

Issued August 31, 1916.

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 OF AGRICULTURAL EXPERIMENT  
STATION; C. B. WILLIAMS, AGRONOMIST.

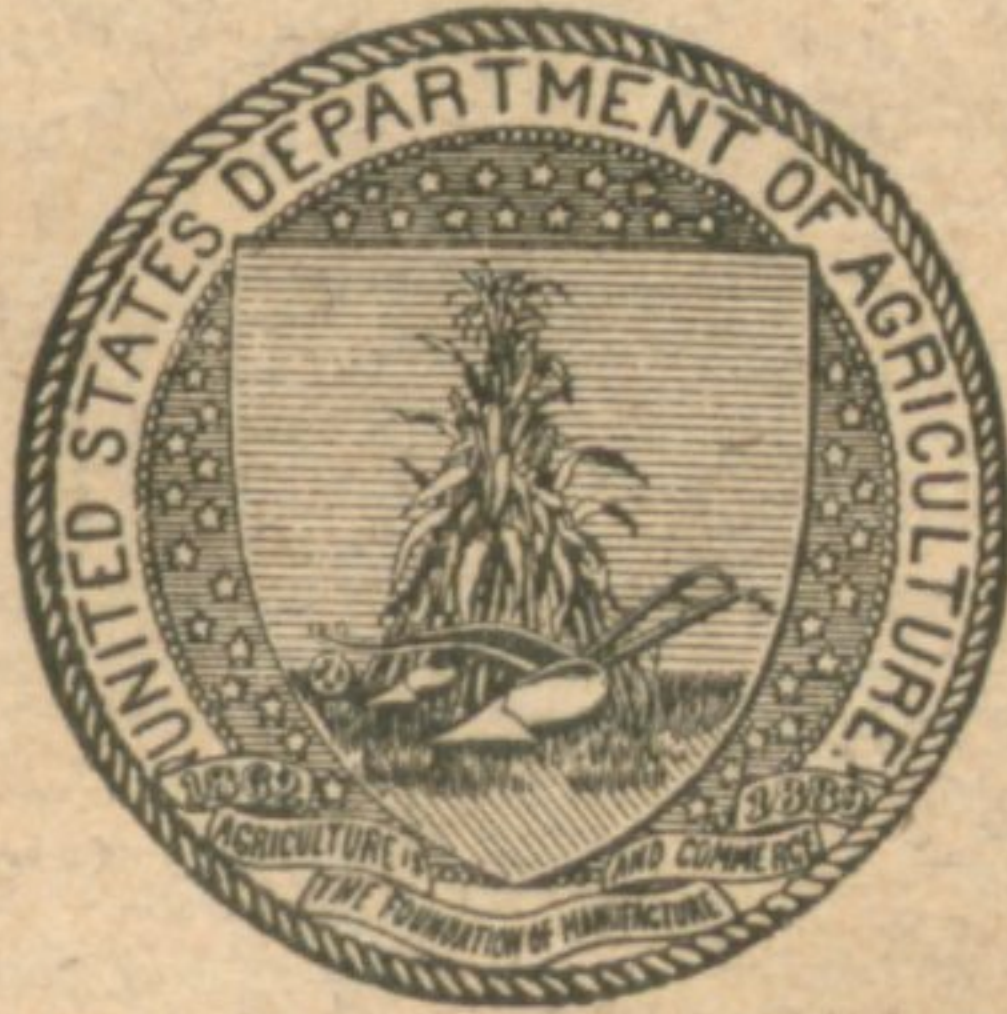
SOIL SURVEY OF WAYNE COUNTY,  
NORTH CAROLINA.

BY

B. B. DERRICK, OF THE U. S. DEPARTMENT OF AGRICULTURE,  
IN CHARGE, AND S. O. PERKINS AND F. N. McDOWELL, OF  
THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE.

W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1915.]



WASHINGTON:  
GOVERNMENT PRINTING OFFICE.

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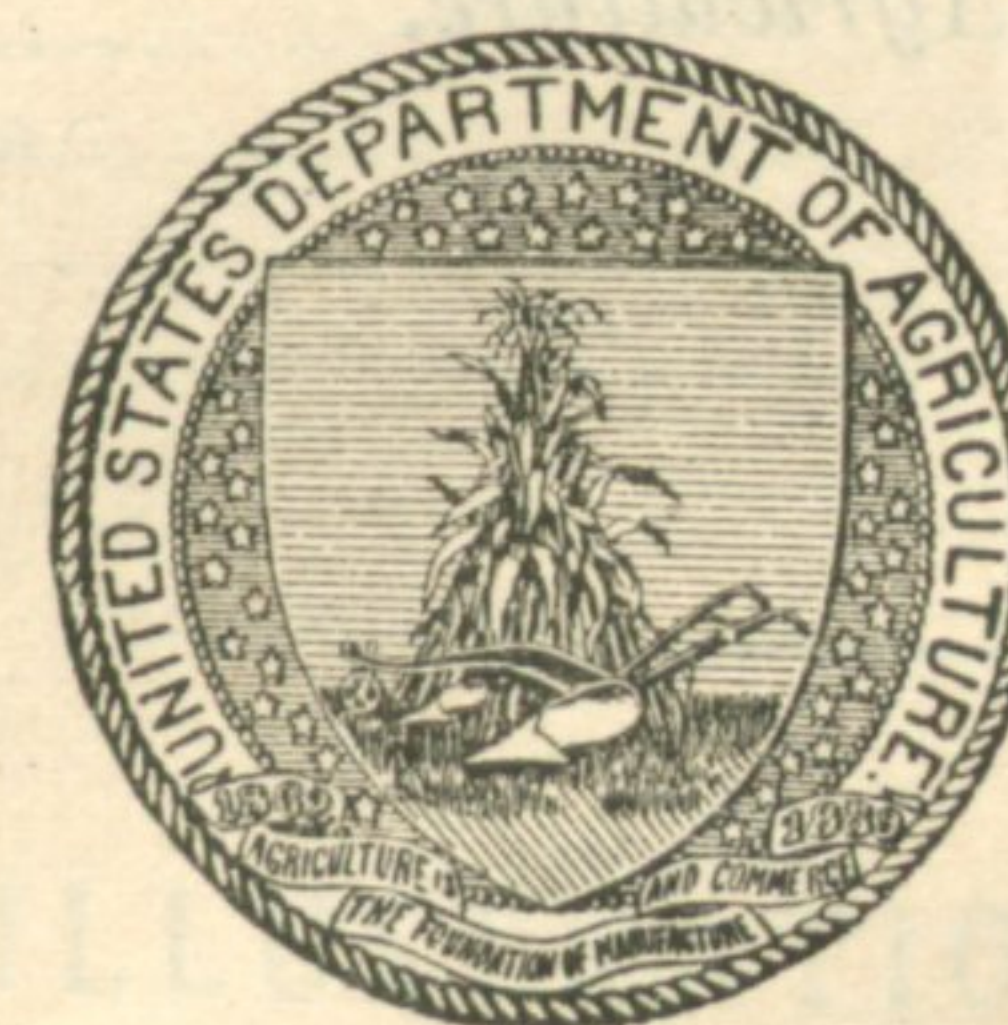
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## LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF SOILS,  
*Washington, D. C., February 1, 1916.*

SIR: In the extension of the soil survey in the State of North Carolina during the field season of 1915 a survey was made of Wayne County. This work was done in cooperation with the North Carolina Department of Agriculture, and the selection of the area was made after conference with State officials.

I have the honor to transmit herewith the manuscript report and map covering this work and to request their publication as advance sheets of Field Operations of the Bureau of Soils for 1915, as authorized by law.

Respectfully,

MILTON WHITNEY,  
*Chief of Bureau.*

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

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## SOIL SURVEY OF WAYNE COUNTY, NORTH CAROLINA.

By B. B. DERRICK, of the U. S. Department of Agriculture, In Charge, and S. O. PERKINS and F. N. McDOWELL, of the North Carolina Department of Agriculture.—W. EDWARD HEARN, Inspector.

### DESCRIPTION OF THE AREA.

Wayne County, North Carolina, is situated in the east-central part of the State. It is bounded on the north by Wilson County, on the east by Greene and Lenoir Counties, on the south by Duplin County, being separated from it for about 8 miles by Northeast Cape Fear River, and on the west by Sampson and Johnston Counties. It has an area of 554 square miles, or 354,560 acres.

The general surface features of Wayne County consist of level or undulating to gently rolling uplands and broad second bottoms along the Neuse and Little Rivers and some of their larger tributaries.

Most of the county possesses an undulating to gently rolling surface. However, some broad, rather level areas occur along the Atlantic Coast Line Railroad between Dudley and Mount Olive and westward to the Sampson County line, around Saulston, and in many other places in the northern half of the county. Along the Neuse and Little Rivers and a few of the other larger streams are developed areas of level to undulating topography. The slopes adjacent to the larger streams and to the bottom areas in the northern end of the county and the country known as the "sandhills" lying to the south of the Neuse River constitute the rolling and rougher surface features of the county. Along most of the streams the slopes are gentle, but occasionally there are some rather steep, though not long, slopes or bluffs. The streams have cut valleys which lie 20 to 40 feet, and in exceptional cases 80 feet, below the general level of the uplands. The bottom bordering the Neuse River varies from 1½ to 4 miles in width; that along the Little River is narrower. Along some of the creeks and swamps are narrow belts of flat, overflowed lands.

The drainage of the western, southwestern, and central parts of the county is through the Neuse River and its tributaries, the principal of which are Little River, Thoroughfare Swamp, and Stony and Sleepy Creeks. Little River joins the Neuse just southwest of Golds-

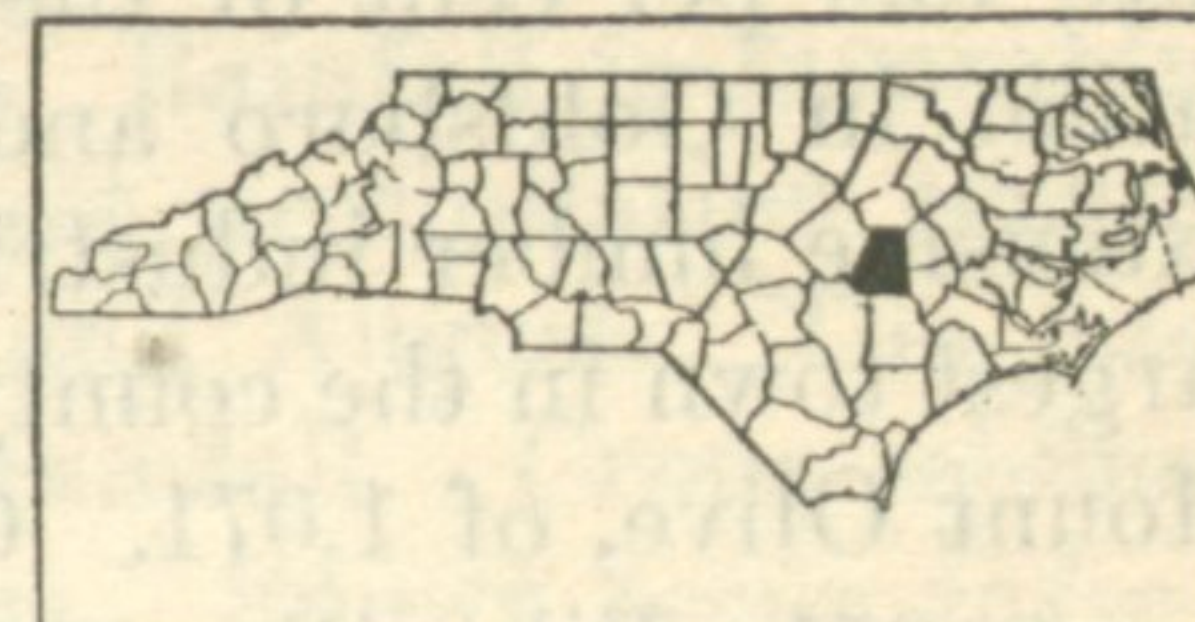


FIG. 1.—Sketch map showing location of the Wayne County area, North Carolina.



boro. The northern end of the county is drained by Nahunta Creek, which traverses the county from west to east, and by Aycock Creek, Great Swamp, and a few smaller streams flowing to the north. A portion of the extreme southeast part of the county is drained by the headwaters of Northeast Cape Fear River.

These streams, with their numerous branches and streamlets, furnish a fairly good drainage system for most of the county. There are some broad level and flat areas in the uplands and some in the second bottoms which are inadequately drained and not connected with natural drainage ways. This condition is due largely to the fact that the drainage system is young and imperfectly developed. The rivers and some of the larger creeks have almost reached base level, and very little actual deepening of their channels is taking place. Swampy areas border the streams in many places. These can in general be drained and reclaimed. Bear Creek, for example, has been canalled, and some excellent corn soil along it restored to a condition suitable for agricultural use.

Considerable water power is developed along the smaller and more rapidly flowing streams for the driving of gristmills, sawmills, and cotton gins.

The population of Wayne County in 1910 was 35,698. More than 99 per cent of the people are natives of the county. Negroes constitute 43.6 per cent of the population. There is a large negro population in Goldsboro and Mount Olive, mainly on account of the extensive lumber industries there. Goldsboro, the county seat, is the largest town in the county. It had a population in 1910 of 6,107, and Mount Olive, of 1,071. Other towns and their population are: Fremont, 951; Pikeville, 210; Whitehall, 179; and Dudley, 164. Quite a number of the rural districts are thickly populated, even at considerable distances from the towns, the land being in small farms. The rural population forms 82.9 per cent of the total and averages 48.1 persons to the square mile. In various sections of the county individuals own large tracts of land, and a considerable area in the aggregate is undeveloped.

The county has good transportation facilities. The Atlantic Coast Line Railroad traverses it almost through the center north and south, passing through Goldsboro and Fremont. The Norfolk Southern Railroad from the east terminates at Goldsboro, whence the Atlantic Coast Line Railroad and the Southern Railroad run west into Johnson County. The Neuse River is navigable for fairly large boats as far as Whitehall and on through the county for smaller craft. Logs are floated down Little and Neuse Rivers to large mills to the east.

The public-road system of the county is extensive, and highways reach all sections. Most of the roads are unimproved, but systematic road improvement is planned. Goldsboro Township has about 25 miles of excellent sand-clay surfaced roads. Several other townships have a few miles of the more important roads surfaced. These sand-clay roads are constructed rapidly and cheaply, and the cost of maintenance is low.

