

Issued October 31, 1914.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE,
W. A. GRAHAM, COMMISSIONER; B. W. KILGORE, STATE CHEMIST
AND DIRECTOR TEST FARMS.

SOIL SURVEY OF FORSYTH COUNTY,
NORTH CAROLINA.

BY

RISDEN T. ALLEN, OF THE U. S. DEPARTMENT OF AGRICULTURE,
AND R. C. JURNEY, OF THE NORTH CAROLINA DEPARTMENT
OF AGRICULTURE.

W. EDWARD HEARN, INSPECTOR SOUTHERN DIVISION

[Advance Sheets—Field Operations of the Bureau of Soils, 1913.]



WASHINGTON:
GOVERNMENT PRINTING OFFICE,
1914.

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1914.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., June 13, 1914.

SIR: During the field season of 1913 a soil survey was made of Forsyth County, N. C. This work was done in cooperation with the North Carolina Department of Agriculture, and the selection of this area was made after conference with State officials.

I have the honor to transmit herewith the manuscript and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1913, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

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MAP.

Soil map, Forsyth County sheet, North Carolina.

is mainly rolling to hilly. These hilly areas are associated with the chain of mountains lying farther north. In the southern two-thirds of the county, particularly the country south of Walkertown, in the vicinity of Kernersville, westward through Winston-Salem to Clemmonsville, and northward to Vienna, occur the more nearly level and gently rolling areas. Throughout the county, and especially in the southern part, are level to gently rolling areas which become more rolling and somewhat broken as the streams are approached. Narrow belts of flat bottom land lie along practically all of the streams. These level stretches are commonly flanked by smoothly rolling slopes. The topography of the greater part of Forsyth County is favorable for agriculture, and over a considerable area improved farm machinery can be operated advantageously.

The general elevation of the uplands varies from about 750 to perhaps more than 1,000 feet. Owing to the rolling topography, the high elevation, and, in part, to the generally loose structure of the surface soils, the natural drainage is good throughout all sections of the county. The Yadkin River and several creeks, such as Bechewa, Muddy, and North, Middle, and South Forks, with their numerous tributaries, furnish an effective drainage system for practically three-fourths of the county. The drainage of the northeastern corner is through Redbank, West Belews, Belews, and East Belews Creeks, which flow in a northerly direction out of the county. Generally the streams flow through rather deep but narrow valleys, and have swift currents. Some water power is developed for operating grist mills.

The first settlement in this region was made at Oldtown in 1753. Salem was settled in 1763. These settlers came direct from the provinces of Moravia in Bohemia and Saxony in Germany. Subsequently a number of Germans from Pennsylvania, and later some people of Scotch-Irish and many of English descent from various parts of the country settled here. Forsyth County was formed from Stokes County in 1849 by act of the General Assembly of North Carolina.

While the county is fairly well settled, it is capable of supporting a much larger rural population. There are extensive forested areas and undeveloped old fields, which can be converted into productive farms or used profitably for grazing.

Forsyth County has a population, according to the 1910 census, of 47,311, showing an increase of about 12,000 over that reported in 1900. Winston-Salem, in the south-central part of the county, is the county seat. It has a population of about 25,000 and is not only the largest town in the county, but one of the most important in the State. Kernersville, situated on the eastern border of the county, has a population somewhat over 1,000; Walkertown, in the northeastern section, has about 300; and Rural Hall, in the northern end of the county, about 500. Other small towns and stations are

scattered throughout all parts of the county. Winston-Salem is the largest producer of flat plug tobacco in the world, her manufacturers annually paying the Government about \$5,000,000 in internal revenue. In and around this city are numerous other manufacturing establishments, engaged chiefly in the production of wagons, furniture, and cotton-mill products.

Forsyth County is favored with excellent railroad facilities, good roads, and other transportation conveniencies. A branch of the Southern Railway enters the county from the east at Kernersville and crosses the county, while another connects Winston-Salem with Charlotte. Another branch also crosses the northern and north-eastern section. The Norfolk & Western Railway reaches Winston-Salem from the northeast corner of the county, and the Winston-Salem Southbound Railway extends southward from Winston-Salem.

At present Forsyth County has about 100 miles of improved and macadam roads. About \$100,000 is expended annually in the building and improvement of the county roads. The ordinary dirt roads are in fairly good condition throughout a greater part of the year, but are usually poor during the winter and early spring months.

All parts of the county are reached by the rural free delivery of mail. Telephones are in use in all sections, and good schools and churches are located at convenient places throughout the rural districts.

Winston-Salem is an excellent market for all the products of the county. It is the leading tobacco market of North Carolina, about 25,000,000 pounds of tobacco being sold here annually.

CLIMATE.

Forsyth County, situated within about 50 miles of the main range of the Blue Ridge Mountains, has an altitude of approximately 1,000 feet. Owing to the elevation, the rolling topography, excellent surface drainage, and the fact that good spring and well water can be had in all sections, this county possesses a healthful and invigorating climate. The summers are mild and pleasant, with cool nights, while the winters are not excessively cold.

According to the records of the Weather Bureau station at Salem, the temperature ranges from an absolute minimum of zero to an absolute maximum of 101° F. The average annual temperature is about 58° F. The rainfall averages about 48 inches annually, and this is well distributed throughout the year. The heaviest precipitation occurs in June, July, and August, and the lightest during the fall months.

The average date of the last killing frost in the spring is April 21, and of the first in the fall October 17. This gives a growing season

of about 180 days, sufficiently long for the production of a wide range of crops. The earliest date of killing frost in the fall is October 11, and the latest in spring, May 10.

The following table, compiled from the records of the Salem station, gives the normal monthly, seasonal, and annual temperature and precipitation for the county:

Normal monthly, seasonal, and annual temperature and precipitation at Salem, Forsyth County, N. C.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December.....	38.9	73	2	3.98	5.06	4.17
January.....	37.5	78	3	3.26	0.32	6.40
February.....	38.3	73	0	4.82	2.47	1.59
Winter.....	38.2			12.06	7.85	12.16
March.....	49.8	91	9	4.63	3.28	3.74
April.....	56.6	98	26	3.11	5.10	1.76
May.....	67.9	96	31	3.63	3.19	2.81
Spring.....	58.1			11.37	11.57	8.31
June.....	73.5	98	45	5.02	5.94	9.77
July.....	77.6	100	49	5.61	2.25	8.10
August.....	76.7	101	49	5.51	3.39	12.92
Summer.....	75.9			16.14	11.58	30.79
September.....	70.8	101	38	2.97	3.45	2.67
October.....	57.7	90	24	2.68	1.46	3.29
November.....	48.0	77	14	2.56	5.26	0.39
Fall.....	58.8			8.21	10.17	6.35
Year.....	57.8	101	0	47.78	41.17	57.61

AGRICULTURE.

