color and slightly more compact. The subsoil becomes heavier and lighter

colored with depth, and near the bottom of the 3-foot section is a light-brown silty clay. In low spots or swales the soil is darker and inclined to show gray mottling in the subsoil. Several small included areas, representing the Wehadkee series, have a gray soil with a drab subsoil, these colors being due to poor drainage. Small areas of silt loam along the Saluda and Bush Rivers also are included with the type.

The Congaree silty clay loam is derived from Piedmont material deposited in sluggish water or under backwater conditions. It occurs as first-bottom overflow land along the larger streams. The largest developments are mapped along the Enoree River at the mouth of Kings and Indian Creeks and extending up these streams for several miles, with smaller ones scattered along the Enoree, Broad, Saluda, and Bush Rivers. The type occurs in areas ranging from narrow strips between the Congaree fine sandy loam along the stream channel and the foot of the hills to broad developments occupying the entire bottom, in some places a mile wide.

The surface is level except for slight depressions and swales, which usually occur next to the hills and which in some places represent old stream channels that have been partially filled. The type lies only 2 to 10 feet above stream level and is subject to frequent and deep inundations, as is shown by the mud rings upon the trees and the thin coating of mud on the surface. Much of it is semiswampy or marshy. Where cleared these wet areas are covered with bulrush, while in the wooded places the growth is usually ash and black gum, with a dense undergrowth of cane in patches. Most of the type where cleared supports a growth of short native grasses. Drainage is not well established, and after overflows the soil is inclined to be boggy.

Most of this land is cleared, but very little is under cultivation. The greater part of the bottom land along Bush River and Big Creek is cultivated, but the large areas of the type along Indian Creek and Kings Creek are in pasture, both cleared and uncleared.

A relatively large number of cattle and hogs are kept on this soil, but corn is about the only crop grown to any appreciable extent. It gives large yields, 40 to 60 bushels per acre, in ordinary seasons, but there is considerable danger of loss from overflow. At one time this soil was used extensively for crops, as is shown by the old ditches and corn rows, but the losses from overflows caused it to be abandoned. Even the higher parts of the type take some time to dry out sufficiently, and plowing is often done when the ground is too wet, resulting in the formation of clods. These are readily dissolved by overflows, but they are difficult to pulverize. The surface soil bakes

and cracks upon drying. This land is not valued very highly at the present time, owing to the danger of floods.

Straightening and cleaning out the stream channels would lessen the danger of overflows and make this soil better suited for the growing of crops. It is an excellent corn soil, and where successfully diked and drained should give good yields of cotton, oats, and wheat. The tendency of the small grains to lodge can not be readily obviated, as it is due to the richness of the soil. There is little need for fertilizers, as the inundations keep the soil enriched. Where it is impossible to prevent clodding, as in the low places, a plank drag should be used. The lower lying areas of the type can best be used for pasture; they can be seeded to Bermuda grass if the volunteer grasses are not satisfactory.

MEADOW (CONGAREE MATERIAL).

The areas classified as Meadow (Congaree material) consist of first-bottom alluvial soils so variable in texture that they could not be satisfactorily separated. Sandy loam is encountered more often than any other texture, followed by sand, loamy sand, gravelly loam, loam, silt loam, and silty clay loam. The texture is usually sandier along the stream, and heavier near the hills. It varies, however, with the predominating texture of the soils of the nearby upland or the local drainage basin. Most of the material is Congaree, washed from uplands where the Cecil soils predominate. Small areas of Wehadkee material are found along the headwaters of streams near Prosperity, where the alluvium is derived mainly from the Wilkes and Appling soils of the upland.

Meadow is developed in the bottom lands along the smaller streams, where the currents are usually quite swift and crossbedding is common. The type is subject to frequent inundations. The material seems to have originally been silt loam or silty clay loam, but large quantities of sand have been washed in from the surrounding hills. The surface is fairly flat and the type lies only a few feet above stream level, so that it is poorly drained for the most part. Bulrush is common in low spots, and in old furrows and partially filled ditches in pastures.

Nearly all of the Meadow was cleared and cultivated at one time, but floods were so destructive to crops that it has been allowed to grow up in brush and briers. The natural forest growth consists of sycamore, pine, ash, sweet gum, and willow. Most of the type at present is used for pasture, only occasional small fields being cultivated. Corn is the chief crop. Some hay, consisting largely of the native grasses, is produced. Small patches are devoted to sorghum and forage crops. Corn makes good yields, but the yields of hay

are rather low and of poor quality. Sorghum does exceptionally well.

While the total extent of Meadow is large, it represents only a small part of any farm. Some of the type could be reclaimed, and the danger of floods lessened, by straightening and enlarging the stream channels. Underdrainage would remove the surface water, and ditches at the foot of the hills would stop wash from the upland slopes. Following such reclamation, heavy yields of nearly all the common crops could be produced with very little loss from floods, and without the use of fertilizers.