The system of rural free mail delivery service is complete. Telephone service reaches all parts of the county.

Goldsboro is the chief market and shipping point for the products of the county. It handles the bulk of the cotton and tobacco. The truck-shipping points, stated in the order of their importance, are Mount Olive, Goldsboro, Dudley, Fremont, and Pikeville. All are cotton markets. Nearly all the truck is shipped to northern markets. Express and fast freight trains are operated during the trucking season. Goldsboro and Mount Olive are centers of important lumber industries, handling finished and rough material.

#### CLIMATE.

The climate of Wayne County is mild and uniform, the highest monthly mean temperature being 79.8° F. in July and the lowest 42.3°, in January. The mean annual temperature is 61.1° F. The average annual precipitation is 52.87 inches. Rainfall is favorably distributed throughout the year. The highest precipitation occurs during the months of March, June, July, and August. The late fall and winter months have the lightest rainfall. Crops seldom suffer from drought or from excessive rains. Snows occur infrequently and are generally light and of short duration.

The winters are short and the summers long and warm. Spring opens early and the conditions are especially favorable for growing early truck and vegetables. With the mild winters, cover crops and several hardy crops for domestic and commercial use can be grown successfully.

The normal growing season in Wayne County is 210 days. The average date of the last killing frost in spring is April 6 and that of the first in the fall November 2. Frost has been recorded at the Goldsboro station, however, as late as April 21 and as early in the fall as October 17.

The climate of Wayne County is pleasant and healthful. At Sevensprings, in the southeastern part of the county, there are mineral waters that are considered to be of therapeutic value. Good drinking water is available in all parts of the county.



The following table, compiled from the records of the Weather Bureau station at Goldsboro, shows the more important meteorological conditions in the county:

*Normal monthly, seasonal, and annual temperature and precipitation at Goldsboro.*

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.....	43.8	83	9	3.32	3.60	2.75
January.....	42.3	78	4	2.97	1.00	5.02
February.....	44.6	78	11	4.10	3.10	.62
Winter.....	43.6			10.39	7.70	8.39
March.....	52.3	96	17	5.35	2.90	9.36
April.....	60.4	93	28	3.64	2.50	4.29
May.....	69.5	104	36	4.53	2.79	6.86
Spring.....	60.7			13.52	8.19	20.51
June.....	76.9	102	46	5.26	2.22	11.15
July.....	79.8	101	50	6.51	6.59	9.00
August.....	78.3	105	53	6.97	8.38	9.78
Summer.....	78.3			18.74	17.19	29.93
September.....	72.8	98	41	4.58	4.17	8.74
October.....	61.5	89	31	3.20	2.10	4.75
November.....	51.2	82	17	2.44	.56	2.15
Fall.....	61.8			10.22	6.83	15.64
Year.....	61.1	105	4	52.87	39.91	74.47

#### AGRICULTURE.

As late as 1730 the territory now included in Wayne County was inhabited by Indians. White settlement was of little consequence until about 1750. Hunting and trapping were the chief occupations of the early settlers, and furs and skins of wild animals were a source of considerable revenue.

Corn was the staple crop of the early settlers. Cattle and hogs were raised, and cotton and tobacco gradually became of importance. Most of the products were consumed at home. Cotton was made into clothing and cattle and hogs were butchered on the farms. A small number were driven to the nearest markets for sale. The turpentine industry developed about 1760 and this was followed by lumbering. Logs were floated down the Neuse River to Newbern, in Craven County. By 1790 an important lumber industry had

developed. With lumbering considerable land was cleared, and this was rapidly put into cultivation. The introduction of the cotton gin about 1840 marked the beginning of real progress in agriculture.

The 1850 census gives the production of the most important crops as follows: Corn, 480,240 bushels; wheat, 13,498 bushels; oats, 20,709 bushels; rice, 36,780 pounds; beans and peas, 93,045 bushels; sweet potatoes, 157,662 bushels; and cotton, 335 bales of 400 pounds each. From this time on until 1880 all the crops showed a decrease in production, with the exception of corn, cotton, and tobacco, the last having increased gradually until it became a staple crop. Rice continued to be grown commercially until after 1900, when its culture was discontinued.

In 1880 there were 44,469 acres in corn, producing 466,432 bushels; 32,103 acres in cotton, producing 14,558 bales; 7,041 acres in wheat, producing 37,195 bushels; 1,347 acres in sweet potatoes, producing 120,581 bushels; and 198 acres in tobacco, which produced 102,979 pounds.

Since 1880 wheat and rye have decreased in acreage. Oats are grown to about the same extent as they were 30 years ago. Corn, cotton, tobacco, hay and forage crops, peas and beans, Irish potatoes, and sweet potatoes have increased in acreage since 1880.

The agriculture of Wayne County at the present time is considerably diversified. It consists of the growing of cotton, tobacco, and various truck crops for sale, and the production for home use and local sale of corn, oats, peanuts, cowpeas, hay, and sweet potatoes. The raising of hogs is an important animal industry.

Cotton is the most important product. It is strictly a money crop. According to the census, in 1909 there were 44,155 acres in cotton, which produced 24,552 bales. It is probable that the production is somewhat greater at the present time. Except for a small amount of cotton used at the local mills, all the crop is shipped to outside markets. The principal varieties of cotton grown are the Cooks Improved, Cleveland Big Boll, Texas Big Boll, Money Maker, and Simpkins.

Corn is grown to a small extent on every farm. The acreage devoted to this crop is gradually increasing, being considerably larger at the present time than it was in the census year 1909. At that time there were 51,400 acres planted to corn, producing 645,592 bushels. The corn produced is used as a subsistence crop for feeding work stock and fattening hogs, and to supply home requirements. The amount produced in the county is not sufficient to meet the demand, and a considerable quantity is annually shipped in.

Tobacco is the third crop from the standpoint of acreage. It is strictly a money crop, and the entire production is shipped to outside markets. The tobacco grown is a bright-yellow leaf, used generally



in the manufacture of cigarettes and smoking tobacco. The 1910 census shows 5,235 acres devoted to tobacco, producing 3,439,063 pounds. The acreage is probably larger than this at the present time. When the price of cotton is low the acreage planted to tobacco is increased, and when cotton commands a high price tobacco is correspondingly reduced in acreage.

Considerable attention is devoted to oats. At the present time probably 50,000 bushels is the annual production. In the last few years the farmers have been growing wheat more extensively. Wheat was formerly grown on a large scale, but during the last few decades this grain has been gradually neglected until for 1909 the census reports only 310 acres sowed.

Of the 3,864 acres devoted to hay and forage crops in 1909, grains cut green occupied 2,582 acres and tame grasses 1,118 acres. Wild hay is of little economic importance. Cowpeas are extensively grown. They are grown either for seed or for hay or plowed under to improve the soil. The census reports 9,705 acres in cowpeas in 1909, from which 23,720 bushels of seed were harvested.

In many sections of Wayne County the texture and structure of the soils, the topography, and the climatic conditions all favor the trucking industry. This is especially true of the territory around Mount Olive and Goldsboro, which are the important truck centers of the county.

The truck crops grown consist of strawberries, English peas, string beans, Irish potatoes, cantaloupes, watermelons, cucumbers, and tomatoes. These are money crops and form an important item of the farm revenues. Most of the truck is shipped to northern markets, although a small part is sold in central and western North Carolina markets. Of the trucking crops the most important is strawberries. The census shows 517 acres in this fruit in 1909, producing 1,310,793 quarts. The chief varieties of strawberries grown are the Klondike, Missionary, Gandy, Lady Thompson, and Dixie Belle. Trucking is confined to locations in close proximity to the towns and lines of transportation.

Market-garden products are grown by practically all farmers for home use and near-by market sale. Sweet potatoes are an important vegetable crop. The annual production amounts to about 250,000 bushels. Peanuts are grown on a rather large acreage. Part of the crop is harvested for marketing, but most of the crop is used as forage for hogs.

The census of 1910 reports 19,760 hogs sold or slaughtered in Wayne County during the preceding year. Hogs are raised mainly for the purpose of supplying the home and the local markets with meat. The cattle sold or slaughtered in 1909 numbered 1,475. Only 188 head of sheep and goats were sold or butchered. Dairying is

not carried on extensively, though there are a few commercial dairies which supply milk for the city of Goldsboro.

Wayne County has a considerable number of fruit trees, mainly apple and peach. The 1910 census reports 26,554 apple trees, 22,321 peach, 1,669 pear, and 2,660 plum trees. The grapes grown are mainly Scuppernong. In 1910 there were 3,579 grape vines in the county. The production of figs in 1909 was 16,000 pounds. The total nut production was 10,802 pounds, mainly pecans.

The farmers of Wayne County to some extent recognize the crop adaptation of certain soils. They realize that the Norfolk sandy loam and fine sandy loam are the best soils for bright tobacco. The Norfolk sandy loam is rightly considered the best cotton soil. The Johnston and Okenee silt loams, where adequately drained, and the Myatt types are the best soils for corn. The Portsmouth fine sandy loam or the Norfolk fine sandy loam or very fine sandy loam is preferred for the production of strawberries. The Norfolk sandy loam and the loamy phase of the Norfolk sand are soils which warm up early in the spring, and they are selected for English peas, string beans, tomatoes, cabbage, cucumbers, cantaloupes, and watermelons. Farmers realize that wheat does best on the upland types of shallow soil, while there seems to be little difference between the yields of oats on the upland and the terrace soils. For best results peanuts require the well-drained, light sandy loams. The Cahaba fine sandy loam or the Norfolk sandy loam is the preferred soil for alfalfa.

Mules are generally used as work stock. The use of the 1-horse plow is general throughout the county, and many of these are commonly found on the large plantations. Many of the farmers, however, have 2-horse plows, disk harrows, stalk cutters, cultivators, fertilizer distributors, cotton weeders, tobacco-setting machines, lime distributors, grain drills, and binders. While the equipment is light, yet, owing to the character of the soil, only shallow plowing and cultivation are necessary over a large part of the county, and shallow tillage has proved to be most profitable.

The rotation of crops according to any definite system is not practiced by the majority of farmers. There are instances where cotton or corn has been planted successively on the same land for 50 years or more. However, many of the farmers alternate corn with cotton, growing cowpeas in the corn, either sowing them broadcast at the last cultivation or planting them in hills between the hills of corn. A rotation practiced on the farm of the State Hospital near Goldsboro, is as follows: The first year, cotton with crimson clover sowed at the last cultivation; second year, the clover is turned under and the land put in corn, with cowpeas sowed at the last cultivation of the corn; third year, a small grain is sowed, followed by cowpeas, the seed being picked later and the vines turned under.



Some of the truckers plant English peas in February, to mature about the 1st of May. Irish potatoes are planted between the rows in March and corn is planted after the peas are harvested. Cowpeas are sowed in the corn at the last cultivation; the second year includes string beans, with cotton planted between the rows and crimson clover sowed at the last cultivation of the cotton; the third year, corn is planted, followed by cowpeas.

The truck crops and tobacco are cultivated several times during the season, and with considerable care. Corn usually receives three or four cultivations, while cotton is given from four to seven cultivations.

About one-half million dollars' worth of commercial fertilizer is annually used by the farmers of Wayne County. Ready-mixed low grades analyzing 8-2-2 or 8-3-3<sup>1</sup> are most commonly used and almost to the exclusion of other formulas by the small farmers. Home mixing is practiced by a few farmers, the ingredients used being acid phosphate, cottonseed meal, and muriate of potash, though sulphate of potash is invariably used in mixtures for tobacco and Irish potatoes. Tobacco is fertilized with an 8-4-4 mixture at the rate of 600 to 1,000 pounds per acre. Cotton usually receives an acreage application of 300 to 600 pounds of an 8-3-3 or 8-2-2 fertilizer and not infrequently 75 to 100 pounds of nitrate of soda is applied during the growing season. Corn receives an application of about 200 to 400 pounds of an 8-2-2 or 8-3-3 fertilizer and sometimes a top dressing of nitrate of soda. The application in use for peanuts is 300 to 500 pounds of a 10-4-1 fertilizer. The soil for peanuts is first limed until it has reached an alkaline condition.

Strawberries require heavy applications of fertilizer. After seeding in the fall about 1,000 pounds of an 8-4-4 preparation is applied per acre. This is followed in December or January by an additional 400 pounds of acid phosphate and 100 pounds of nitrate of soda, and by another application, of 200 pounds of an 8-4-4 mixture, in February. English peas, string beans, cucumbers, cantaloupes, and watermelons are given 600 to 1,000 pounds of a high-grade fertilizer, usually analyzing 8-4-4 or 7-5-7. When stable manure is applied the percentage of nitrogen required in the fertilizer is less. Frequently Irish potatoes receive as much as 1,200 to 1,500 pounds per acre of a high-grade fertilizer. Oats and wheat are given a light application of mineral fertilizers in the fall and winter, and nitrate of soda in the spring. Cowpeas are liberally treated with phosphoric acid.

The labor supply is in general adequate. The laborers are mainly negroes. In the trucking districts during the busy season and in

<sup>1</sup> The formulas stated in this report represent the respective percentages of phosphoric acid, nitrogen, and potash.

cotton-picking time the bulk of the labor is obtained from near-by towns. Ordinarily, day laborers receive 75 cents to \$1 a day, while monthly wages, with board, range from \$12 to \$15, and without board from \$15 to \$20. Women receive about 60 cents a day. The pay for picking English peas is 20 cents a bushel, for beans 15 cents, and for strawberries 1 cent a quart. Cotton pickers are paid at the rate of 50 cents a hundred pounds at the beginning of the season, the pay increasing, as the season advances, to 75 cents or even \$1 a hundred pounds near the close of the season. As labor becomes scarce and increases in cost the natural tendency is for the farmers to cultivate a smaller acreage, giving it more intensive cultivation, and small farms are becoming more numerous.

Even at the present time the farms of Wayne County vary greatly in size. The large plantations of the Civil War period, comprising 1,000 to 5,000 acres, have been divided and sold until now very few of such holdings remain, but there are still a few farms of 1,000 to 2,000 acres held by individuals. According to the 1910 census, 81.8 per cent of the area of Wayne County is in farms, averaging in size 879.8 acres. The number of farms has increased from 2,232 in 1890 to 4,035 in 1910. In the western and eastern parts of the county the large farms range in size from 600 to 1,000 acres. Along the Atlantic Coast Line Railroad and in the more thickly settled sections farms comprise 20 to 200 acres. The larger holdings occur for the greater part in the undeveloped sections and sandy-land regions.