Prior to the first settlement of Forsyth County a reconnoissance survey was made to determine the quality of the land, its physiography, drainage, fauna, and flora. The natural conditions were considered ideal. The country was adequately watered, an excellent forest growth flanked the stream courses, and wild pea vines flourished on the upland prairies. These vines furnished good grazing for sheep and cattle, and by reason of the prairie conditions of practically all of the uplands, farming operations could easily be inaugurated. Perhaps no other colony of settlers in America was so systematic

and thoroughly scientific in its investigations of the natural resources as the colony of Germans who first occupied this section. The colony was successful from the beginning.

The first crops grown were corn, wheat, flax, hops, and garden vegetables. Some tobacco was grown for home use. The flax was spun and made into clothing, and the hops were used in brewing beer. Cattle, hogs, and sheep were raised on a large scale. Mulberry trees were planted for the purpose of propagating the silk worm, and large quantities of raw silk were produced. Later some cotton was grown. Prior to 1837, in which year the first cotton gin in the county was built at Salem, the lint was separated from the seed by hand. Hog, cattle, and sheep raising increased in importance until the outbreak of the Civil War. About 1872, with the opening of a warehouse in Winston, an impetus was given to the commercial production of tobacco, and since then this crop has steadily increased in importance. According to the 1880 census, 822,788 pounds of tobacco were produced from 1,693 acres in 1879, and this was by far the most important money crop of the county. By this time corn had become the crop of second importance, and oats, wheat, hay, sweet potatoes, and rye were grown, ranking after corn in the order named. A few Irish potatoes, Canada peas, beans, and orchard and garden products were also produced.

By 1890 the production of tobacco had about doubled, while that of corn and oats had decreased. The acreage devoted to wheat had greatly increased, while sweet potatoes, Irish potatoes, rye, Canada peas, and beans were grown in larger quantities. Barley, buckwheat, sorghum, hay, broom corn, peanuts, and clover were produced in a small way.

By 1900 tobacco was being grown on 4,886 acres, or about 737 acres more than reported in 1890, and the yield of this crop was 2,649,440 pounds, a little over 1,000,000 pounds more than the yield reported in 1890, the average yield showing a material increase over that of preceding years. At this time only 4 acres were devoted to cotton. The corn, Irish potato, sweet potato, grass, clover, and wheat production was considerably in excess of that reported in 1890. A decided increase in the production of other farm products, including peanuts, and especially barley, was shown. Alfalfa had just been introduced.

The principal crops at present are tobacco, corn, wheat, oats, and clover. The crops of secondary importance are sweet potatoes, Irish potatoes, cabbage, cowpeas, rye, sorghum, cotton, watermelons, cantaloupes, and garden vegetables. Considerable dairying is carried on in the vicinity of Winston-Salem, and to a limited extent throughout the county.

Tobacco is the money crop of the county. The 1910 census reports a production of 3,592,237 pounds from 6,290 acres. This crop is grown on every upland soil in the county. The Durham sandy loam is the most highly prized soil for tobacco, but owing to its relatively small extent the greater part of the tobacco is produced on the Cecil sandy loam and the Applying gravelly sandy loam. The lighter areas of these types produce an excellent quality of leaf. A considerable quantity is also grown on the more sandy areas of the Cecil clay loam and the Iredell sandy loam. A number of different varieties are grown, the most popular being the Orinoco, Warren, Flanigan, and White Stem. The yields, depending upon the character of the soil, fertilization, and cultivation, range from about 500 to 1,200 pounds per acre, averaging somewhat less than 600 pounds. The farmers give considerable attention to tobacco production because of the prevailing high prices. Most of the tobacco grown in this section is used for the manufacture of plug tobacco. A small amount of the brighter leaf is used in the manufacture of smoking tobacco and cigarettes. A large quantity of the tobacco sold in the Winston-Salem market is exported.

A larger total acreage is devoted to corn than to any other crop grown in the county. It is planted to a greater or less extent on all of the soils, and is the principal crop produced on the alluvial bottom lands. Large yields are commonly obtained under good treatment from many of the Cecil types. A production of 394,651 bushels from 21,430 acres is reported in the 1910 census.

The aggregate area in wheat is almost as great as that devoted to corn. The 1910 census reports 20,544 acres in wheat, with a production of 200,710 bushels. This crop is grown throughout all parts of the county. It is generally sown on land previously occupied by clover, corn, or tobacco.

Red clover is grown extensively in the central and western parts of the county, while a small acreage is devoted to its production in other sections. Much of the clover is seeded with the wheat in the fall or harrowed in the wheat in the early spring.

Oats are grown to a small extent, a production of 49,357 bushels from 4,079 acres being reported in 1910. This crop is generally seeded in the fall. Much larger yields are secured from fall than from spring sowing. The fall-sown oats attain sufficient size and strength to withstand the winter freezes.

Rye and crimson clover are grown to a small extent and these make excellent cover crops for the soil during the winter. The 1910 census reports a production of 2,715 bushels of rye from a total of 385 acres. Cowpeas are grown in a small way, being sown or planted at the last cultivation of the corn or immediately following the harvesting of

wheat or oats. The total production of hay in 1909 is given as 9,478 tons, from 10,628 acres.

Sweet potatoes and Irish potatoes are grown for home use and for local markets. The yields are satisfactory and the quality is excellent. The 1910 census reports 343 acres in sweet potatoes with a production of 41,713 bushels, and 422 acres in Irish potatoes, with a production of 35,523 bushels.

Sorghum is grown in patches throughout the county, and the sirup produced is largely consumed locally. The production of 8,010 gallons of sorghum sirup is reported in 1910. The heavier soils produce a larger yield, but the lighter colored soils give a much brighter sirup. Cabbage, turnips, tomatoes, pumpkins, watermelons, cantaloupes, and other vegetables are produced for home use and to supply the local markets.

A few apple, peach, and cherry orchards are scattered over the county. The value of orchard products, including small fruits and nuts, is reported in 1910 as about \$40,000. It is necessary to spray the trees in order to secure good fruit.