ROUGH STONY LAND.

The term Rough stony land is applied to a large area occupying Little Mountain. The soil is a gray very fine sandy loam to silt loam, about 6 to 10 inches deep, underlain by a red clay subsoil. Scattered upon the surface and protruding from the ground are a large number of rocks and bowlders, which diminish in quantity with depth. In several of the highest places there seems to be nothing but a mass of solid rock outcrops, composed of quartzite, quartz, mica, talcose schist, and slate.

Little Mountain, in the southeastern part of the county, rises about 780 feet above sea level and about 300 to 400 feet above the surrounding country. The sides are fairly steep and the top is comparatively narrow. Most of the surface was at one time covered with longleaf pine and a scattering of oak, poplar, hickory, and dogwood. The longleaf pine and other merchantable timber has largely been removed, and a growth of scrub oak has taken their place to a great extent.

A small acreage has been cleared of the largest stones by arduous labor, and placed under cultivation. The soil compares favorably with the Georgeville gravelly loam, but the cost of removing the stones from most of the type would make it impossible to produce crops profitably.

SUMMARY.

Newberry County is situated in the northwestern part of South Carolina, near the eastern edge of the Piedmont Plateau. The county is well drained, and topographically represents a well-developed system of low, rolling ridges with a narrow broken border along the streams. The ridge tops average 100 to 250 feet above the streams. The upland varies from 450 or 500 feet above sea level in the eastern part of the county to 650 to 700 feet in the northern and western parts.

Settlement began in this county as early as 1752, most of the original settlers being Scotch-Irish and German. The present white

population is descended from the original settlers. The total population of the county in 1910 was 34,586, and the greater part is rural. Newberry, the county seat and largest town, had a population in 1910 of 5,028. Prosperity, 7 miles south of Newberry, and Whitmire, in the northern corner of the county, are towns of local importance.[5]

The county is well supplied with railway facilities. Newberry is the principal local market for farm products, and Columbia the chief outside market. The main dirt roads of the county are fairly good except during wet seasons, so that the markets are readily accessible.

The climate of Newberry County is mild and healthful. The mean annual temperature as recorded by the Weather Bureau station at Newberry is 62.2° F., and the mean annual precipitation 47.98 inches. The snowfall is light, amounting to only a few inches per annum.

In 1909 cotton was grown on 75,662 acres, as compared with 60,085 acres for all other crops. Corn, oats, and some peavine hay are grown for feeding work stock. The wheat acreage has recently increased, owing to the demand for food products, but vegetables, sweet potatoes, and sorghum are the principal subsistence crops. Clover is grown on a small acreage for soil improvement.

Hogs are kept in small numbers on most farms, but cattle are mainly confined to the larger stream bottoms. Mules are the principal work stock.

Little attention is given to crop rotations. Some farmers alternate cotton and corn, but large areas are kept in cotton indefinitely. Clean cultivation has depleted the soils of organic matter, and little attempt is made to supply this by turning under cover crops, commercial fertilizers being depended upon to maintain yields. The upland is used chiefly for cotton and the bottom land for corn and pasture, the latter consisting of Bermuda and other grasses.

The farm buildings in all parts of the county are small, especially the barns, but the equipment is generally adequate for the system of agriculture. On the larger farms more improved implements are in use.

In 1910, 67.4 per cent of the farms were operated by tenants, most of them on a share basis. In some sections the farms are small, in others large. The average size is 82.1 acres. Good average farm land ranges in selling value from $35 to $45 an acre, with outlying areas and broken land lower priced and improved farms near towns held at a considerably higher figure.

The soils of Newberry County fall into three natural divisions: Upland or residual soils, terrace or old-alluvial soils, and first-bottom or recent-alluvial soils. The residual soils cover the largest area and are the most important. They are derived from the weathering in place of igneous and metamorphic rocks.

[5] See footnote on page 7.

The Cecil, Appling, Wilkes, Davidson, Worsham, and Iredell soils are developed in the crystalline area, and the Georgeville and Alamance soils and Rough stony land in the slate belt.

The Cecil sandy loam is an important soil, well suited to the general farm crops. It is used extensively for cotton and corn. Wheat and oats are grown to a small extent, but give light yields.

The Cecil sandy clay loam is the most extensive soil in the county. It is used extensively for cotton, which gives fair yields, and cowpeas and clover make good returns.

Large areas of the Cecil clay loam are used for cotton, but it gives only fair yields unless well handled. Grains make good yields, and occupy a larger relative acreage than on most of the other soils.

The Appling sandy loam is extensively used for the general farm crops, although cotton production shows a slight decrease since the beginning of the present potash shortage. This soil is well suited to legumes, such as cowpeas and velvet beans. Small grains give rather low yields, but corn does well under a modification of the Williamson plan.