The percentage of farms operated by owners has decreased from 55.4 in 1890 to 37.3 in 1910. The systems of tenantry include outright renting, farming on shares, and cash rental. Where the land is rented outright the landowner receives one-third or one-fourth of the crops. In operating on the share system the landowner furnishes the land, work stock, stock feed, implements, and one-half the fertilizer, and receives one-half the production. Some of the land is let for a cash rental, while some is rented for a stated amount of a staple crop, *e. g.*, 1,000 pounds of lint cotton for a "one-horse farm" of 30 acres.

Land values throughout the county have increased rapidly in the last 10 or 12 years, owing largely to the growth of the towns and the development of the trucking possibilities. The value of land ranges from \$10 an acre in the sandy sections to \$200 in the trucking districts. In the vicinity of Goldsboro and Mount Olive the best developed land is held at \$100 to \$200 an acre.

#### SOILS.

Wayne County lies wholly within the Coastal Plain region of North Carolina. "The surface of this county is formed of three Pleistocene terrace plains. The Wicomico plain forms a belt several



miles wide along Neuse River at elevations of perhaps 70 to 80 feet above sea level. The Sunderland plain covers most of the surface to the north of Neuse River and a portion of the southeastern part of the county, at elevations of 110 to 150 feet. The highest or Coharie plain forms the surface of much of the southwestern part of the county, with probable elevations of 160 to 190 feet. These two latter are considerably dissected by stream erosion. The plains are separated from each other in places by well-defined escarpments."<sup>1</sup> In addition to the three formations mentioned, the Chowan formation enters the county from the east along the Neuse River and extends along that stream to the west of Broadhurst Bridge. Ancient slate rocks closely underlie the northwestern part of the county, and outcrop along Little River and at various other places, as Coore and Steven Mills and near the County Home south of Pikeville. These slate formations have not influenced the soils, however, except locally.

Superficial deposits of sands ranging from a few feet to 100 feet in thickness cover a belt of country lying to the south of the Neuse River and extending from Hallowell Store to Sevensprings.

The soils of Wayne County are derived from the unconsolidated sands, clays, and gravel of sedimentary origin which were brought down in former times from the Piedmont Plateau and Appalachian Mountain regions and deposited upon what was then part of the sea floor. Water has played an important part in assorting and redepositing the different grades of soil material, and the action of waves and stream currents accounts largely for the occurrence of soils of varying texture in different parts of the county. In the southwestern, northwestern, and southeastern parts the soils are finer in texture than in the northwestern and east-central parts and in the section bordering the Neuse River on the south.

In Wayne County there are two main groups of soils, the upland and the bottom-land types.

The upland soils occupy by far the greater part of the county. They are derived from sedimentary material. The upland soils are grouped into series distinguished chiefly by difference in color, structure, topography, and drainage. The Norfolk, Orangeburg, Ruston, and Portsmouth series are developed in the uplands.

The Norfolk soils are prevailingly light gray to grayish yellow in the surface portion and have yellow, friable sandy clay or sand subsoils. These soils are usually well drained.

The Orangeburg soils, derived from the same material, have gray to brownish or yellowish-red surface soils, with brick-red, friable sandy clay subsoils. The red subsoil color represents a more complete oxidation of the iron compounds than has taken place in the

<sup>1</sup> From report of N. C. Geological and Economic Survey, Vol. III, 1912, on The Coastal Plain of North Carolina. Other statements in this report concerning the geology of Wayne County are based on the same authority.

case of the Norfolk soils. Drainage is well established in the Orangeburg area. Only one Orangeburg soil is mapped in Wayne County.

The Ruston series, with its gray to grayish-brown surface soils and reddish-brown sandy clay subsoils, represents a stage of oxidation intermediate between that of the Norfolk and that of the Orangeburg series, as well as intermediate subsoil coloring.

The Portsmouth soils are derived from the same materials as the Norfolk, but have been modified by very different conditions since emergence from the sea. They occupy flat or depressed upland areas that have been for long periods in a semiswampy condition, favoring the accumulation of large quantities of vegetable matter. The surface soils are dark gray to black, with gray, mottled with brown and yellow, sandy clay or sand subsoils.

The bottom lands and terraces bordering the rivers and larger streams owe their origin to sediments which have been washed mainly from upland Coastal Plain soils and deposited by the streams. Along some of the larger streams some Piedmont material is intermixed with wash from the Coastal Plain material. The terrace, or second-bottom, soils differ from the first-bottom types in that they are seldom overflowed, while the first bottoms are subject to deposition of soil material by the streams at frequent inundations. The terraces occupy flat benches lying 30 to 50 feet above the first bottom.

The soils of the Neuse and Little River terraces or second bottoms occupy a position intermediate in stage of weathering between the most recent, or first-bottom, soils and the oldest, the upland, soils. The topography of the terraces indicates that they were formerly overflowed by the streams. The outer margin is marked by an abrupt rise to the uplands. The soils of the terraces differ from the upland soils mainly in position and structure of the material. Four soil series are developed on the terraces—the Cahaba, Kalmia, Myatt, and Okenee. These include sand, sandy loam, fine sandy loam, and silt loam types.

The surface soils of the Cahaba series are gray to brown, and the subsoils are yellowish red to reddish brown. The soils of this series lie largely above overflow and represent the best drained land of the terraces. The material consists of wash from the Coastal Plain with an admixture of Piedmont-Appalachian material. In places the subsoil is similar in color to that of the Orangeburg series, such areas representing the most advanced stage in drainage development and oxidation. Prevalingly, however, the subsoils have more of a reddish-brown color and correspond very closely to the subsoils of the upland Ruston series.

The Kalmia soils are related to the Cahaba series in physical properties in much the same way as the Norfolk series of the upland is



related to the Ruston. In color characteristics the Kalmia and Norfolk closely correspond, both having gray surface soils with yellow subsoils.

The Myatt types of the terraces correspond to the Portsmouth types of the uplands, occupying flat and slightly depressed situations, and having dark-gray to black surface soils. The subsoils are gray or mottled gray and yellow. They are friable, but are impervious, and natural drainage is poor.

The Okenee series is characterized by the black color of the surface soils and by the bluish-black to bluish-gray, plastic, heavy character of the subsoil. Frequently the surface soil is quite mucky, owing to the accumulation of organic matter from the decay of a growth of moisture-loving plants. These soils are found in the flats and depressions adjoining the upland. Poor drainage and the accumulation of decaying plant remains have altered the material. The Okenee soils are related to the grayish Myatt soils just as the black Johnston soils of the first bottoms are related to the grayish-brown Thompson soils. Only one soil of the Okenee series is recognized in Wayne County.

The soils of the first or overflowed bottoms are grouped in the Johnston and Thompson series. The Johnston silt loam occupies first bottoms along the upland streams. It has a black surface soil and a gray to brown subsoil, and is subject to frequent overflow. The Thompson silt loam is developed in the first bottoms along the Neuse and Little Rivers. It consists of a gray to brown surface soil with a yellow or mottled yellow and gray subsoil.

The Swamp comprises wet areas of soil of variable texture, developed along streams.

The following outline shows the general grouping of the various soil types according to origin, drainage, and color:

## Soils of Wayne County, according to origin, drainage, and color.

Origin.	Material.	Drainage.	Color.	Type.
Sedimentary Coastal Plain deposits.	Unconsolidated sands and clays.	For most part well established.	Gray to yellowish-gray, light-colored surface soils; yellow, friable sandy clay or sand subsoils.	Norfolk sand. Norfolk sand, loamy phase. Norfolk sandy loam. Norfolk fine sand. Norfolk fine sandy loam. Norfolk very fine sandy loam.
		Natural drainage thorough.	Grayish to brownish or yellowish surface soil; red, friable sandy clay subsoil. Oxidation more advanced than in other Coastal Plain soils.	Orangeburg fine sandy loam.
		Well established.	Gray to grayish-brown surface soils; reddish-brown, friable sandy clay subsoils. Occupy a stage of oxidation intermediate between Norfolk and Orangeburg.	Ruston sandy loam. Ruston fine sandy loam.
		Poorly established.	Dark-gray to black surface soils; gray or mottled gray, yellow, and brown subsoils. Oxidation retarded to a marked degree.	Portsmouth sand. Portsmouth sandy loam. Portsmouth fine sandy loam. Portsmouth loam.
Old alluvial stream terraces, now above normal overflow.	Coastal Plain, with varying admixtures of Piedmont and Appalachian material.	Well established.	Gray to brown surface soils; yellowish-red to reddish-brown, friable sandy clay subsoils.	Cahaba sandy loam. Cahaba fine sandy loam.
	Largely Coastal Plain.	Fairly well established.	Gray to grayish-yellow surface soils; yellow or mottled yellow and gray, friable sandy clay subsoils.	Kalmia sand. Kalmia sandy loam. Kalmia fine sandy loam.
		Poorly established.	Gray to dark-gray or black surface soils; gray to mottled gray and yellow, heavy, impervious sandy clay subsoils.	Myatt fine sandy loam. Myatt sandy loam.
		.....do.....	Black surface soil, bluish-black to bluish-gray, plastic clay subsoil.	Okenee silt loam.



*Soils of Wayne County, according to origin, drainage, and color—Continued.*

Origin.	Material.	Drainage.	Color.	Type.
Recent alluvial, first-bottom; subject to frequent overflows.	Largely Coastal Plain	Poorly established.	Black surface soil, gray to brown silty clay subsoil.	Johnston silt loam.
		Poorly established. Diking necessary to reclaim soil.	Gray to brown surface soil, dominantly yellow subsoil, which may show mottling of gray and brown.	Thompson silt loam.
		Poorly established; covered with water most of the year.	Grayish-brown to black undifferentiated surface soils and subsoils of variable texture.	Swamp.

The following table gives the name and the actual and relative extent of the several soils mapped in Wayne County. The distribution of the various soils is shown by means of colors on the map accompanying this report, and in the following pages the individual types are described in detail. Small areas of the unimportant type, the Louisa stony loam, are shown on the map with the Norfolk sandy loam, being distinguished by inclusion symbol.

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk fine sandy loam.....	79,296	22.4	Orangeburg fine sandy loam....	5,376	1.5
Norfolk sandy loam.....	75,904	21.4	Thompson silt loam.....	5,248	1.5
Norfolk sand.....	36,608	13.4	Cahaba fine sandy loam.....	4,992	1.4
Loamy phase.....	10,880		Cahaba sandy loam.....	4,928	1.4
Norfolk very fine sandy loam...	20,736	5.8	Kalmia sand.....	4,864	1.4
Ruston fine sandy loam.....	18,048	5.1	Kalmia fine sandy loam.....	4,736	1.3
Ruston sandy loam.....	11,392	3.2	Myatt sandy loam.....	4,672	1.3
Johnston silt loam.....	10,688	3.0	Portsmouth fine sandy loam....	4,096	1.2
Norfolk fine sand.....	10,624	3.0	Myatt fine sandy loam.....	3,648	1.0
Swamp.....	9,984	2.8	Okeene silt loam.....	2,816	.8
Portsmouth sandy loam.....	9,088	2.6	Portsmouth sand.....	1,664	.5
Portsmouth loam.....	7,872	2.2			
Kalmia sandy loam.....	6,400	1.8	Total.....	354,560	.....

#### NORFOLK SAND.

The surface soil of the Norfolk sand, to a depth of 6 to 8 inches, consists of a light-gray to nearly white, medium sand, resting upon a pale-yellow to yellow, loose, porous sand which generally extends to a depth of 3 feet or more. There is no well-defined line of demarcation between the surface soil and subsoil. On a few of the steeper slopes bordering streams the subsoil is yellowish brown to reddish

yellow in color. Along the streams flowing into the Neuse River from the south it frequently contains small quartz gravel particles and small stones consisting of sand cemented with iron compounds. Where it borders on the sandy loam types of this and other series the subsoil at a depth of 28 to 32 inches becomes slightly sticky.

In small depressed areas a light-brown sand to loamy sand is frequently encountered along the slopes of the ridges, and, on the other hand, in places where the loosened material has been accumulating for a long time, the surface soil and subsoil to a depth of many feet consist of a coarse sand. Spots in which the texture is a coarse or fine sand are found throughout the type in developments too small to be separated on the map. The principal included developments of Norfolk coarse sand are to the west of Goldsboro and along the Johnston County line.

Small, irregularly shaped areas of Ruston sand are included in this type as mapped, owing to their small aggregate extent and the lack of distinct variation in agricultural adaptations from the Norfolk type. The Ruston sand occurs mainly on high ridges and knolls surrounded by the Norfolk sand. It consists of a grayish-brown medium sand at the surface, underlain by a reddish-yellow or yellowish-brown sand to a depth of 3 feet or more.

The Norfolk sand with its loamy phase is an extensive soil type in Wayne County, covering an area of 74.2 square miles. The largest and best developed area occurs south of the Neuse River, extending in a narrow, irregularly shaped belt, close to the stream, from Hallowell Store to Whitehall. The second area of importance lies north of the Neuse River, extending from south of Adams Store east to the county line. This area is interspersed with numerous small spots of Norfolk sandy loam and Norfolk sand, loamy phase, and with occasional areas of Ruston sand and Ruston sandy loam.

The Norfolk sand comprises gently rolling to hilly, interstream upland areas having smoothly rounded slopes and knolls. Overlooking the larger streams it occupies steep and even precipitous bluffs 30 to 150 feet in height. Only a small part of the type has a topography that unfits it for the use of modern farm implements. Owing to its loose, open structure and comparatively high position, the natural drainage is good to excessive. Only in a few of the level or depressed areas is artificial drainage advantageous. As a result of the thorough drainage the soil warms up quickly in the spring and can be cultivated immediately after ordinary rains.

Upon the Norfolk sand there remain inextensive bodies of the original forest growth, consisting of longleaf pine and blackjack oak. The present forest growth consists mainly of old-field and shortleaf pine, scrub oak, and sweet gum, with some persimmon. In all the areas south of the Neuse River wire grass grows abundantly.