There are several dairies in the vicinity of Winston-Salem, supplying milk, butter, and cream to the residents of that city. Practically every farmer raises chickens, and a few of them turkeys for home use and for the local markets. There are only a few sheep in the county, although a large number of hogs and a few beef cattle are raised.

There is no definite or regular rotation in general practice in the county. Some of the best farmers grow corn the first year, sowing cowpeas at the last cultivation, and the second year wheat, which is followed by clover and grasses for two years. Crimson clover sometimes precedes corn, and where this crop is turned under in the spring the yields of corn are materially increased. Rye is used to some extent as a winter cover crop, and tobacco following this crop does well. A few farmers grow tobacco, wheat, and peas in rotation.

The adaptation of the various soils of the county to different crops is generally recognized. For a long time the farmers have known that the different soils produce widely different grades of tobacco. For this reason they select the Durham sandy loam and the more sandy areas of the Cecil types for the growing of bright tobacco. A darker colored leaf is obtained from the heavier soils. The sandy areas are also favored for the production of truck crops and sweet potatoes. The heavy red lands, particularly the Cecil clay and clay loam types, are admirably suited to the production of wheat, oats, clover, grasses, and corn. The alluvial soils or bottom lands, developed in restricted areas along the streams, are especially adapted to the production of corn. Where the Iredell sandy loam is properly handled good yields of oats and wheat are obtained.

Commercial fertilizers are used to a greater or less extent throughout the county. Larger quantities are used for tobacco than for any other crop, usually from about 400 to 800 pounds per acre being applied. The mixtures commonly used analyze 8-2½-4, 8-2-2, 8-3-3, and 8-3-5, the figures indicating, respectively, the percentage content of phosphoric acid, nitrogen, and potash. On wheat many farmers use liberal quantities of fertilizer analyzing 14 or 16 per cent acid phosphate. It has been found that oats and wheat give considerably larger yields where nitrate of soda is sown broadcast over the field in the spring at the rate of about 75 pounds per acre. Lime is beneficial on the heavier and poorer drained soils, particularly where large quantities of green vegetable matter are turned under. In some sections of the county small quantities of bone meal are used. One of the requirements of the Iredell soils is kainit. A heavy application of this salt, it is said, has a tendency to prevent the frenching of corn, which is likely to affect the crop on this soil. Very little home mixing of fertilizers is practiced. However, as the farmers become better acquainted with the needs of their individual soils this practice is becoming more popular.

Farm labor is scarce in Forsyth County. The 1910 census reports an expenditure of \$70,957 for farm labor in 1909. The scarcity of labor throughout the rural sections is due largely to the high wages paid by the numerous factories in operation in Winston-Salem. The ordinary wages for farm help by the day ranges from \$1 to \$1.50, and in the tobacco fields during the busy seasons even boys are paid as much as \$1 a day. These high prices, resulting from the scarcity of labor, tend to encourage the use of modern farm machinery.

The size of the farms varies considerably, ranging from a few acres to several hundred acres. The average size is about 84 acres. The tendency is toward the subdivision of the larger into smaller farms. Nearly three-fourths of the farms are operated directly by the owners, and in such cases the greater part of the farm work is performed by the owner and his family. A small percentage of the land is rented on the share basis, the owner furnishing the stock and fertilizers and receiving one-half the crop produced. In some cases the land is rented for one-third, and in a few instances for one-fourth, of the crop. A comparatively small number of farms are rented at a definite cash rate per acre.

The land values in Forsyth County are influenced by the growth of Winston-Salem, by the extension of improved roads, and by the markets for all of the products from the soil. Near Winston-Salem and in the vicinity of the smaller towns land values range from \$60 to \$200 an acre. In the more remote regions good farm land can be purchased at \$20 to \$60 an acre. The best bottom-land soils easily bring \$100 an acre.

SOILS.

Forsyth County lies within the Piedmont Plateau region, a physiographic province that extends from the Hudson River to east-central Alabama. All of the upland soils of the county are residual in origin, and have been formed through the weathering of various rock formations. The dominant rocks in the eastern and southern sections of the county are mainly granite, while the prevailing rocks throughout the western and northern sections are gneisses and schists. Numerous bodies of diorite and gabbrodiorite, and occasionally a few areas of diabase, occur in the western and central-eastern parts of the county. Dikes and narrow veins of quartz are present throughout all of the granite and gneiss formations. A considerable quantity of quartz rock is distributed over local areas, particularly in the northern part of the county.

These various rocks differ materially in chemical and physical characteristics, and their disintegration and subsequent weathering give rise to different soils. The soils are grouped into series mainly on the basis of color, structural characteristics, and origin.

Over 83 per cent of the area of the county is occupied by one series of soils. This is the Cecil series. Six types of this series are shown on the map—the stony sandy loam, coarse sandy loam, sandy loam, fine sandy loam, clay loam, and clay—but two of these, the clay loam and sandy loam, form 86 per cent of the Cecil area and dominate the agriculture of the county.

Besides the Cecil soils, representatives of the Appling and Iredell series are upland residual soils encountered in the county. The importance of these soils is restricted locally by their relatively small extent. The most important, both areally and agriculturally, is the Durham sandy loam, of which there is shown on the map 9,408 acres, or 3.7 per cent of the county area.

In addition to the residual upland soils, alluvial soils, mapped as the Congaree series and Meadow, occur along the stream bottoms. About 3 per cent of the area mapped is Congaree and 4 per cent Meadow.

The following table gives the name and actual and relative extent of each of the soil types mapped in Forsyth County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil clay loam.....	103,424	40.8	Congaree silt loam.....	5,632	2.2
Cecil sandy loam.....	79,232	31.3	Cecil clay.....	2,880	1.1
Cecil fine sandy loam.....	19,648	7.8	Cecil stony sandy loam.....	2,560	1.0
Meadow.....	10,240	4.0	Cecil coarse sandy loam.....	1,984	.8
Durham sandy loam.....	9,408	3.7	Congaree fine sandy loam....	1,856	.7
Iredell sandy loam.....	8,832	3.5			
Appling gravelly sandy loam..	7,744	3.1	Total.....	253,440

CECIL SERIES.