Partially disintegrated bedrock is usually encountered within less than 3 feet in the areas of Wilkes sandy loam, and, owing to the usually broken surface and the subsoil seepage, the type is not used very extensively for crops. Cotton, corn, and oats usually give low yields, and lime and organic matter are needed.

The Davidson clay loam has a smooth topography, but is well drained. It is used mainly for cotton, which gives good yields. The type is well suited to general farm crops, and is used in other sections for alfalfa.

The Iredell sandy loam is fairly level and poorly drained. It is found in widely scattered areas, and is not extensively farmed. It is fairly well suited to grain.

The Worsham sandy loam occurs in small, low, poorly drained areas, and is of little importance. It is suited to grass and oats, but needs artificial drainage.

The Georgeville silt loam is used mainly for cotton and corn, which give fairly good yields. Farming is more diversified than on most of the soils.

A large percentage of the Georgeville silty clay loam is cleared and cultivated. Cotton and grains give good yields where properly handled.

Much of the Alamance silt loam remains forested with pine and scrub oak, but part of it is used for the general farm crops, which give poor yields unless highly fertilized.

The Wickham fine sandy loam occupies fairly level to undulating terraces along the main streams, lying above overflow. Drainage is

well established, and general farm crops give good yields where properly handled.

The Congaree fine sandy loam is found in a generally narrow strip along the stream edge of the larger valleys. It is used to a small extent for crops, principally corn, oats, and melons.

The Congaree silty clay loam occupies broad, low bottoms along the larger streams and is subject to deep overflows. The type is used mainly for pasture.

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[PUBLIC RESOLUTION—No. 9.]

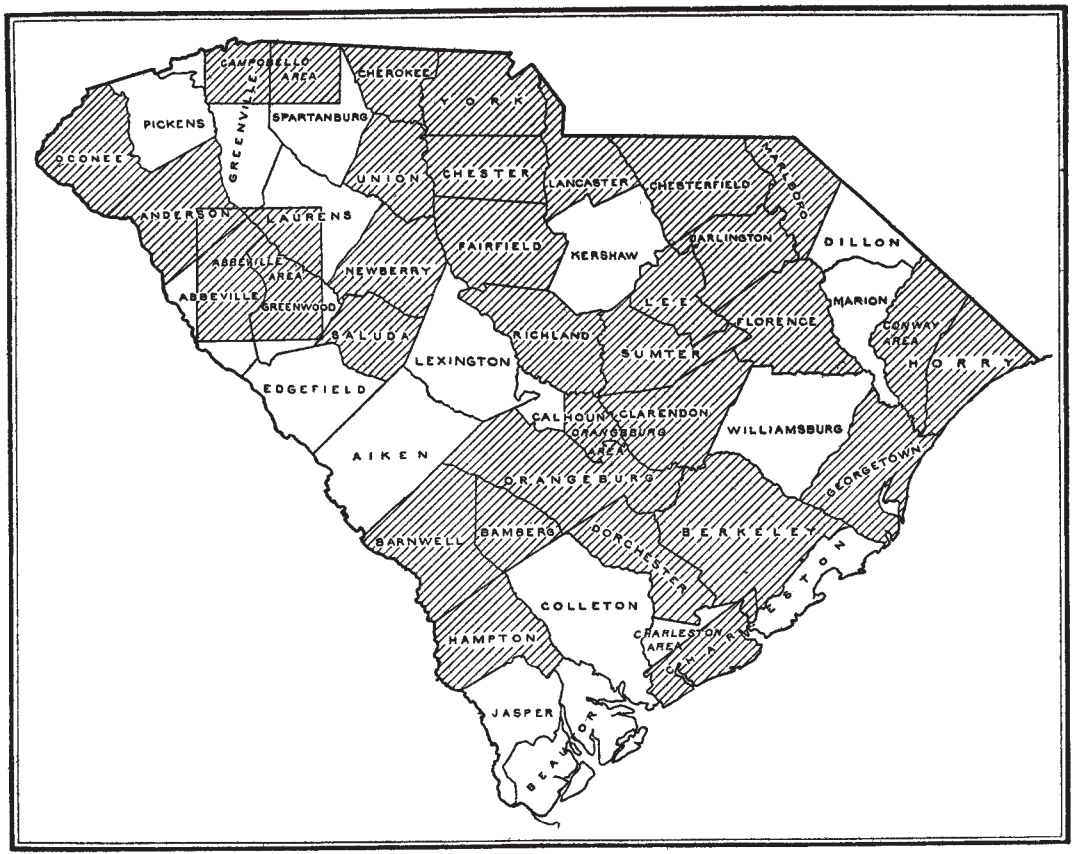
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture"

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.]



Areas surveyed in South Carolina.

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