Little of the Norfolk sand is under cultivation. The principal crops are corn, cotton, and tobacco, with watermelons and peaches of some importance. Peanuts are grown for home use and to supply forage for hogs. The yields of corn and cotton are ordinarily low, about one-quarter bale of cotton or 6 to 10 bushels of corn being a usual acreage yield where no fertilizer is applied and no cover crops are grown. Some of the best farmers annually turn under one or more of various cover crops, including rye, rye and vetch, rye and crimson clover, oats and vetch, or cowpeas. This last legume makes a good growth when about 200 pounds of acid phosphate and 25 pounds of muriate of potash per acre are applied, and when these means are taken or where large quantities of stable manure and lime are applied, cotton can be made to yield one-half to three-fourths bale per acre with the use of 400 to 600 pounds per acre of an 8-3-3 fertilizer at planting time, followed at the second cultivation by a top dressing of 100 pounds of nitrate of soda. Corn with an acreage application of 400 pounds of an 8-3-3 or 8-2-2 fertilizer mixture yields 15 to 20 bushels per acre. For best results land for sweet potatoes receives an application of 600 to 1,000 pounds per acre of bone-meal and potash mixtures, and with such treatment yields of 100 to 300 bushels to the acre are obtained. Rye does well following cowpeas and makes a good winter cover crop. Tobacco land ordinarily receives 1,000 pounds of an 8-3-3 fertilizer to the acre and yields 800 to 1,000 pounds of bright tobacco of fine quality. In fact, the Norfolk sand is recognized as producing the finest quality of leaf in the county.

The Norfolk sand has been recognized in the district about Pinehurst, N. C., as being well adapted to peaches, watermelons, cantaloupes, dewberries, and grapes.

Land of the typical Norfolk sand varies greatly in value, depending upon the location and the general improvements. Near Goldsboro the price ranges from \$25 to \$75 an acre, while farther from town and transportation facilities it sells for \$7 to \$20 an acre.

It is recognized that this type is deficient in organic matter. This can be most economically added by growing and turning under green manuring crops, such as cowpeas, the vetches, the clovers or rye. Where this is done the moisture content of the soil is increased and the physical conditions bettered, and with these improvements the soil gains in productiveness. Sweetening the soil with burned lime scattered over the surface at the rate of 1,000 to 3,000 pounds to the acre tends to neutralize any sourness that may result from the turning under of vegetable matter, and the application of this material further improves the structure of the soil.

*Norfolk sand, loamy phase.*—The surface soil of the loamy phase of the Norfolk sand to a depth of 6 to 8 inches consists of light-

gray to gray, mellow sand. The surface coloring varies in shade according to the amount of organic matter present. Below the surface soil a pale-yellow loamy sand extends to a depth of 24 to 36 inches, where a sticky sandy loam, dull yellow in color, is reached. This continues to a depth of 3 feet or more. In level or depressed areas a friable sandy clay is frequently encountered at 28 to 33 inches, similar to the subsoil of the Norfolk sandy loam in color and texture. Small areas of typical Norfolk sand and of sandy loam too small to be separated on the map are included with this phase.

The loamy phase is an unimportant soil. It covers an area of 17 square miles, occurring in isolated areas throughout the eastern, south-central, and southeastern parts of the county. The most prominent bodies lie near Millers Station, around Best, in the vicinity of Indian Springs, and north of Whitefield Store.

The soil embraces undulating to level areas within the more rolling to hilly areas of typical Norfolk sand. Bordering the stream courses the surface configuration is rolling or slightly broken. By reason of its position the type is well drained and the effects of ordinary droughts are less severe on this than on heavier soils.

The original forest growth on the Norfolk sand, loamy phase, consisted of longleaf pine and scrub oak. The areas now uncultivated have become reforested with shortleaf pine, sweet gum, and bushes similar to those on the typical Norfolk sand, though the growth is more luxuriant on this phase. About 75 per cent of the phase is cultivated. The crops grown are the same as those upon the Norfolk sandy loam, but the yields are appreciably less. The phase, however, is much more productive than the typical Norfolk sand.

On land of this phase to the northwest of Goldsboro corn has yielded 15 to 35 bushels, cotton 1 bale, sweet potatoes 150 bushels, and oats 50 bushels, per acre. Ordinary yields, however, are one-fourth to one-half bale of cotton and 8 to 15 bushels of corn per acre. Truck crops, including cabbage, tomatoes, English peas, beans, dewberries, strawberries, onions, and collards, give excellent yields. In the vicinity of Carthage, N. C., dewberries on this kind of land produce \$150 to \$225 worth of fruit per acre.

The areas of this phase are generally so small that it is seldom sold independently of associated types. To the northwest of Goldsboro, where the soil has been improved, especially in organic content, and where values are influenced by the location near the town, it sells at \$125 to \$175 an acre, while isolated, unimproved bodies farther from town and transportation facilities bring only \$10 or \$20 an acre.

This soil is best adapted to early truck, tobacco, corn, and cowpeas. It is low in organic content. Vegetable matter can readily be incorporated and the soil otherwise improved by the same means as are suggested for the typical Norfolk sand and the sandy loam.



## NORFOLK FINE SAND.

The surface soil of the Norfolk fine sand, locally called "light sandy land" consists of a light-gray to ashy-gray, mellow fine sand to a depth of 6 to 8 inches. On a few knolls the surface is whitish in color, while along creeks and in some of the depressed areas the surface is frequently brownish, and in heavily wooded areas the surface few inches may be dark gray. The variation in color is due to the amount of organic matter present or to the staining of the quartz sand by iron or other minerals resulting from the decay of vegetable matter. The subsoil to a depth of 36 inches is a yellowish fine sand, loose and incoherent on the ridges and mellow on the level areas. Near the margin of areas of the Norfolk fine sandy loam it grades at about 30 inches into a sticky fine sandy loam. Occasionally patches of Portsmouth fine sand, which is dark gray to black in the surface portion and has a light-gray to gray subsoil, are included in this type, as their extent did not warrant the establishment of a separate type.

The Norfolk fine sand is developed in the southwestern part of the county and to a small extent in the eastern and northeastern parts. It covers an area of 16.6 square miles in Wayne County. The principal areas are located in the basins of Mill Branch, Mill Creek, Beaverdam Creek, and Thoroughfare Swamp. Isolated patches are encountered throughout the eastern half of the county. The most typical development is to the west of Steven Mill.

In surface configuration this type is somewhat variable. It occurs mainly as low ridges having smoothly rounded slopes and knolls, and becoming slightly rolling to broken as the stream courses are approached. All the type is sufficiently smooth to permit the operation of improved farm machinery. Owing to its favorable surface features and loose, open structure it possesses excellent natural drainage, except in occasional small depressions. Where the clay lies only 3 or 4 feet below the surface the soil is not markedly leachy and the moisture-holding capacity is good.

This soil was once forested with longleaf pine, most of which has been cut. The pine has been replaced by scrub oak, old-field pine, and sweet gum, together with a sparse growth of gallberry and myrtle in the poorly drained areas.

About 50 per cent of this type is now under cultivation. Formerly the belief prevailed among the farmers that this soil was of little value, but with the incorporation of large amounts of organic matter in the soil, in the form of green manuring crops, it has been demonstrated to be a desirable type for corn, tobacco, peanuts, and early truck crops, such as English peas, watermelons, cantaloupes, and cucumbers. Ordinary yields of corn where the soil has not been

improved are 8 to 15 bushels per acre, of cotton one-fourth to one-third bale, and of other crops in like proportion. Where organic matter has been supplied, corn yields 15 to 30 bushels per acre and cotton one-half to three-fourths bale. Tobacco produces 800 to 1,000 pounds per acre of a bright leaf of fine quality when 800 to 1,000 pounds of an 8-3-3 fertilizer per acre is applied. Peanuts of the Virginia bunch variety give 30 to 75 bushels per acre, and the North Carolina flat pea variety about 50 bushels. Oats give light yields and are almost entirely neglected. Sweet potatoes do well, but this vegetable, like the principal fruits, grapes and peaches, is grown only to supply home requirements and the demands of local trading centers.

The Norfolk fine sand, being located in general a considerable distance from towns and transportation facilities, sells at low prices. Values range from \$10 to \$50 an acre.

The farmers on this soil do not yet realize how much yields depend upon the content of organic matter. Best results require the plowing under yearly of at least one cover crop, such as crimson clover and rye, cowpeas, oats and vetch, or bur clover. These crops not only add much needed vegetable matter to the soil, but improve the physical condition and in this way increase the moisture-holding capacity of the soil. The addition of 1,000 to 2,000 pounds of burnt lime per acre also increases the productiveness materially.

## NORFOLK FINE SANDY LOAM.

The surface soil of the Norfolk fine sandy loam, to a depth of 6 inches, consists of a light-gray to gray fine sandy loam, passing into a pale-yellow or yellowish-gray fine sandy loam which extends downward for about 12 to 15 inches. The typical subsoil to a depth of 36 inches or more is a yellow, friable fine sandy clay. In the vicinity of Sevensprings it is encountered at depths varying from 18 to 28 inches. In the depressions the surface soil has a dark-gray color caused by the organic matter present, and the subsoil is sometimes mottled with gray. In the higher areas the lower part of the 3-foot section occasionally presents mottlings of red. Small areas of Norfolk sandy loam and very fine sandy loam and of Ruston fine sandy loam, too small to be separated, are mapped with this type.

The Norfolk fine sandy loam has a larger development than any other type in Wayne County, having an area of 123.9 square miles. It occurs most extensively and typically in the southwestern, southeastern, northern, and north-central parts of the county. The principal areas occur southwest of a line drawn through Anderson Store, Buck Swamp, and Thoroughfare Swamp and continuing to the Sampson and Duplin County lines; to the west, northeast, and east of Fremont; to the south of Pikeville; surrounding No. 4 School; and



to the south of Whitehall as far as the Lenoir and Duplin County lines. Small detached areas of irregular shape are scattered throughout the county.

Characteristically the type occupies undulating to gently rolling areas, interspersed here and there with almost level and flat tracts. It prevailingly occupies broad interstream situations. The flat or level areas are developed in the vicinity of Mount Olive, while some of the more rolling bodies lie to the west of Fremont, and to the north and east of Eureka and Faro. On account of the favorable topography this type is generally well drained. Only the flatter areas require artificial drainage, and this can be accomplished by means of open ditches or tile drains.

The Norfolk fine sandy loam is probably the most important soil type in the county. Only a small part of it remains uncultivated, forested with scrub oak, old-field pine, sweet gum, sassafras, and gallberry. Probably 85 per cent of the type has been cleared and is devoted to the production of cultivated crops. It produces in general good yields of all the common crops, although there is a general deficiency of organic matter throughout the type, brought about by the extensive use of commercial fertilizers and by continuous cropping without the application of stable manure or the incorporation of green manures. By the practice of proper rotations in connection with trucking and general farming and with liming it has been demonstrated that the Norfolk fine sandy loam improves in productiveness from year to year.

This soil is devoted to different farm practices in different parts of the county. Land of this type around Mount Olive is part of an extensive trucking district, while in areas in the central, northern, and southeastern parts of the county it is used for the general farm crops, only enough garden truck being grown for home needs.

One of the main money crops grown in the Mount Olive district is strawberries. The Klondyke, Missionary, Gandy, Dixie Belle, Lady Thompson, and Greensboro varieties are grown. The first three varieties named are the best suited for long shipment and bring the highest market price. They yield on an average about 175 crates per acre. The Dixie Belle, Lady Thompson, and Greensboro give yields of 175 to 200 crates of berries which sell well on the local market but are inferior in shipping quality. Strawberries ordinarily receive 1,000 to 2,000 pounds per acre of an 8-8-4 fertilizer mixture, given in two applications, the first about September 1 and the second about January 1. The crop ripens early in May.

Irish potatoes of the Irish Cobbler, Red Bliss, and White Bliss varieties are another crop produced for shipment in the Mount Olive district. They are planted from February 1 to 20, and are harvested about June 15. The average yield is about 80 barrels per

acre. Land for potatoes receives 1,500 to 2,000 pounds per acre of a 7-5-7 commercial fertilizer or of a homemade mixture consisting of 1,000 pounds of cottonseed meal, 200 pounds of nitrate of soda, 600 pounds of acid phosphate, and 200 pounds of sulphate of potash. This fertilizer is applied in the furrow and stirred with a North Carolina cotton plow. The potatoes are then dropped at intervals of about 16 inches in rows  $3\frac{1}{2}$  feet apart and two light furrows are thrown over the row.

English peas of the Telephone varieties are planted from about January 1 to February 1 and are harvested about May 1 to 15. They give an average yield of 75 baskets per acre. String beans yield 50 to 125 baskets to the acre, and mature about May 25. Onions of the White Pearl, White Potato, and Red Potato varieties yield 400 to 500 bushels per acre. The onion crop is ready for harvesting any time after June 1. For best results the seed for sets is sowed about August 10, and the sets transplanted about September 15. The land for onions usually receives 10 to 15 tons of stable manure per acre, applied at planting time, and the crop is given a top dressing in the spring of 600 to 1,000 pounds per acre of a 10-3-10 fertilizer. Cucumbers are another truck crop in this section. Yields range from 150 to 300 crates to the acre. The fertilizer applied is about 800 to 1,000 pounds of an 8-5-7 preparation per acre. Cucumbers are picked about June 30. Corn for roasting ears is an important crop, maturing about June 15. Acreage yields range from 60 to 100 boxes of about 90 ears capacity. Cantaloupes are a successful truck crop, yields ranging from 200 to 300 crates per acre. The crop is harvested about July 4 to 10. Cantaloupes and cucumbers are reported to net the producer on an average about \$150 an acre. Tomatoes and cabbage are minor but successful crops.

Land of the Norfolk fine sandy loam in the highly developed Mount Olive district is also used for the staple crops cotton, corn, oats, wheat, and tobacco. Cotton yields run as high as 1 to 2 bales per acre. Ordinarily 400 to 1,000 pounds to the acre of an 8-3-3 fertilizer is applied, with a top dressing of nitrate of soda in June. Some planters use 800 pounds to the acre of a home-mixed preparation in the proportion of 800 pounds of cottonseed meal, 800 pounds of acid phosphate, 200 pounds of nitrate of soda, and 200 pounds of muriate of potash.

Corn makes an average yield of 35 bushels per acre. Corn land receives 200 to 400 pounds of an 8-3-3 fertilizer per acre. Yields of oats of the winter varieties are reported as ranging from 25 to 70 bushels per acre. Spring oats are not a profitable crop. Wheat is growing in favor near Mount Olive. This grain follows some heavily fertilized crop and itself receives only a light application of nitrate of soda in March.



Tobacco is grown extensively on the Norfolk fine sandy loam in the northern part of the county and yields about 1,000 pounds to the acre of a slightly heavier leaf than that grown on the lighter soils. Sweet potatoes are grown on this type for home consumption and to supply local markets.

Land of the Norfolk fine sandy loam has a high value. The selling price ranges from \$100 an acre in the general farming sections to as much as \$250 an acre in the trucking districts.