The Cecil series includes the most important and widely distributed soils of the Piedmont Plateau. The heavier members are known as the "red clay lands." These soils are characterized by their red clay subsoils and gray to red soils ranging in texture from sand to clay, the lighter colors prevailing in the sandy members. A characteristic of the subsoil is the content of sharp quartz sand and the frequent occurrence of veins of quartz. Mica flakes are also usually present in the subsoil. The soils are of residual origin and derived principally from granite and gneiss, weathered to great depths, so that rock outcrops are rare. Fragments and boulders of the parent rock are, however, found in places on the surface. The topography is rolling to hilly, with level to undulating areas in situations where stream erosion has not been active.

CECIL STONY SANDY LOAM.

The surface soil of the Cecil stony sandy loam consists of a gray to reddish-brown sandy loam 5 to 10 inches in depth. The subsoil is a red, stiff clay extending to a depth of 3 feet or more. Large quantities of angular quartz fragments, varying in size from about 1 inch to 6 inches in diameter, are scattered over the surface and occasionally disseminated throughout the soil. In a few small areas these are present in sufficient quantities to prevent cultivation. Throughout the type they make the cultivation of certain crops difficult and interfere with the use of farm machinery. The stone content is the one feature which distinguishes the type from the Cecil sandy loam. On a few of the knolls and slopes the greater part of the sandy surface soil has been removed by erosion, leaving areas of a reddish-brown loam or clay loam.

The Cecil stony sandy loam is an inextensive type in the county, having an area of only 4 square miles. It occurs principally in the northwestern section. The largest areas are situated southeast of Donnoha, northeast of Tobaccoville, and northwest of Rural Hall. A few small areas are found elsewhere in the county.

The topography is prevailingly rolling to hilly, with numerous knolls and narrow ridges. The surface is more uneven than that of the Cecil sandy loam. The drainage is good.

The native vegetation consists principally of shortleaf pine, white oak, post oak, and red oak, with some hickory, sourwood, dogwood, and cedar.

This soil is used for practically the same crops as the Cecil sandy loam. Corn yields from 15 to 30 bushels, wheat about 8 to 20 bushels, and tobacco about 600 to 1,000 pounds per acre. Apples, peaches, sweet potatoes, and garden vegetables give satisfactory

returns, but are grown only for home use. Corn and wheat receive light applications of commercial fertilizer, while for tobacco an application of 400 to 600 pounds per acre of an 8-2-4 or 8-2-2 mixture is used.

The price of this land ranges from \$20 to \$50 an acre.

CECIL COARSE SANDY LOAM.

The surface soil of the Cecil coarse sandy loam consists of a gray coarse sandy loam to loamy sand, which grades into a reddish-yellow coarse sandy loam at about 6 inches. The typical subsoil, beginning at 8 to 15 inches, is a red, stiff but rather friable clay. It extends to a depth of 3 feet or more, and carries a small quantity of coarse, angular sand. In local spots the surface material has a brownish or a reddish tinge. Usually in these places the surface soil rests directly upon the red clay subsoil, and the intermediate sub-surface layer encountered in the typical area is lacking. The Cecil coarse sandy loam is essentially similar to the Cecil sandy loam, except that the sand particles are slightly larger in size in the former type. This soil has a very mellow, open structure and is easily tilled.

This type has only a small development in this county. The largest bodies are encountered north of Kernersville, north of Antioch Church, along West Belews Creek, and south of Clemmons along the county line. A few patches occur in other parts of the county.

The surface varies for the most part from gently rolling to rolling, but is in a few places more or less broken and hilly. Owing to the open structure of the surface soil and the generally rolling topography, the natural drainage is good.

The greater part of this type is under cultivation, the remainder being covered with hardwood forest or old-field pine.

The Cecil coarse sandy loam is closely associated with the Cecil sandy loam. It is adapted to practically the same crops, produces similar yields, and requires about the same fertilization and cultural methods.

The value of this land is not materially different from that of the Cecil sandy loam.

CECIL SANDY LOAM.

The surface soil of the Cecil sandy loam consists of a gray sandy loam, which ranges in depth from about 6 to 12 inches. The subsoil is a red, stiff to brittle clay extending to a depth of 3 feet or more. In many localities the surface soil is a brownish-gray to reddish-brown sandy loam. Frequently a few quartz fragments are present on the surface, and occasionally narrow veins of quartz are encountered in the subsoil. Included in this type are numerous eroded places and

gall spots where the sandy surface material has been washed off, leaving the red clay loam or clay exposed. These spots, really Cecil clay or clay loam, together with a few included patches of Cecil coarse sandy loam and fine sandy loam, are too small to be shown separately on the soil map. In a few localities the Cecil sandy loam is a fine to very fine sandy loam carrying an appreciable amount of coarse sand particles, and, in some places, small quartz gravel. In the uniform and typical areas the surface soil has a mellow structure, is easily tilled, and seldom clods if cultivated under proper moisture conditions. This type is locally known as "gray land."

The Cecil sandy loam is the second type in extent in Forsyth County. It is the dominant soil in the eastern half of the county, occurring in large, irregularly shaped areas, broken mainly by areas of Cecil clay loam and Durham sandy loam. Other areas are distributed throughout the remaining part of the county. This type is confined almost exclusively to the high, gently rolling to rolling inter-stream areas which are characterized by more regular curves and a smoother surface configuration than the associated types of the Cecil series. The roughest topography is encountered in the vicinity of Belews Creek and along the numerous small streams which flow through or head in areas of this type. Some of the broader ridges possess almost level to gently rolling surface features. Practically all of this type, by reason of its high position, its generally rolling surface, and the open texture of the surface material, has good natural drainage. Only a few of the more nearly level spots or slight depressions, comprising a small total acreage, require artificial drainage, and this is easily supplied.

The greater part of the Cecil sandy loam is cleared and cultivated, the remaining portion supporting an original forest growth of hardwoods, such as white, red, and post oak, a little hickory, dogwood, sourwood, cedar, or a second growth of old-field pine and scattering cedar pine.

The Cecil sandy loam is adapted to the production of a wide variety of crops. The areas of heavier and shallower surface soil are suited to corn, clover, cowpeas, wheat, and oats, while the areas of more sandy and deeper surface are particularly adapted to tobacco, sweet potatoes, Irish potatoes, peanuts, watermelons, cantaloupes, berries, and garden vegetables. This soil may be considered the principal trucking soil of the Piedmont Plateau of North Carolina.