#### NORFOLK VERY FINE SANDY LOAM.

The surface soil of the Norfolk very fine sandy loam consists of a light-gray to yellowish-gray, mellow very fine sandy loam, ranging in depth from 6 to 15 inches. Where the soil is more than 6 inches deep it continues pale yellow in color from that depth to the subsoil. In the level areas the surface soil is gray to light gray to a depth of 8 to 15 inches. The differences in the surface coloring are due to variations in the organic-matter content.

The typical subsoil, to a depth of 36 inches or more, is a bright-yellow very fine sandy clay or clay. In the undulating to slightly rolling areas it has a distinctly yellow color to a depth of several feet. In level to flat areas it shows mottlings of gray, the result of imperfect drainage and oxidation, while in other areas of small extent where oxidation, through aeration and drainage, has proceeded to an advanced stage mottlings of salmon red are seen, as along stream banks and adjacent to areas of the Ruston soils.

East of Aaron, the surface soil to a depth of 12 inches is a gray to pale-yellow very fine sandy loam; a pale-yellow very fine sandy clay extends from 12 to 18 inches, at which depth mottlings of red and yellow appear and continue to a depth of 36 inches or more. Large ferruginous stones are distributed over the surface, and disseminated through the subsoil are small iron concretions. The topography of this small area is flat and drainage is poor.

The principal developments of the Norfolk very fine sandy loam are around Saulston and Patetown, west of Antioch Church, to the west and northwest of Faro, around Fremont, and in irregularly shaped bodies in the vicinity of Mount Olive. The topography in general is level to undulating, although there are small areas having a flat surface, and a few rolling areas. The natural drainage of the type is not well established, and open ditches and tile are often necessary to insure proper drainage and aeration. In the more rolling areas, however, drainage is good.

The Norfolk very fine sandy loam occupies an important place among the soil types of Wayne County. About 75 per cent of its aggregate area is under cultivation, the remainder supporting a

growth of shortleaf and longleaf pine, scrub oak, red oak, black-jack oak, dogwood, and holly. In the Mount Olive district this type is used for trucking and general farming and here the crops grown, as well as the yields and the general farm practices, are the same as in the case of the Portsmouth loam. In the northern part of the county the Norfolk very fine sandy loam is almost exclusively a general-farming soil. Practices upon it are similar to those upon its associated type, the fine sandy loam, and the crops and yields upon it are much the same, with the exception of tobacco.

The Norfolk very fine sandy loam is well adapted to cotton. In Robeson County it is one of the best soils for this staple. It is also especially well suited to corn and cowpeas, and to general farming.

The selling price of land of the Norfolk very fine sandy loam ranges rather widely. In the vicinity of Mount Olive it readily brings \$150 to \$200 an acre, but around Saulston and to the north of that place the value is lower, about \$75 to \$100 an acre.

Owing to its rather close structure, this soil is benefited by applications of coarse manure or by plowing under green manuring crops, including crimson or bur clover, rye, vetch, oats, cowpeas or soy beans, and by applications every 3 or 4 years of 1,500 to 2,000 pounds of burnt lime per acre. This treatment not only materially improves the structure but assists in inducing proper aeration and drainage. All these betterments contribute to increase the productivity of the soil. Deep plowing and subsoiling have also been found beneficial.

#### NORFOLK SANDY LOAM.

The surface soil of the Norfolk sandy loam consists of a light-gray, or in places grayish-brown, loamy sand or light sandy loam, passing at about 6 inches into a pale-yellow sandy loam. The brown color where developed is due to the content of organic matter. The typical subsoil, beginning at any level between 12 and 20 inches and continuing to a depth of 3 feet or more, is a deep-yellow, friable sandy clay. Occasionally, in poorly drained situations, the lower portion of the 3-foot section shows mottlings of gray, and faint mottlings or streaks of light red are frequently seen in the higher and better drained areas. In places the typical deep-yellow, friable sandy clay is not reached above 20 to 24 inches, but the areas where this condition exists are insufficient in extent to warrant the recognition of a deep phase. A few inextensive areas of a shallow variation of this type, in which the surface soil is only 6, 8 or 10 inches in depth, were noted along the Johnston County line, but as this variation is not developed in other parts of the county it is not mapped separately.



Rounded quartz gravel is sometimes found on slopes, although the more uniform and typical areas are free from it. In some isolated areas, particularly on slopes, a rather large quantity of coarse sand is found on the surface, while in some of the more level or gently rolling situations the soil closely approaches in texture a fine sandy loam or loamy sand. Northwest of Goldsboro to the Johnston County line it is in places difficult to draw distinct boundaries between the different Norfolk types, as they merge into each other gradually.

In many places, especially to the west and southwest of Academy Crossroads and in spots bordering the Johnston County line, are areas differing from the sandy loam in having a coarser texture and in containing a little rounded quartz gravel. Such areas represent the Norfolk coarse sandy loam, which would have been mapped separately had its extent and importance justified it.

The Norfolk sandy loam is the second type in extent in Wayne County, covering 118.6 square miles. Its largest and most typical development is in the northwestern, western, east-central, and south-central parts of the county. It is the predominant soil around Aycock Mill, Academy Crossroads, and Dudley, and along Beaverdam Swamp, and is developed in an almost continuous tract reaching from Goldsboro east to the Lenoir County line. Small, irregularly shaped bodies are widely distributed throughout the county.

The Norfolk sandy loam occupies level, undulating or gently rolling to rolling, broad interstream areas, which become more rolling as the larger streams are approached. Some of the more level and gently rolling areas occur to the east of Goldsboro, east of Academy Crossroads, east of Fremont, and in the vicinity of Aycock Mill and Aycock Store. Owing to the favorable topography and the loose structure and depth of the surface soil the type is generally well drained. Only the flatter areas require artificial drainage and this can be accomplished by means of open ditches or tiles.

The Norfolk sandy loam is one of the important soils of Wayne County, and influences to a great extent the general agriculture. About 90 per cent of the type is under cultivation, the remainder being forested with a growth of old-field pine, oak, dogwood, hickory, and persimmon.

The Norfolk sandy loam is not surpassed by any type in the county in the range of crops to which it is adapted. It is one of the best cotton soils developed in eastern North Carolina. The yields of this staple range from one-half to  $1\frac{1}{4}$  bales per acre. From 400 to 1,000 pounds per acre of an 8-2-2 or 8-3-3 fertilizer is commonly applied at planting time, and a top dressing of 50 to 100 pounds of nitrate of soda given between June 15 and July 10. Cotton matures for the first picking by September 15.

Corn is the second crop in importance. This grain ordinarily yields 25 to 35 bushels per acre, though under favorable conditions as much as 99 bushels has been produced. Corn usually receives an acreage application of 200 to 400 pounds of an 8-2-2 fertilizer, with a light application of nitrate of soda as a top dressing. Corn planted March 25 to 30 matures about August 15 to September 1, depending upon the season.

Tobacco is extensively cultivated and the suitability of land for the culture of this crop has an important relation to its selling price. Yields of 500 to 1,000 pounds per acre are obtained with acreage applications of 600 to 1,000 pounds of an 8-3-3 or other high-grade home-mixed fertilizer. The potash element is preferably in the form of a sulphate, as the muriate of potash has a detrimental effect on the burning quality of the tobacco. Some of the best farmers favor a top dressing of about 50 pounds per acre of nitrate of soda two weeks after transplanting. The harvesting of tobacco covers the period from August 1 to September 15.

Oats and wheat are, after corn, the principal grain crops produced on the Norfolk sandy loam. Oats of the winter varieties, mainly the Appler, yield 25 to 45 bushels per acre. This crop usually receives about 200 pounds of acid phosphate and 100 pounds of muriate of potash per acre, applied about March 25, and is harvested about May 25 to June 1. Wheat is grown by a few farmers on this type with pronounced success. Yields of 15 to 40 bushels per acre are obtained. Wheat matures about June 1 to 10, in time to be followed by cowpeas for hay. One of the discouragements to wheat production is the lack of flour-milling facilities. Rye is grown to some extent for forage and as a winter cover crop.

A wide range of vegetable and truck crops can be produced on the Norfolk sandy loam. Formerly large quantities of watermelons and cantaloupes were grown for shipment, but owing to inefficient methods of marketing and consequent reduction of profits these crops have been somewhat neglected, though they are still grown for home use and near-by markets. Sweet potatoes do well and are grown on every farm. The surplus is disposed of at local markets. This crop matures about August 1 to September 1, and does best on types of rather light textured, deep surface soils, heavily manured or fertilized with phosphate, potash, and a small amount of nitrogen to start the growth. Irish potatoes are successfully produced, although on a small scale. They mature about June 25. Cabbage succeeds, the early varieties maturing about June 1. By changing the variety and varying the planting time, cabbage can be harvested throughout the season. Some of the cabbage shipped from the county is grown on this type of soil. Near Goldsboro dewberries have become an important crop, and indications are that this small fruit will be



highly profitable. Dewberries mature about June 1 to 15, following very closely the close of the strawberry season.

Although all the truck crops give excellent returns on this soil type, they are, in general, grown mainly for home use. English peas and beans, however, are shipped in large quantities. Peas mature about April 15 and string beans are harvested about June 10.

Trucking has a somewhat restricted development in Wayne County. It is carried on mainly near Goldsboro and in the northern part of the county. The lack of greater development is apparently due to inefficient methods of marketing, though seasonal conditions are not altogether favorable. In late seasons crops go on the market at the same time as the Virginia products and the Wayne County growers are handicapped in competition.

Miscellaneous crops grown on the Norfolk sandy loam are sorghum, cultivated for home use; chufas, valued for forage and as a winter cover crop; and various legumes. Peanuts give excellent yields of nuts, and are in addition excellent for soil improvement, but this legume occupies only a small acreage. Cowpeas are grown extensively and give good yields of both seed and hay. A mixture of cowpeas with soy beans or crab grass makes excellent hay, and the soy beans help to support the cowpea vines. Cowpeas may be sowed after a truck or small-grain crop or in corn at the last cultivation. They do best where an application of acid phosphate is given the land.

Tree fruits, including peaches, pears, and figs, are profitable crops, but they are not grown on an extensive scale. Scuppernong grapes are especially well adapted to this soil and there are large vines on nearly every farm.

Land of the Norfolk sandy loam varies greatly in value, depending upon the location and the general improvements. Near Goldsboro the price ranges from \$75 to \$175 an acre, while in the vicinity of Dudley values run from \$40 to \$75 an acre. In the northern part of the county, where tobacco is one of the most important crops, this land sells at \$125 and upward an acre.

The Norfolk sandy loam is deficient in organic matter. The incorporation of this constituent strengthens the moisture-holding capacity of the soil and increases the productiveness. Clovers and cowpeas are highly valuable as soil improvers, and growing these legumes and, especially, plowing them under constitutes one of the quickest and most economical means of furnishing needed organic matter. The friable sandy clay subsoil enables the soil to be built up to a rather high state of productiveness and the effects of manuring or incorporating organic matter are quite lasting. The application of 1,000 to 2,000 pounds of burnt lime per acre tends to counteract

any sourness resulting from the addition of the green manure and is further beneficial to a certain extent in improving the structure of the soil.

#### LOUISA STONY LOAM.

Areas mapped in Norfolk sandy loam color but indicated on the map with inclusion symbol represent developments of the unimportant type, the Louisa stony loam.

The surface soil of this type in Wayne County varies from a silt loam 3 to 5 inches deep carrying a high percentage of schist rock, as near the County Home, to a reddish-yellow fine sandy loam 4 to 6 inches deep, as near Coore and Steven Mills. In the area near the County Home 60 to 75 per cent of the surface is covered with schist rocks varying in color from light gray to pinkish red, and in size from platy fragments a fraction of an inch in thickness to irregularly shaped rocks several inches in diameter. A small percentage of the fragments are of feldspar. At Coore and Steven Mills huge outcrops of the schist rock are exposed.

The subsoil is a dull-red very fine sandy clay, silty clay or clay, 6 to 30 inches or more in depth. The variableness of the texture is due to different proportions of Coastal Plain material being mixed with the Piedmont material. Finely divided mica flakes are disseminated through both the surface soil and subsoil.

The Louisa stony loam is residual in character and its development in Wayne County represents dikes or ridges of Piedmont formations protruding through the Coastal Plain mantle. The topography varies from level near the County Home to hilly and broken at Steven and Coore Mills. This type is of little agricultural value, and is mainly interesting from a geological standpoint, since such developments are of rare occurrence in this part of the State.

#### ORANGEBURG FINE SANDY LOAM.

The surface soil of the Orangeburg fine sandy loam to a depth of 6 to 8 inches consists of a gray to grayish-brown light sandy loam or loamy fine sand, which grades into a reddish-yellow or yellowish-red fine sandy loam. At 15 to 18 inches a brick-red, friable fine sandy clay subsoil is encountered, which continues to a depth of 3 feet or more. In isolated spots the subsoil shows mottlings of yellow. Throughout the soil mass, but especially in the subsoil, there are conspicuous quantities of small iron concretions, and in places ledges of iron crusts appear on the surface. In local areas on slopes and knolls overlooking streams the surface soil has been removed by erosion, exposing the red sandy clay.

In a few spots elsewhere the brick-red clay is encountered at depths of 28 to 30 inches. These latter areas would be mapped as



Orangeburg loamy fine sand had their extent justified their separation. This type also includes areas of Orangeburg sandy loam, Ruston sandy loam, and Ruston fine sandy loam too small to be separated. The largest areas of Orangeburg sandy loam occur to the west of Roberts School, west of Williams Pond, and in the vicinity of Whitfield Store. Along Nahunta Swamp this type contains a high percentage of quartz gravel scattered through the subsoil, the fragments varying in size from a fraction of an inch to 2 or 3 inches in diameter.

The Orangeburg fine sandy loam has an area of 8.4 square miles. Its greatest development is in the southern and northern parts of the county. Some of the more prominent areas are situated along Northeast Cape Fear River, where they occupy upland slopes adjacent to the stream on the north. Isolated tracts are located to the north of Nahunta Swamp.

This type occupies in general the slopes and higher areas adjoining streams, though in a few cases in the northern part of the county it is found in level to undulating interstream situations. The topography is on the whole gently rolling to rolling, and in the vicinity of streams often somewhat gullied and broken. Owing to the position and topography, natural drainage is well established.

The present forest growth on the Orangeburg fine sandy loam consists mainly of shortleaf pine. Scarcely any of the type remains forested.

The chief crops grown are corn and cotton. Oats, cowpeas, and wheat are crops of less importance. Sweet and Irish potatoes, sugar cane, and garden vegetables are grown to supply home requirements. Such fruits as peaches, pears, and grapes do well and attain fine color and flavor. The yields of all the crops grown on this soil are similar to those obtained on the Norfolk and Ruston fine sandy loams. The Orangeburg, however, is naturally a stronger soil than either the Norfolk or Ruston, owing to the more complete oxidation of the iron compounds that has taken place, resulting in the red color of the subsoil. The iron compounds in this soil impart to fruits a richer color and better flavor than it is possible to attain on other soils in this section of the State.

The Orangeburg fine sandy loam is in general located a considerable distance from towns and transportation facilities, and sells at very reasonable prices. Values range from \$25 to \$60 an acre.

The Orangeburg fine sandy loam responds to the same methods of improvement as does the Ruston fine sandy loam.

#### RUSTON SANDY LOAM.

The surface soil of the Ruston sandy loam consists of a gray or brownish-gray loamy sand or light sandy loam, grading into a yellowish-gray or brownish-yellow sandy loam of the same or

slightly heavier texture at about 6 inches. In places the surface material is rusty brown in color and it may be a loamy sand instead of a sandy loam. The subsoil, beginning at about 12 to 20 inches, is a brownish-yellow or reddish-yellow, friable sandy clay. This type occupies an intermediate position as regards color, particularly subsoil color, between the Norfolk and the Orangeburg sandy loams. The subsoil is somewhat heavier than that of the Norfolk sandy loam and frequently shows mottlings of pale yellow.

As mapped this type includes areas of Ruston sand and coarse sandy loam and of Orangeburg sandy loam too small to be separated on the map. The areas of Ruston coarse sandy loam included are found to the north of the State Hospital and to the west of Coore Mill. They occupy slopes overlooking stream courses. The soil is a light-gray to brownish-gray coarse sandy loam to a depth of 12 to 15 inches. The subsoil is typical of the Ruston series in color. Small rounded quartz gravel is scattered on the surface and mingled through the soil and subsoil to form about 10 per cent of the mass.

The Ruston sandy loam is found in small, scattered areas throughout the county. This type is closely associated with the Norfolk sandy loam and occupies strongly rolling slopes and hilly areas adjacent to stream courses. Most of these slopes and hills have comparatively smooth surface features, and there are few gullies, although the run-off is rapid and the drainage thorough.

Approximately 75 per cent of this soil is now under cultivation. The remainder is forested with a rather heavy growth of longleaf and shortleaf pine, red, white, and blackjack oak, sweet gum, and black gum, with some cedar, maple, and sassafras.

The areas of this type possessing the more favorable topography are well suited to corn, cotton, tobacco, oats, and cowpeas, of all of which it gives good yields, as well as fair yields of sweet potatoes and early truck. Corn and cotton are the principal crops. Corn yields 10 to 25 bushels per acre, and cotton one-half to 1 bale per acre, depending upon the fertilization. Rye, beans, sugar cane, peanuts, melons, Irish potatoes, berries, small fruits, and vegetables are grown, but not extensively. They bring good returns. Certain varieties of peaches and grapes succeed on the slopes where the air drainage is good.

The Ruston sandy loam is intricately associated with the Norfolk sandy loam and seldom occurs in developments of sufficient extent to be sold separately. An ordinary price, however, for this soil is \$30 to \$70 an acre.

The areas of this type having steeper topography than the average are best left in the forest cover. Where such land has been cleared



it is best adapted to use as permanent pasture. The type is improved and made more productive by the same practices as are advantageous upon the Norfolk sandy loam.

#### RUSTON FINE SANDY LOAM.

The surface soil of the Ruston fine sandy loam to a depth of 4 to 6 inches is a grayish loamy fine sand or light fine sandy loam, grading into a lighter gray or brownish-yellow fine sandy loam which extends to a depth of 12 to 15 inches. This is underlain to a depth of 36 inches or more by a brownish-red or reddish-yellow, friable fine sandy clay, the lower portion of which is occasionally mottled with yellow, rusty brown or dull brown. Included in this type are areas in which the subsoil is not encountered above 28 inches, while in other places, adjacent to streams and where erosion has been active, the reddish subsoil is frequently exposed at the surface. Often near stream courses a small percentage of the soil and subsoil mass consists of fine quartz gravel.

In the neighborhood of Saulston this type approaches the Ruston very fine sandy loam in characteristics and would be mapped as such did such development occur in sufficient extent. In the more rolling areas, where conditions are more favorable to weathering, a light-textured variation of the Ruston fine sandy loam is developed, with a subsoil redder than typical, while in the more level situations, generally on the lower slopes of the stream valleys, the soil contains more silt and a heavier phase occurs, in which the subsoil is lighter colored.

The Ruston fine sandy loam has its greatest development in the northern part of the county. Large, irregular areas are mapped along Nahunta, Aycock, and Turner Swamps. Small but important areas occur in the section drained by Thoroughfare Swamp and Buck Marsh, and to the south of Sevensprings. Isolated areas are scattered throughout the county.

The type occupies gently rolling to level areas adjacent to streams and having smoothly rounded slopes and knolls. The rolling surface features of this type favor excellent natural drainage for all the areas. The quartz gravel present on the slopes tends to retard surface washing and consequently few gullies have been carved out by the run-off.

About 80 per cent of this soil type is under cultivation. A few isolated areas still support a moderately heavy cover of old-field pine, red and white oak, dogwood, and sweet and black gum, with some persimmon, elm, and sycamore.

The Ruston fine sandy loam gives good yields of the staple crops, including cotton, corn, oats, and cowpeas. Under the usual methods

of culture employed cotton yields about one-half to 1 bale per acre, corn from 25 to 45 bushels, and oats 25 to 40 bushels. Cowpeas yield 1 to 1½ tons of hay per acre. Soy beans, vetch, peanuts, sugar cane, and a number of vegetables do well and are grown for home consumption.

Cotton is fertilized with an acreage application of 400 to 1,000 pounds, and corn 200 to 400 pounds, of an 8-3-3 preparation. Land for oats is treated with a fertilizer high in phosphoric acid.

Land of the Ruston fine sandy loam is valued at prices ranging from \$50 to \$125 an acre.

Most of the land of this type can be brought to and maintained in a reasonably high state of productiveness by methods including deep fall plowing, the rotating of crops, and the incorporation of vegetable matter in the soil by the use of such winter cover crops as rye, oats, bur clover or vetch. These crops not only serve as a protection against washing and leaching, but they, as well as cowpeas, soy beans, and velvet beans, are especially beneficial to the soil when plowed under in adding nitrogen and humus-forming matter. Frequent and shallow cultivation during the summer months and the judicious use of liberal quantities of commercial fertilizers are other factors important in improving the productiveness of this soil.

#### PORTSMOUTH SAND.

The surface soil of the Portsmouth sand to a depth of 12 to 15 inches consists of a dark-brown or black sand, carrying a high percentage of organic matter. This is underlain by a light-gray medium sand which frequently shows mottlings of yellow and rusty brown. Layers of white sand are encountered at varying depths in the subsoil. Frequently at about 30 inches the color becomes lighter and the material may grade into a dingy-white sand or a mottled gray and yellow, sticky sandy clay. In local areas the lower part of the 3-foot section is slightly sticky. In localities in which this type borders the Norfolk sand a layer of white sand 1 inch to 3 inches in thickness frequently covers the black to brown sand soil. This type as mapped includes patches of the Portsmouth sandy loam type too small to be separated.

The Portsmouth sand is confined mostly to the east-central part of the county. Small areas of Portsmouth fine sand in the southwestern part of the county are included in this type on the map because of their small extent. The most important of such areas is west of Corbett Hill School.

The characteristic occurrence of the Portsmouth sand is in flat, level or slightly depressed upland situations. It occurs generally near the heads of streams. The drainage is poor, part of the type



being in a semiswampy condition during much of the year, necessitating artificial drainage. This can be supplied by open ditches, although this method is not altogether satisfactory, as the loose sand has a tendency to slide.

The native vegetation comprises mainly scattered pine, with a growth of bay bush, gallberry, and huckleberry. In some of the more swampy tracts the soil supports more or less cypress and gum.

Approximately 90 per cent of this type is still in forest. The remainder is mainly in corn and cotton. Owing to the generally poor drainage the yields are low, and the Portsmouth sand is a rather undeveloped type in this county. In Bladen and Pender Counties the type gives good yields of corn, cabbage, and cucumbers, with heavy applications of lime and commercial fertilizers.

This soil is not considered desirable for general farming and can be purchased at a low price.

#### PORTSMOUTH SANDY LOAM.

The surface soil of the Portsmouth sandy loam extends to a depth of 5 to 8 inches. It is prevailing a dark-gray to black, light sandy loam carrying a high percentage of organic matter. Between this and the subsoil proper is a subsurface layer of light-gray sandy loam, which extends to a depth of 12 to 15 inches. The subsoil consists of a mottled gray and yellow or yellowish-brown, heavy, plastic sandy clay. In places sand strata appear at depths of 30 to 36 inches.

In the poorly drained or depressed areas the surface soil is a black, heavy sandy loam or loam containing a very high percentage of organic matter, and the subsoil is a drab or steel-gray, heavy, sticky sandy clay, showing occasional mottlings of rusty brown. In cultivated areas where good drainage has been established and continuous cropping has been practiced the surface soil ranges in color from black to dark gray, and the subsoil shows more of the yellow mottlings.

This soil has the largest development of any of the Portsmouth types. Tracts of varying extent and outline are scattered throughout the county. Some of the more prominent areas are found to the south of Indian Springs, north of Grant School, in the vicinity of Goldsboro, near Casey Chapel, and northwest of this place. The Portsmouth sandy loam occupies prevailing flat and level areas and slight depressions. The land is saturated during many months of the year, and without artificial drainage is not suited to the production of the general farm crops.

Perhaps 75 per cent of this type is still forested. The timber growth consists of cypress, gum, willow, and water oak, with a small number of shortleaf pine. There is an undergrowth in many places of water-loving vegetation, consisting of gallberry, huckle-

berry, myrtle, bamboo briers, and cane. A large acreage of this type is fenced for hog and cattle pasture, to which use it is well adapted.

In the well-drained situations the Portsmouth sandy loam gives good yields of corn and cotton in favorable seasons. Such garden crops as cucumbers, cabbage, onions, strawberries, and lettuce are grown for home use. They do well and apparently would be profitable crops for commercial production. Corn ordinarily yields 20 to 35 bushels, cotton one-half to two-thirds bale, and oats 25 to 40 bushels, per acre. Cotton is treated with about 200 pounds of an 8-3-3 fertilizer per acre, but corn is seldom fertilized.

The selling price of this soil depends upon several factors, largely upon the expense and possibilities of drainage. The soil and subsoil are very compact and open drainage ditches must be placed close together, cutting the farm into many small fields and making the use of labor-saving machinery difficult. Underdrainage would circumvent this disadvantage, but would increase the initial cost of preparing the soil for general farming.

This type, like all the Portsmouth soils, needs heavy applications of lime, as well as drainage improvements to permit more thorough aeration. When reclaimed it is well adapted to corn.

#### PORTSMOUTH FINE SANDY LOAM.

The surface soil of the Portsmouth fine sandy loam is prevailing a dark-gray to black fine sandy loam, having a depth of 10 to 15 inches. In slightly depressed situations where drainage is poor the surface soil is black, and frequently approaches a very fine sandy loam in texture, while, on the other hand, the better drained areas which have been cultivated for a length of time usually are dark gray in color. Occasionally a subsurface layer of light-gray fine sandy loam or loamy sand is encountered at 6 or 8 inches, overlying the subsoil. In its typical development the subsoil consists of a mottled gray and yellow, heavy, sticky fine sandy clay or clay. Deficiency in drainage accounts for the mottlings. In poorly drained situations the subsoil consists of a drab or steel-gray fine sandy clay. Strata of fine sand and pockets of clay are encountered in the subsoil.

The Portsmouth fine sandy loam covers an area of 6.4 square miles. It occurs in small, irregularly shaped patches throughout the county. The principal areas are in the northern and southwestern parts.

The type prevailing occupies slightly depressed, flat or level upland areas. The close and compact structure makes artificial drainage a prerequisite for the production of farm crops. Open ditches dug through this soil retain their shape well and are sufficient to provide adequate drainage for most of the type.



The growth on the wooded areas of the Portsmouth fine sandy loam consists of longleaf pine, willow oak, water oak, cypress, gum, and a few poplar, with an undergrowth of gallberry, bamboo, and cane. Inadequate drainage has favored the luxuriant growth of grasses and other vegetation, with the result that a large content of organic matter has accumulated in the surface soil. About one-half of this type is cleared and under cultivation.

Corn, cotton, oats, strawberries, cucumbers, potatoes, cabbage, and turnips do well on this soil. On well-drained land corn yields 20 to 35 bushels per acre. Cotton yields one-half to 1½ bales per acre. In the vicinity of Mount Olive this type produces excellent yields of strawberries, cucumbers, cabbage, and cantaloupes. Many of the farmers here make heavy applications of lime and small applications of commercial fertilizer, using about 300 to 500 pounds per acre of an 8-3-3 preparation for corn and cotton, and 800 to 2,000 pounds of an 8-4-4 or other high-grade home-mixed fertilizer on strawberries and other truck crops.

No land of this type is sold independently of its closely associated type, the Norfolk fine sandy loam. It is highly prized as a truck soil, and is located near good shipping points.

#### PORTSMOUTH LOAM.

The surface soil of the Portsmouth loam is prevailing a dark-gray to black silty loam, loam or very fine sandy loam to a depth of 12 to 15 inches. The typical subsoil is a light-gray sandy clay or clay loam, mottled with varying shades of yellow and extending to a depth of 36 inches or more. In forested and poorly drained situations the surface soil has a black color, caused by the accumulated organic matter, and in a few places it contains more than the typical proportion of very fine and medium sand. The subsoil where both these variations occur shows occasional mottlings of rusty brown, indicating a low degree of oxidation, the result of imperfect drainage. In level situations, where the type is saturated with water for a part of the season, the subsoil often presents a dark-gray to drab color. To the north of Goldsboro and in the vicinity of Saulston the surface soil approaches in texture a very fine sandy loam and would have been mapped as such had the variation occurred in sufficient area.

The Portsmouth loam has a limited development. It occurs in numerous small areas and is closely associated with the Norfolk very fine sandy loam and fine sandy loam. The principal areas occur around Mount Olive and to the west, in the vicinity of Freewill Chapel and in detached areas east to the Greene County line. Small isolated patches are scattered throughout the county.