Practically every crop common to the county is grown on the Cecil sandy loam. Wheat and corn are the most important crops grown upon this type. They receive light applications of commercial fertilizer, 16 per cent acid phosphate being used on the wheat. Under these conditions corn yields 15 to 75 bushels per acre; wheat 10 to 35 bushels; red clover 1 to 3 tons; and sweet potatoes 100 to 300

bushels. A large acreage is devoted to the production of bright tobacco, and yields of 600 to 1,200 pounds per acre are obtained with an application of about 400 to 800 pounds of an 8-2½-4, 8-3-3, or 8-3-5 mixture of commercial fertilizer. Sorghum is grown to a small extent for making sirup, the yields ranging from 75 to 150 gallons per acre. The sirup usually has a bright color and good quality. Some rye is sown as a winter cover crop, and cowpeas as a summer forage crop. Both of these crops do well. Watermelons and cantaloupes, a few peaches, cherries, and apples are grown for home use. Crimson clover is grown to a small extent. Tomatoes, pumpkins, cabbage, beans, turnips, radishes, lettuce, Irish potatoes, and other garden vegetables are grown for home use and for the local markets.

The Cecil sandy loam, like the Cecil stony sandy loam and the Cecil fine sandy loam, is as a rule deficient in humus, which may be supplied by growing clover and cowpeas and turning them under, or by applying stable manure.

The large yields of corn and wheat obtained by the best farmers indicate what this soil is capable of producing where properly handled. The red clay subsoil is very retentive of moisture and does not leach readily, so that the effect of manures and green crops turned under is quite lasting. The improvement of the type is a comparatively easy matter.

The Cecil sandy loam sells at \$25 to \$100 an acre, depending upon location and improvements.

CECIL FINE SANDY LOAM.

The surface soil of the Cecil fine sandy loam typically consists of a yellowish-gray to light-gray fine sandy loam, varying in depth from about 5 to 12 inches. The subsoil is a red, stiff but brittle clay which extends to a depth of 3 feet or more. In many places, particularly in forested areas, the surface soil is a yellowish-gray very fine sandy loam. The type includes spots of reddish-brown fine to medium sandy loam, the red color being due mainly to an admixture of the red clay subsoil resulting from deep plowing. In local spots the subsoil consists of a yellow to reddish-yellow or salmon-red clay. In small areas a small quantity of quartz rock and occasionally fragments of the parent granite or gneiss appear on the surface, and frequently coarse sand and fine gravel are mingled with the surface material. The Cecil fine sandy loam is generally mellow and easily tilled. In areas of the finer textured material the soil bakes and forms clods when plowed under unfavorable moisture conditions.

The largest and most important area of this type extends from immediately north of Winston-Salem in an almost unbroken belt to the northern boundary of the county. Another fairly large body

occurs at Lewisville and Concord Church. Small areas occur in various parts of the county.

The surface of this type is prevailingly rolling to hilly, and somewhat dissected by small streams. Many of the ridges have a gently rolling to rolling topography. As a rule, this type is slightly more broken than the Cecil sandy loam. The surface drainage throughout the type is excellent. The run-off is, in fact, too rapid in places, and gullying has injured some of the fields.

The greater part of the Cecil fine sandy loam is forested, the growth consisting of red, white, and post oak, and hickory, together with some poplar, old-field pine, and shortleaf pine.

This type is well suited to the production of corn, wheat, oats, clover, and grasses, and in areas of deeper surface soil to tobacco, sweet potatoes, and garden vegetables. Tobacco yields from about 700 to 1,000 pounds per acre with acreage applications of 400 to 700 pounds of fertilizer analyzing 8-2½-4 or 8-3-3. Wheat yields from 8 to 20 bushels per acre and corn from 15 to 25 bushels. Clover does well, especially in areas of heavier soil. Sweet potatoes and garden truck give satisfactory returns. A small quantity of commercial fertilizer is applied to corn, and to wheat. Some farmers use liberal quantities of 16 per cent acid phosphate in growing the latter crop. Red clover is generally harrowed into the wheat in early spring. This harrowing seems to improve rather than to harm the wheat.

Land values range from \$15 to \$60 an acre.

CECIL CLAY LOAM.

The surface soil of the Cecil clay loam is quite variable in texture and color, comprising material which is intermediate between the sandy loams on the one hand and the heavy clays on the other. The surface soil of the largest and best developed areas consists of a reddish-brown or red loam to clay loam, having a depth of 4 to 8 inches. The subsoil is a stiff red clay extending to a depth of 3 feet or more. This clay is hard and brittle when dry and sticky when wet. The surface soil is more variable in texture and color than that of any other type encountered in the county, and almost every field of 10 acres or more has a spotted appearance, showing shades of red, brown, and gray. Frequently the immediate surface material, to a depth of 1 to 3 inches, is a heavy sandy loam of gray to reddish-brown color. Occasionally spots of dark-brown or snuff-colored loam, which are locally known as "dead land" or "push land," are seen. Included in this type are many small patches of Cecil sandy loam, fine sandy loam, and clay, the spots of clay occurring generally on eroded slopes.

The Cecil clay loam is locally referred to as "red land." It is by far the most extensive, and probably the most important type in Forsyth County. The largest continuous areas are developed in the

central, northern, and northwestern parts of the county, and other large bodies are distributed over the remaining sections.

Characteristically the surface is sloping to rolling. Some of the interstream areas have an almost level to gently rolling surface on the crests of the ridges, but even these areas become rolling and broken as the streams are approached. Areas of rougher topography are developed along Bechewa and Fries Creeks and in the vicinity of Mount Pleasant Church in the northwestern part of the county. Although the prevailing surface is rolling, most of the slopes are gradual and smooth, and the topography is favorable for agriculture. The natural drainage is excellent, and even excessive on some of the steeper slopes.

The forest growth on this type consists mainly of hardwoods, such as red, white, post, and chestnut oak, and hickory, with some poplar, sourwood, cedar, and dogwood. Old-field pine is commonly seen in fields abandoned for some time.

The Cecil clay loam is especially valuable for the production of wheat, oats, corn, red clover, and cowpeas. The more sandy areas are also well suited to tobacco, cabbage, Irish potatoes, sweet potatoes, and other vegetables. Corn yields from 12 to 75 bushels per acre, with an average of 20 to 25 bushels, the larger yields being obtained through heavy fertilization, either with commercial fertilizer or with barnyard manure, and thorough preparation of the soil. Wheat yields from 10 to 35 bushels per acre, oats 20 to 60 bushels, and red clover 1 to 3 tons. Cowpeas do well. Alfalfa is grown in a few patches, and the stand and yield are satisfactory when the soil has been thoroughly prepared, manured, limed, and inoculated. A large acreage is devoted to tobacco. The yields range from 700 to 1,200 pounds per acre, with acreage applications of 400 to 800 pounds of fertilizer analyzing 8-2½-4 and 8-3-3. The color and quality of the leaf are not quite as good as of that grown on the Cecil sandy loam. Sorghum is grown in small patches and manufactured into sirup for home use. Sweet potatoes are grown to a small extent, the yields ranging from 100 to 250 bushels per acre. Cabbage, turnips, tomatoes, pumpkins, beans, Irish potatoes, strawberries, apples, peaches, and cherries are grown for home consumption and to a limited extent for local markets.