The type occupies uniformly level, flat or slightly depressed areas in the uplands. On account of the situation and the close, compact structure of both the surface soil and subsoil the natural drainage is poor. The use of tile drains would apparently be desirable in reclaiming this type, although open ditches give satisfactory results, as the subsoil material is tenacious and the walls of ditches are not apt to crumble or slide. The open ditch, however, is objectionable, as it reduces the size of fields and in so doing makes the use of improved machinery less profitable.

Perhaps 80 per cent of this type is now under cultivation. The better drained, uncleared areas are forested with a sparse growth of shortleaf pine, gum, and cypress. Land saturated with water for a part of the year supports a luxuriant growth of water-loving shrubs, such as gallberry, huckleberry, and myrtle. The type has long been covered with vegetation and considerable organic matter has accumulated in the soil.

This soil gives large yields of corn, oats, cotton, strawberries, cucumbers, cantaloupes, onions, lettuce, potatoes, English peas, and beans, and, in fact, of all the common crops except tobacco. All the truck crops do especially well. Under present conditions corn yields 25 to 50 bushels per acre with small applications of fertilizer. Oats in the Mount Olive district yield from 30 to 70 bushels per acre. In other sections of the county oats are fed in the sheaf, but they yield equally well.

Ordinarily oats receive no fertilizer, as they follow other heavily fertilized crops, but some farmers give a top dressing of nitrate of soda in March. Cotton land receives 300 to 600 pounds per acre of an 8-3-3 fertilizer, and yields range from one-half to 1½ bales per acre. In the vicinity of Mount Olive strawberries yield 175 to 200 crates per acre. This crop is treated with 1,000 to 2,000 pounds per acre of an 8-4-4 or other high-grade fertilizer. Cantaloupes and cucumbers yield 150 to 300 crates, English peas and beans 50 to 125 baskets, and Irish potatoes 100 to 250 bushels per acre. These crops are fertilized with preparations analyzing 8-4-4, 8-5-7, 7-5-7 or 7-5-5, applied at the rate of 400 to 1,500 pounds to the acre. Rye, vetch, and crimson clover are grown in the Mount Olive district as winter cover crops. Grapes are cultivated inextensively. In sections of the county other than that about Mount Olive this type is devoted to general farming.

Well-drained and high-lying land of the Portsmouth loam around Mount Olive sells for \$150 to \$200 an acre. Outside the trucking sections it sells for \$50 to \$100 an acre, depending on the state of cultivation and the improvements.

The Portsmouth loam is naturally "cold" and in an acid condition. With the installation of better drainage and aeration, deeper plow-



ing, thorough pulverization of the seed bed, the growing of cover crops, and the application of coarse manures and lime, it can be built up to a high state of productiveness. Lime can be applied to good advantage at the rate of 1,500 to 2,000 pounds of burnt lime per acre.

#### KALMIA SAND.

The surface soil of the Kalmia sand is a light-gray to grayish-yellow or brownish-yellow, loose, medium sand to a depth of 4 to 6 inches, where it usually passes into a pale-yellow sand which extends to a depth of 15 to 18 inches. This is underlain by a yellow, medium sand to a depth of 3 feet or more. The type is of a rather loose and incoherent nature and frequently becomes coarse in texture in the lower part of the 3-foot section. In the poorly drained situations mottlings of gray appear. The surface coloration varies from almost white on the highest knolls to dark gray in the poorly drained places. Included with this type are small, isolated areas of Cahaba sand, having a light-brown surface soil with a light-brown to reddish-brown subsoil.

The Kalmia sand occupies second-bottom areas along the Little and Neuse Rivers. It occurs on high knolls and ridges. The largest bodies of this type are scattered along the Neuse River between Quaker Bridge and Sevensprings. It is usually excessively drained.

The vegetation on the Kalmia sand consists of a sparse growth of longleaf and shortleaf pine, elm, walnut, scrub oak, prickly pear, cactus, huckleberry, and gallberry.

A few small areas of this type are under cultivation to cotton and corn, of which the yields are low. The type is inextensive in Wayne County and is of little agricultural importance at the present time.

#### KALMIA SANDY LOAM.

The surface soil of the Kalmia sandy loam typically consists of a gray to dark-gray sandy loam or loamy sand, 4 to 6 inches deep, resting on a pale-yellow sandy loam or loamy sand which gradually passes at 12 to 15 inches into a yellow, friable sandy clay. This typically extends to a depth of 36 inches or more, though occasionally it grades into a yellowish sandy loam at about 30 to 36 inches. In the poorly drained areas the surface soil consists of a dark-gray heavy sandy loam, and the subsoil shows a mottling of gray and yellow in the lower part of the 3-foot section, while in the better drained areas of lighter texture an occasional mottling of light red is noticed. Spots of Cahaba and Myatt sandy loam too small to be shown separately are included with the Kalmia sandy loam as mapped.

This type is developed on the second bottoms or low terraces along the Neuse and Little Rivers. The largest developments are found along Little River from the Johnston County line to Goldsboro. Small, irregularly shaped areas occur along the entire course of the Neuse River. The second bottom or terrace along the Neuse varies in width from  $1\frac{1}{2}$  miles on the Johnston County line to 4 or  $4\frac{1}{2}$  miles at Goldsboro, whence it gradually narrows to an average width of 3 miles east of Broadhurst Bridge.

The topography of this type is predominantly level to slightly undulating or flat. There is a gradual slope toward the first bottoms. The natural drainage is only partially established and in a few of the flatter areas open ditches or tile drains are necessary to prevent the land remaining water-logged after continuous rains.

This type is comparatively small in extent, but is an excellent general farm or truck soil. Its value as a truck soil is lowered by its failure to warm up in the spring until 10 days or 2 weeks after the surrounding upland soils, so that truck grown on it does not come on the market until prices decline.

A small proportion of this type is still forested with a heavy growth of shortleaf pine, scrub oak, willow oak, water oak, hickory, poplar, and gallberry.

According to reports obtained from farmers, the Kalmia sandy loam yields one-half to 1 bale of cotton per acre and 20 to 40 bushels of corn. Tobacco is grown to a limited extent and produces 600 to 800 pounds per acre. Cowpeas following a small grain crop or corn yield three-fourths ton to  $1\frac{1}{4}$  tons of hay to the acre. Oats produce from 30 to 50 bushels per acre. Nearly all the truck crops are grown to a sufficient extent to supply home needs and the requirements of local markets.

Corn land ordinarily is fertilized with 200 to 300 pounds per acre of an 8-2-2 or 8-3-3 preparation, applied at planting time. Corn matures about September 1 to 15. Cotton receives 300 to 600 pounds of an 8-3-3 mixture and matures for the first picking about September 1. Cowpeas sowed in corn at the last cultivation mature about September 15 for hay. Oats can be harvested for grain about May 25.

The selling price of land of the Kalmia sandy loam type ranges from \$150 an acre near Goldsboro to \$40 or \$50 an acre in localities more remote from towns.

The Kalmia sandy loam responds quickly to the use of cover crops, such as cowpeas, rye, crimson clover, vetch, oats, and bur clover, showing improvement in the structure of the soil and in the drainage and aeration. Experiments at the State Hospital Farm have shown that by plowing down one cover crop a year and applying 1,000 to 2,000 pounds of burnt lime per acre, the yields on this soil, as well as on all the second-bottom types, are greatly increased.



## KALMIA FINE SANDY LOAM.

The surface soil of the Kalmia fine sandy loam is a gray to light-gray fine sandy loam or loamy fine sand. It extends to a depth of 6 to 8 inches, and rests on a light-gray to yellow fine sandy loam. The subsoil, beginning at a depth of 12 to 15 inches, is a yellow, friable fine sandy clay which usually exceeds a depth of 3 feet. Mottlings of gray and various shades of yellow are occasionally encountered at 30 to 36 inches, and in the low, poorly drained areas mottlings of red and gray are often seen. Occasional small bodies of Kalmia very fine sandy loam too small to be separated are included in this type as mapped, and a few narrow ridges of Cahaba fine sandy loam, as well as isolated patches of Myatt fine sandy loam, are also included.

The Kalmia fine sandy loam is confined to small developments scattered throughout the second bottoms bordering Little and Neuse Rivers. The topography is level to slightly undulating, there being a gradual slope toward the streams. Artificial drainage is in many places beneficial in lowering the water table, thus permitting the soil to warm up early in the spring.

Perhaps half the total area of this type is forested with shortleaf pine, black and sweet gum, water and willow oak, hickory, poplar, and gallberry. The type is similar to the associated Kalmia sandy loam in agricultural importance. It gives like yields of the various staple and truck crops, and crops mature at about the same time. The methods given for the improvement of the Kalmia sandy loam apply equally well to this type.

## CAHABA SANDY LOAM.

The surface soil of the Cahaba sandy loam consists of a brownish-gray to yellowish-brown sandy loam or loamy sand to a depth of 6 to 10 inches, underlain to a depth of 12 to 15 inches by a pale-yellow heavy sandy loam which becomes lighter in color and heavier in texture with depth. The subsoil to a depth of 3 feet or more is a heavy but friable sandy clay, varying in color from dull red to yellowish red, and likewise becoming heavier in texture with depth. Occasionally over small areas the surface soil to about 18 inches is loose and porous, and of a brownish-yellow to pale-yellow color, while in developments bordering streams or on the higher knolls a dull-red, heavy, friable sandy clay appears at the surface. Small quartz gravel fragments are disseminated through the soil and subsoil in places on slopes overlooking the first bottoms. A small percentage of minute mica scales is characteristic of the type.

There are included with this type as mapped small patches of Cahaba sand, consisting of a light-brown sand which at a depth of about 2 feet becomes reddish in color. Intricately associated, iso-

lated areas of Myatt sandy loam and fine sandy loam and of Kalmia sandy loam and fine sandy loam are also included with the type.

The Cahaba sandy loam occupies gentle swells or ridges on the second bottoms or terraces of Little and Neuse Rivers. The gentle surface relief aided by the open structure of the soil permits good drainage and renders the type "warm."

The Cahaba sandy loam from an agricultural standpoint is the most important of the second-bottom types. It is not extensive, but about 90 per cent of it is under cultivation. The principal crops grown are corn, cotton, cowpeas, oats, soy beans, and crimson clover. Corn is the leading crop. It yields 15 to 40 bushels per acre, cotton one-half to three-fourths bale, cowpeas and soy beans three-fourths to 1½ tons of hay, and oats 25 to 40 bushels per acre. Spring oats are a failure on this type as upon all the other second-bottom soils. Peanuts are grown for sale, as well as for the forage, and do well. All crops mature about one week earlier on the Cahaba soils than upon other terrace series, and the Cahaba sandy loam is rapidly becoming a favorite trucking soil. It produces excellent yields of all truck crops except strawberries. Alfalfa gives yields of 5 tons per acre at four cuttings on the Cahaba fine sandy loam and apparently will do equally well if not better on this type.

Land values upon the Cahaba sandy loam are rapidly increasing. The prices now paid range from \$60 an acre in the more remote sections to \$150 an acre near Goldsboro.

The Cahaba sandy loam, as well as other terrace soils, has been found to respond in a marked degree to the following rotation now employed at the State Hospital Farm. The first year the land is planted to cotton, crimson clover being sowed in September. In the second year the crimson clover is plowed down for corn, which is planted in 5-foot rows. Cowpeas are planted between the rows about July 4 to 10. The seed is picked and the vines turned down, and the land is sowed to winter oats. The third year, after the oats are harvested, about May 25, the land is put in cowpeas and soy beans for hay, sowed at the rate of one-half bushel of each per acre. The soil is disked and sowed in the fall to rye, which is turned under in the spring and followed by cotton. The practice of this rotation in conjunction with deep plowing would apparently be beneficial upon all the soils of the second bottoms.

## CAHABA FINE SANDY LOAM.

The surface soil of the Cahaba fine sandy loam consists of a gray to grayish-brown or reddish-brown fine sandy loam, extending to a depth of 6 to 12 inches. The presence of organic matter often gives the first few inches a color darker than that of the material underneath. The subsoil, to a depth of 30 inches or more, is a heavy,



friable fine sandy clay or clay, varying in color from brownish yellow to light red. Occasionally it is decidedly red, in which case the type is very similar in character to the Orangeburg fine sandy loam. Frequently at about 30 to 36 inches mottlings of red, yellow, and gray are encountered.

In the level or depressed areas the surface soil to a depth of 4 to 6 inches is a dark-gray fine sandy loam, beneath which a reddish-yellow fine sandy loam or loamy sand is encountered as a gradational subsurface stratum overlying the subsoil. On some of the knolls and ridges the surface soil has been removed by erosion, so that the typical reddish-brown fine sandy clay is exposed at the surface. Quartz gravel occurs over small patches, especially near the mouth of Little River.

This type is so intricately associated with the Cahaba sandy loam and the Kalmia sandy loam and fine sandy loam that it is almost impossible in places to establish definite boundaries; consequently this type includes small patches of all these three types.

The Cahaba fine sandy loam occurs on the second bottoms along the Neuse and Little Rivers. The most extensive development is to the west of Goldsboro, near the junction of the two streams. The topography is level to gently rolling, the type occupying for the most part narrow hills adjacent to the first bottoms. The natural drainage is good and only a few of the depressed areas would be benefited by artificial drainage.

Probably 90 per cent of this type is under cultivation. It comprises some of the most desirable second-bottom farms. It is, however, subject to occasional overflow, as are all the second-bottom soils, and for this reason alone it is inferior to the upland soils.

Land of the Cahaba fine sandy loam at the State Hospital Farm gives good yields of corn, cotton, cowpeas, oats, peanuts, blackberries, sweet and Irish potatoes, English peas, beans, cantaloupes, cucumbers, cabbage, and other vegetables. Scuppernong grapes do very well. Alfalfa on the first test made a remarkable showing and indications at the time of the survey were that it would cut 5 tons an acre in the 1915 season.

The selling price of this soil ranges close to that of the Cahaba sandy loam.

The Cahaba fine sandy loam, like its associated types in the Cahaba and Kalmia series, is deficient in organic matter. This can be incorporated in the same way as suggested for the Cahaba sandy loam.