The Cecil clay loam is naturally a strong soil and is capable of being built up to a high state of productiveness. Its present value varies from \$30 to \$100 an acre, depending upon location and improvements.

CECIL CLAY.

The Cecil clay consists of a heavy, stiff, red clay with a depth of 3 feet or more. In some places the surface material to a depth of about 2 to 4 inches is a reddish-brown or red heavy clay loam, passing

gradually into the typical red, stiff clay. This soil, when plowed and harrowed under proper moisture conditions, works up into a fairly good tilth.

The Cecil clay has only a small total area in this county. It occurs in close association with the Cecil clay loam. The largest areas lie along Muddy Creek north of Bethania and along the Yadkin River west of Clemmons, with a few small areas in other parts of the county.

This type is found principally on slopes and knolls and in many places borders the Congaree soil of the bottoms. The rolling surface insures excellent natural drainage. Unlike many of the types in the county, the topography is characterized by smooth, rounded slopes which are not gullied and lie favorably for cultivation.

The original forest growth consisted mainly of red, white, and post oak, hickory, dogwood, sourwood, and poplar. Practically all of this type is now under cultivation.

The Cecil clay is naturally a strong and productive soil, especially suited to the production of clover, grasses, wheat, corn, and oats. Wheat and corn are the principal crops. The yields of wheat range from 10 to 30 bushels, with an average of about 17 bushels per acre, and of corn from about 15 to 40 bushels. Red clover does well, yielding 1 to 2 tons of hay per acre. Tobacco is grown to a small extent, producing heavy yields of a dark-colored, coarse-textured leaf. A few garden vegetables and pumpkins are grown for home use.

The Cecil clay is valued at \$30 to \$60 an acre.

DURHAM SERIES.

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

DURHAM SANDY LOAM.

The surface soil of the Durham sandy loam consists of a light-gray to almost white loamy sand to light sandy loam, which usually grades into a yellowish-gray sandy loam at about 3 to 6 inches. The subsoil proper is encountered at depths of 8 to 15 inches. It consists of a pale to bright-yellow clay, commonly carrying a sufficient quantity of angular sand to give it a friable, crumbly structure. Included in this type in the northern end of the county are a few patches of Durham fine sandy loam. South of Kernersville the

surface soil is somewhat coarser than the typical, closely approaching the coarse sandy loam. The subsoil in many places throughout this type is tinged or mottled with shades of red in the lower part of the 3-foot section. This red color is particularly noticeable along the boundary between this type and the Cecil types. Occasionally a very narrow strip of Iredell sandy loam, too small to be shown on the soil map, is encountered.

The largest areas of this soil occur around and south of Kernersville, south of Goodwill Church, near Hope Church, and south of Winston-Salem along South Fork. Small areas are distributed throughout all parts of the county.

The type occupies almost level and gently rolling to rolling areas. All areas of the Durham sandy loam have good natural surface drainage and are well suited to general farming.

A forest growth consisting principally of white, red, post, and blackjack oak, with some hickory, sourwood, poplar, and pine, covers a part of the type.

The Durham sandy loam is preeminently a tobacco soil and is highly prized for the production of that crop. It is also well suited to sweet potatoes, cantaloupes, corn, peanuts, and garden vegetables. Tobacco yields from 600 to 1,000 pounds per acre with an application of 400 to 600 pounds of fertilizer analyzing 8-3-5. Corn yields 8 to 20 bushels per acre. Sweet potatoes are grown mainly for home use. Melons, apples, peaches, and small fruits give satisfactory returns. Crimson clover is grown to a small extent. The tobacco grown upon this type cures to a bright color and sells at fancy prices. Rye is grown in places and furnishes good spring pasturage.

The Durham sandy loam is in need of organic matter, but it is said that tobacco following clover or cowpeas is of inferior quality, being dark colored and coarse textured, and care should be taken to rotate the crops to avoid this succession. In such cases the quality is better where the crop is fertilized heavily with potash and only small quantities of phosphate and nitrogen used.

Where corn is planted the first year after the leguminous crops, and tobacco the second year, both the quality and quantity are satisfactory.

The value of this land ranges from \$40 to \$75 an acre.

APPLING SERIES.

The types of the Appling series are characterized by the grayish to pale-yellow color of the surface soils and the mottled or streaked red and yellow color of the subsoils. In places the color varies from yellow to red, while grayish colors are also occasionally noted in the subsoil. These soils are derived principally from schist of grayish color and undetermined composition, from hornblende schist,

and from gneiss. Occasional small areas of the red Cecil material suggest that fields of this type belong in the Cecil series, requiring examination of the subsoil underlying the associated grayish soils to determine the character of the prevailing type. The topography averages about the same as that of the Cecil, possibly somewhat less rolling. The Appling series is a Piedmont series encountered so far only in the Carolinas and Georgia.

APPLING GRAVELLY SANDY LOAM.

The surface soil of the Appling gravelly sandy loam consists of a gray to brownish-gray loamy sand to light sandy loam, ranging in depth from about 8 to 15 inches and containing a large quantity of fine quartz gravel and small particles of the parent rock. The subsoil in typical areas is dominantly a reddish-yellow, rather friable clay to a depth of about 3 feet. The subsoil is variable in color, and all shades from yellow to red, mottlings of red and yellow, and even light-gray to almost white colors are of frequent occurrence. The coarser textured surface soil usually occurs on the knolls and ridges. On gentle slopes and in the small valley areas spots of medium to coarse sandy loam are conspicuous. Occasionally on the knolls and crests of ridges granite and gneiss rocks outcrop and immediately surrounding such outcrops the surface soil, consisting of a brownish or grayish gravelly sandy loam, grades into the disintegrated rock at depths of about 6 to 15 inches. Such spots are too intricately associated with the typical soil and too limited in extent to warrant their separation.

The main development of this type is in the two large bodies in the northeastern and southwestern parts of the county, one lying north of Bethlehem Church and the other east of Muddy Creek Station. A few patches occur in the eastern part of the county.

The surface is characteristically rolling to hilly, with many knolls and ridges. In general, this type has a more uneven and broken topography than any other soil in the county. The development to the east of Muddy Creek Station includes small, narrow inter-stream areas having a gently rolling to rolling surface.

Owing to the rolling topography and the open structure of the soil, the natural drainage is good. On a few of the steeper slopes the runoff of rain water is rapid, and gullies and ravines have formed.

The natural growth includes white, post, red, and blackjack oak, cedar, hickory, and old-field pine, with some sassafras, persimmon, and dogwood.

This soil warms up early in the spring and by reason of its good drainage can be tilled immediately after rains.

The Appling gravelly sandy loam is fairly well suited to the production of tobacco, corn, watermelons, cantaloupes, sweet potatoes,

truck crops, peaches, dewberries, and blackberries. Tobacco yields from 600 to 1,000 pounds per acre with an average application of about 400 to 600 pounds of commercial fertilizer analyzing 8-2-4 or 8-3-5. Corn produces 10 to 25 bushels per acre, wheat from about 8 to 15 bushels, and sweet potatoes from 100 to 200 bushels.

The type in general is deficient in humus, as is the case with most of the soils of the county that have been under cultivation to inter-tilled crops for a long time.

The value of this land ranges from \$18 to \$50 an acre.

The results of mechanical analyses of fine-earth samples of the soil and subsoil of the Appling gravelly sandy loam are given in the following table:

Mechanical analyses of Appling gravelly sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
233119.....	Soil.....	<i>Per cent.</i> 11.0	<i>Per cent.</i> 18.5	<i>Per cent.</i> 11.4	<i>Per cent.</i> 22.6	<i>Per cent.</i> 11.8	<i>Per cent.</i> 18.6	<i>Per cent.</i> 6.3
233120.....	Subsoil.....	6.6	8.9	4.7	8.0	3.4	9.9	58.8

IREDELL SERIES.

The soils of the Iredell series are light brown to almost black in color and frequently carry small iron concretions. The subsoils consist of extremely plastic, sticky, or waxy clay of a yellowish-brown to greenish-yellow color. Disintegrated rock is very often encountered within the 3-foot section. The topography varies from nearly flat to gently rolling. The parent rocks consist mainly of diorite, hornblende schist or hornblende gneiss, and chloritic rocks.

IREDELL SANDY LOAM.

The surface soil of the Iredell sandy loam consists of a gray to brownish-gray light sandy loam varying in depth from about 6 to 12 inches. The subsoil in typical areas is a brownish-yellow, yellow, or light-brown, sticky, impervious, waxy clay, which extends to a depth of about 20 to 30 inches. Generally below this depth the greenish-yellow disintegrated diorite rock is encountered. This type is locally known as "sprouty land," "blackjack land," or "pipe-clay land." Noticeable quantities of small, rounded, dark-brown iron concretions or pebbles are scattered over the surface and throughout the soil in the typical areas. In a few localities there are included in this type many small, typically developed spots of Iredell fine sandy loam and patches of Cecil sandy loam and Durham sandy loam, all of which were of insufficient size to be separated on the soil map.

While there are no extensive areas of this type mapped, several fairly large bodies and numerous small spots are distributed through-

out the county. The principal areas are situated east of Capernium, along the Yadkin River, along Blanket and Muddy Creeks, and south and southwest of Goodwill Church.

The surface of the Iredell sandy loam areas varies from almost level to rolling. The type lies mainly in depressions or shallow valleys near the heads of small streams, although it includes a few knolls and steep slopes. The area near Clemmonsville has a rolling topography which becomes broken near the streams, resembling in surface features the Cecil types.

With the exception of a few of the lower situations this type possesses fairly good natural surface drainage, but the impervious subsoil, which has somewhat the consistency of putty, retards the downward percolation of rain water and the capillary return of subsoil water to the surface. Open ditches are necessary for the proper drainage of the flatter areas of the type, which can not be profitably used for agriculture in their present condition.

The predominating forest growth consists of blackjack, post, and white oak. Some of the ridges and slopes support a growth of cedar and old-field pine.

A comparatively small part of the Iredell sandy loam is under cultivation. It gives the best results with oats, wheat, corn, and grasses, for hay or pasturage. Of these crops wheat is the most satisfactory, under present conditions. The yields range from 8 to 25 bushels per acre. Corn does fairly well, yielding from 15 to 30 bushels. Tobacco is grown in areas where the surface soil is deep and the drainage well established. The yields range from 500 to 900 pounds an acre. The fertilization for tobacco and wheat on this soil is practically the same as on the Cecil sandy loam. Sorghum yields from 75 to 150 gallons of sirup per acre. Sweet and Irish potatoes, cabbage, and garden vegetables are successfully grown. The soil is in need of humus and lime. The addition of stable manure is beneficial. The use of kainit results in marked improvement of the yields, especially with corn, which has a tendency to french on this type of soil not only here but elsewhere in the State.

Improved areas of this soil and those having a favorable topography bring from \$30 to \$50 an acre. Other areas range in value from \$15 to \$25 an acre.

CONGAREE SERIES.

The soils and subsoils of the Congaree series are brown to reddish brown, there being comparatively little change in texture, structure, and color from the surface downward. Occasionally grayish and yellowish mottling is encountered in the subsoil of the poorly drained areas. These soils are developed in the overflowed first bottoms of the streams of the Piedmont region and in similar positions in the Coastal Plain along streams issuing from the Piedmont.

CONGAREE FINE SANDY LOAM.

The surface soil of the Congaree fine sandy loam consists of a light-brown to chocolate-brown fine sandy loam, from 8 to 12 inches in depth. The subsoil is somewhat variable in texture, consisting of either a fine sandy loam or a silt loam, generally of a yellowish-brown color. Frequently a thin stratum of fine sand is encountered at a depth of about 16 to 20 inches. Usually in the lower part of the 3-foot section, at about 30 to 36 inches, a brownish-gray fine sandy loam or silty loam is encountered. However, in a few localities, particularly along the Yadkin River, the fine sandy loam subsoil is quite uniform in texture and extends to a depth of 3 feet or more. Finely divided mica scales are a characteristic constituent of both the soil and the subsoil. Included in this type are spots of Congaree silt loam, Congaree loam, and very narrow bands of Congaree fine sand, all of which are too small in extent to be separated on a map of the scale used in the present survey.

This is one of the less extensive types in the county. Its main development is along the Yadkin River in the northwestern part of the county. Other narrow bands occur along a number of the smaller streams.

This soil has a flat and level topography, with an occasional hummock rising a foot or more above the general level of the land. It occupies the first bottoms along the streams, and all of it is subject to overflow in times of high water, although the greater part of it lies sufficiently above the normal level of the streams to give fairly good drainage and to permit cultivation.

The Congaree fine sandy loam is used mainly in the production of corn, and practically the entire area is in this crop. The yields range from 30 to 100 bushels per acre, with an average of 40 or 50 bushels, without the use of commercial fertilizers or manures. Pumpkins are grown to a small extent and do well.

The value of this land can not be definitely given, as it is sold, as a rule, in conjunction with the adjoining upland areas.

CONGAREE SILT LOAM.

The Congaree silt loam consists of a brown or reddish-brown silt loam, about 8 inches deep, underlain by a light-brown or chocolate-brown silty loam, which grades into a bluish-gray silt loam or fine sandy loam in the lower part of the 3-foot section. Small mica scales are abundant in the soil and particularly in the subsoil. In local areas the subsoil is a brown fine sandy loam, and in places thin strata of fine sand are encountered. The type includes numerous patches of Congaree fine sandy loam and Congaree fine sand, which it was not practicable to map separately.

This type forms a large part of the bottom-land area, being especially well developed along some of the larger streams of the county.

It is low lying and flat, the surface being only a few feet above the normal water level of the streams. Owing to its flat topography and low position, the type is inundated during periods of heavy rainfall. Crops are frequently damaged and sometimes destroyed by floods. Straightening and deepening the stream channels and digging ditches would reclaim practically all the soil, so that it could be used for cultivated crops.

The Congaree silt loam is naturally a strong and productive soil. It is especially suited to the production of corn, grasses, pumpkins, and forage crops. Yields of 50 to 100 bushels of corn per acre are obtained when the land is free from overflow. Only a small acreage, however, is devoted to corn, while upon a large part of the type wild grasses flourish, from 1½ to 3 tons of hay per acre being obtained. Much of the type supports a light growth of alder and willow bushes, briars, and reeds. Such areas afford some pasturage during the summer months.

This type is usually sold in conjunction with the adjoining upland soils. Where sold separately it commands a high price.

MISCELLANEOUS MATERIAL.

MEADOW

Meadow consists of alluvial material, modified locally by colluvial wash, which is so variable in character that no definite type separations can be made. It ranges in texture from fine to medium sand, through fine sandy loam to clay loam. Where the upland soils are dominantly sandy loams, the Meadow materials are correspondingly sandy. On the other hand, in the clay and clay loam regions the surface material of Meadow is generally a loam or a clay loam.

Meadow occurs as very narrow bands in the first bottoms along the small streams, at the headwaters of the creeks, and, in a few localities, along the larger streams. It is closely associated with the Congaree soils, and includes all of the overflowed bottom lands which can not be separated into the Congaree fine sandy loam and silt loam or any other definite soil type. It is subject to frequent inundation, and a part of it remains in a saturated condition throughout the year. The surface soil is subject to change by the deposition of new material or by the removal of the present surface material at times of heavy overflows.

Small areas of Meadow have been reclaimed, and are used mainly for the production of corn. The greater part of it supports a small growth of alder bushes, willow, elm, and other water-loving trees, with an undergrowth of coarse grasses, briars, and reeds, affording excellent summer pasturage for cattle.

SUMMARY.

Forsyth County lies in the northwestern part of North Carolina. It contains 396 square miles, or 253,440 acres.

The surface as a rule is rolling, but varies to strongly rolling and hilly. The elevation of the upland ranges between 750 and 1,000 feet.

The greater part of the county is drained by the Yadkin River and its numerous tributaries. Drainage is well established.

The first settlement was made in this region in 1753. The early settlers were mainly Germans. Forsyth County was organized in 1849.

According to the 1910 census the county has a population of 47,311. Winston-Salem is the county seat, with a population of about 25,000. It is an excellent local market for the products of the county, and the leading tobacco market of North Carolina. Kernersville, the next largest town, has a population somewhat over 1,000.

Several railroad systems furnish transportation facilities. About 100 miles of graded and macadam roads have been built, and the mileage of such highways is steadily increasing. Telephones are in general use, and the rural delivery of mail reaches all parts of the county.

The climate of Forsyth County is mild and healthful. A well-distributed rainfall of 48 inches annually is ample for the production of a wide range of crops.

Tobacco, corn, wheat, oats, and clover are the leading crops. Crops of secondary importance, grown mainly for home use, are sweet potatoes, Irish potatoes, cabbage, cowpeas, rye, sorghum, watermelons, cantaloupes, and garden vegetables.

Only a small amount of cotton is produced. Tobacco is the money crop.

Farm labor is relatively scarce. The average size of the farms is about 84 acres. About three-fourths of the farms are operated by the owners.

Land values range from about \$60 to \$200 an acre near Winston-Salem and smaller towns to \$20 to \$60 an acre for good farm land in more remote sections. The best bottom-land soils have a value of \$100 or more an acre.

The soils of this county are residual and alluvial. The soil materials have come principally from granites, gneisses, schists, and gabbro-diorite.

The Cecil is the most important series, covering more than 80 per cent of the area of the county. The lighter soils of this series are especially well suited to the production of truck crops, peanuts,

sweet potatoes, berries, pumpkins, watermelons, and tobacco, although all crops common to this region do well. The heavier red lands are especially suited to wheat, oats, corn, grasses, and clover.

The Durham sandy loam is the only member of the Durham series recognized, and this soil is particularly well suited to the production of bright tobacco, truck crops, sweet potatoes, peanuts, watermelons, and berries.

The Appling series is represented by a single member, the gravelly sandy loam. The soil is best suited to the production of fruits, vegetables, and tobacco.

The Iredell series is represented by the sandy loam type, some areas of which are well suited to the production of grains and grasses.

The Congaree series comprises the fine sandy loam and silt loam. These soils where drained are valuable for the production of corn and grass.

Small strips of alluvial and colluvial material are mapped as Meadow.

Most of the soils of Forsyth County are capable of being built up and maintained in a high state of productiveness.



[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, 1931, the Division of Soils was reorganized as the Bureau of Soils.]

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