#### MYATT FINE SANDY LOAM.

The surface soil of the Myatt fine sandy loam to a depth of 10 to 12 inches consists of a dark-gray, compact fine sandy loam. In the depressed areas the surface soil approaches a black fine sandy loam

to loamy sand, while in the better drained situations it is light gray in color. The typical subsoil is a mottled gray and yellow, stiff, sticky fine sandy clay, which extends to a depth of 3 feet or more. Occasionally mottlings of brown appear in the lower part of the 3-foot section. Frequently the subsoil is steel gray in color and without mottling.

This type occurs in close association with the Myatt sandy loam, and is encountered in scattered areas throughout the second bottoms or terraces along the Neuse and Little Rivers. The Myatt fine sandy loam is developed in level to slightly depressed situations on the terraces. The natural drainage is fairly well established, although open ditches are beneficial. In wet years the soil is difficult to work and usually gives poor yields.

When properly drained the Myatt fine sandy loam gives fair to good yields of corn, oats, cotton, cowpeas, and sugar cane, with good methods of management. At present these crops make yields equivalent to, or slightly lower than, those obtained on the Kalmia fine sandy loam.

Where the drainage is well established land of this type near Goldsboro sells for \$75 to \$100 an acre. In more remote locations it is valued at \$40 to \$75 an acre.

The Myatt fine sandy loam is improved by such remedial practices as deep plowing and thorough pulverization of the seed bed. It responds to the incorporation of coarse manures and green manures, and to liberal liming.

#### MYATT SANDY LOAM.

The surface soil of the Myatt sandy loam to a depth of 8 to 10 inches is a dark-gray sandy loam, usually underlain to a depth of 12 to 15 inches by a light-gray, somewhat heavier sandy loam which often carries mottlings of yellow or brown. The subsoil is a light-gray to gray, heavy sandy clay, strongly mottled with yellow. Occasionally mottlings of rusty brown appear, especially in the poorly drained areas. The surface portion contains accumulations of dark-colored organic matter, to which its dark color is due. The Myatt sandy loam corresponds very closely to the Portsmouth sandy loam of the uplands.

This type occupies terrace or second-bottom areas along the Neuse and Little Rivers and a few of their larger tributaries. The aggregate extent is small. The most prominent developments occur in the vicinity of Goldsboro, south of Broadhurst Bridge, and south and southwest of Quaker Bridge.

The type is developed in flat, depressed areas usually bordering the uplands, and lies lower than the land between it and the stream. The natural drainage is poor and artificial drainage is necessary. Some of the areas, however, are difficult to drain.



The Myatt sandy loam is of small extent and from an agricultural standpoint is of little importance. On areas having drainage well established corn is the leading crop. In favorable seasons it yields 15 to 35 bushels per acre. Cotton usually yields one-third to two-thirds bale per acre. Owing to the later date at which the soil is cultivable in the spring, crops mature a few days later on this type than on the Kalmia sandy loam.

The degree of thoroughness of drainage is the limiting factor in the development of the Myatt sandy loam. With the type reclaimed in this respect, it can be improved by deep plowing, with the incorporation of coarse manures and green manuring crops plowed under. Thorough pulverization of the seed bed is desirable. The liberal application of lime gives good results.

#### OKENEE SILT LOAM.

The surface soil of the Okenee silt loam to a depth of 5 to 18 inches is a black, mellow silt loam. The subsoil is a bluish-black to dark-gray, plastic, heavy silty clay. Frequently the soil is quite mucky, owing to the accumulation of organic matter from the growth and decay of moisture-loving plants. Occasionally mottlings of gray and rusty brown appear.

The Okenee silt loam is of inextensive development in Wayne County. The principal areas occur to the northeast of Piney Grove Church, south and east of Roberts School, and along Northeast Cape Fear River. This soil occurs on the second bottoms, in flats and depressions adjoining the uplands, where the drainage is poorly established.

About 10 per cent of the Okenee silt loam is under cultivation. Where drainage is well established land of this type produces 30 to 60 bushels of corn to the acre, and from 1 to 1½ tons of cowpea and crab-grass hay. Cotton is grown to a small extent, and gives good returns. Celery is grown for home use and does exceptionally well. Oats also make good yields. This type is especially adapted to corn. With good drainage, thorough aeration, and heavy applications of lime, from 60 to 100 bushels of corn can be obtained per acre without the use of any fertilizer or of only small quantities.

The Okenee silt loam is being cleared rapidly and apparently will soon be one of the most highly valued types in Wayne County. Under present conditions, however, no reliable statement can be made as to selling values.

#### JOHNSTON SILT LOAM.

The Johnston silt loam to a depth of 12 to 15 inches consists of a black, mellow silt loam high in thoroughly decomposed organic matter. The subsoil is a gray, drab or brown, smooth, plastic silty clay,

usually showing a few streaks or mottlings of rusty brown. The clay content increases with depth and in a few local areas the lower part of the 3-foot section consists of a dark-gray, heavy, sticky, tough clay. Bordering the uplands the type as mapped includes narrow strips of wash or colluvial material varying in texture from fine sandy loam to coarse sandy loam.

The Johnston silt loam occurs in narrow strips as first-bottom land along the upland streams. Its largest and most typical development is along Nahunta, Aycock, and Turner Swamps, and Bear, Walnut, and Stony Creeks. The natural drainage is poor and during the winter and early spring months most of the type is covered with water. Land along Bear Creek has been drained and is producing 60 to 100 bushels of corn per acre with liberal applications of lime. The incorporation of coarse manures also aids in increasing yields. Oats and grasses do very well. Vegetables, such as cabbage, onions, and celery, are grown on a small scale and give good yields.

The type is peculiarly adapted to corn, the yields exceeding in many instances those of the famous corn lands of the middle west. Indications are that all the areas will be reclaimed for crop purposes within a few years.

Thoroughly drained land of the Johnston silt loam type can not be purchased for less than \$100 to \$125 an acre.

#### THOMPSON SILT LOAM.

The surface soil of the Thompson silt loam to a depth of 8 to 12 inches is a gray to brown, mellow silt loam. The surface layer varies in color, owing to the imperfect drainage conditions and the range in content of decayed vegetable matter. The higher lying and better drained land shows a light-gray to gray color, while in some of the depressed areas the surface soil is dark gray to brown. The subsoil to a depth of 30 to 36 inches is prevailing a yellow, plastic silty clay to clay. Frequently at 30 to 36 inches it shows mottlings of steel gray. A small percentage of finely divided mica scales is contained in both surface soil and subsoil. These probably owe their origin to the outcrops of micaceous rocks along Falling and Beaverdam Creeks and occasionally outcrops along the Neuse River.

Included in this type are inextensive areas having a gray to brownish-gray surface soil and a gray, heavy, plastic silty clay subsoil, delicately mottled with various shades of brown and rusty brown, with not infrequently a trace of red. These patches usually occur on the inner bend of the stream and are overflowed at every rise. Had soil of this variation been of sufficient extent it would have been separated as the Ochlockonee silt loam. There are also included with the Thompson silt loam a few spots of Thompson sand, fine sand, sandy loam, and fine sandy loam, all of which types occur in too small developments to warrant their separation.



The Thompson silt loam is developed in the first bottoms of the Neuse and Little Rivers. It has a uniformly flat and level surface. Frequently it lies appreciably lower than the soil at the bank of the stream and in such positions it occupies depressions. There is, however, a gentle slope in the direction of the stream flow. On account of the flat topography and low position the natural surface drainage of the type is inadequate. Inundations occur during freshets and the water remains on the surface of the broader areas for a considerable length of time. Artificial drainage can be established only by a comprehensive system of open ditches and dikes leading to the natural drainage ways.

None of the Thompson silt loam is under cultivation. It is forested with a heavy growth of water beech, black and sweet gum, white and willow oak, spruce, elm, cypress, maple, ash, and cedar, with a little holly, shortleaf and longleaf pine, and ironwood, and an abundance of bamboo brier. In the better drained situations a luxuriant carpet of wild grass grows and furnishes pasturage for a large number of cattle and goats.

Land of this type is valued for its timber and pasturage possibilities at \$5 to \$10 an acre. Until a thorough drainage system is established, which will entail large expense, it will be of no agricultural importance. The type is well adapted to use as corn land if drained.

#### SWAMP.

The several areas mapped as Swamp are extremely variable in character. The soil material ranges so widely from place to place that definite textural classification is not practicable. In many places the surface soil is a black sandy loam, while in others it is almost a Muck, and the absolute range in texture is from a loose sand to a clay. In some of the larger areas the soil is a dark-gray or drab to black loam or sandy loam, underlain by material which is slightly lighter in color and of variable texture. In many spots the type consists of a mucky loam to a depth of about 2 feet. Areas of Swamp in which the soil is a drab to black silt loam are locally called "mud lands." The Swamp developed in the more sandy regions of the county consists of a dark-colored sandy loam or loamy, mucky sand. The coloring in practically all the areas of Swamp depends upon the organic-matter content. Along some of the smaller streams the material is both alluvial and colluvial in origin and extremely variable in texture.

Swamp has its greatest development in the southwestern and northern parts of the county. The principal areas occur along Thoroughfare, Thunder, and Great Swamps, along Beaverdam Creek, between Bizzle Mill and the Neuse River, and along Northeast Cape Fear River. Areas of minor importance occur throughout the county. The type is developed to some extent along most of the upland streams.

Swamp is confined to the first bottoms of streams. The surface is practically level and flat, with a slight slope in the direction of the stream flow. The type is subject to heavy and protracted overflows and the greater part of it remains in a water-logged condition throughout the year. Its wet and swampy condition has favored the growth of a heavy vegetation, the decay of which accounts for the large content of organic matter.

Practically none of the Swamp has been cleared and put under cultivation. Most of it is forested with a heavy growth of black and sweet gum, with some hickory, poplar, cypress, and white oak, and a few pine. The few fields now under cultivation give excellent yields of corn and grasses. The type is used mainly as timber land and for summer pasture.

The type can be reclaimed by ditching and diking. These improvements entail considerable expense, but would result in the reclamation of some valuable corn land.

#### SUMMARY.

Wayne County, with an area of 554 square miles, or 354,560 acres, lies in the east-central part of North Carolina.

The topography includes broad, gently rolling interstream areas, which become more rolling as the larger streams are approached. The western, central, east-central, and southeastern parts of the county have a general slope to the southeast. The northern part slopes to the northeast, and the southwestern section has a northwesterly slope but drains into the Neuse River to the west of the sand hills.

The drainage is mainly through the Neuse and Little Rivers and their tributaries.

The population of Wayne County is reported in the 1910 census as 35,698. Goldsboro, the county seat, with a population of 6,107, is located in the center of the county.

The county has good marketing facilities and good railroad service. Several lines connect Goldsboro with Rocky Mount, Norfolk, Wilmington, Smithfield, and Raleigh. Only the southwestern and southeastern parts of the county are inadequately supplied with railroad facilities, and the southeastern section is partially supplied with freight transportation by boats on the Neuse River running between Newbern and Whitehall.

The climate is healthful, and favorable to agriculture. The rainfall is abundant, and evenly distributed throughout the year. Excellent water is obtained from deep wells and from numerous artesian wells. At Indian Springs and Sevensprings there are abundant supplies of mineral waters, of reputed medicinal value.



Wayne County lies wholly within the Coastal Plain soil province. The upland soils are derived from unconsolidated sands and clays, the weathering of which gives rise to the four upland series, the Norfolk, Ruston, Orangeburg, and Portsmouth. Bordering the rivers and large creeks are broad areas of second-bottom lands and narrow strips of first bottoms. These alluvial soils consist of re-worked Coastal Plain material. On the terraces or second bottoms the Cahaba, Kalmia, Myatt, and Okenee series are developed, while in the first bottoms of the Neuse and Little Rivers the Thompson series is developed. The Johnston series and Swamp occur in the first bottoms along the upland streams.

The Norfolk soils predominate throughout the county. They possess excellent natural drainage. They are adapted to cotton, corn, tobacco, peanuts, cowpeas, crimson and bur clover, sweet and Irish potatoes, grapes, peaches, small fruits, and a wide range of truck crops.

The Orangeburg type mapped is a well-drained soil, adapted to the same crops as the Norfolk and Ruston series.

The Ruston series represents soils in an intermediate stage of oxidation between the Norfolk and Orangeburg series. They have about the same crop value as the Norfolk.

The Portsmouth loam and fine sandy loam are the types of this series best adapted to strawberries and lettuce. Corn, cotton, oats, Spanish peanuts, cucumbers, cantaloupes, onions, and cabbage do well on all the Portsmouth types.

The Cahaba soils give excellent yields of all the general farm crops with the exception of tobacco, which also gives good yields in favorable seasons. The Cahaba soils, which occur on terraces, correspond to the Ruston series of the uplands.

The Kalmia soils give excellent yields of the staple crops and truck crops also are successful. The lighter textured areas of this series are well adapted to Scuppernong grapes, dewberries, and peaches.

The Myatt soils are adapted to corn. If drained the two types of this series would constitute some of the most desirable land in the county for this grain.

The Okenee silt loam is small in extent but is a valuable corn soil where good drainage is established.

The Johnston silt loam is rapidly being drained. This type is proving one of the best corn soils in the county, with liberal treatment with lime.

The Thompson silt loam is perhaps the type of least importance in the county. Diking is essential to good drainage and therefore reclamation is quite expensive. The present use of this land is for its timber and wild-grass pasture.

The Swamp areas can in places be converted into good corn land with a thorough system of drainage with open ditches.

There is a wide variation in land values throughout the county. Land in the undeveloped and more remote areas can be purchased at \$10 an acre, while the best general farming soils in the northern part of the county sell at \$75 to \$125 an acre. In the trucking districts near towns the same types of soil may sell at \$175 to \$200 an acre.

Wayne County offers excellent opportunity for the development of general and specialized farming. The soils are capable of high and lasting improvement, and in texture, structure, and topography are favorable for highly developed agriculture.

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The Division of Soils, Department of Agriculture, has been organized since its creation in 1898, and has since that time been engaged in a systematic study of the soils of the United States. It has been the policy of the Department to publish the results of its work in a series of reports, which have been issued from time to time. The first of these reports was published in 1901, and was entitled "Report on the Soils of the United States, 1898-1900." This report was published in two volumes, and contained a great deal of valuable information regarding the soils of the United States. It was the first of a series of reports, which have since been published at intervals of one or two years. The reports have been published in a series of volumes, and have been issued from time to time. The first of these reports was published in 1901, and was entitled "Report on the Soils of the United States, 1898-1900." This report was published in two volumes, and contained a great deal of valuable information regarding the soils of the United States. It was the first of a series of reports, which have since been published at intervals of one or two years. The reports have been published in a series of volumes, and have been issued from time to time.

## [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."

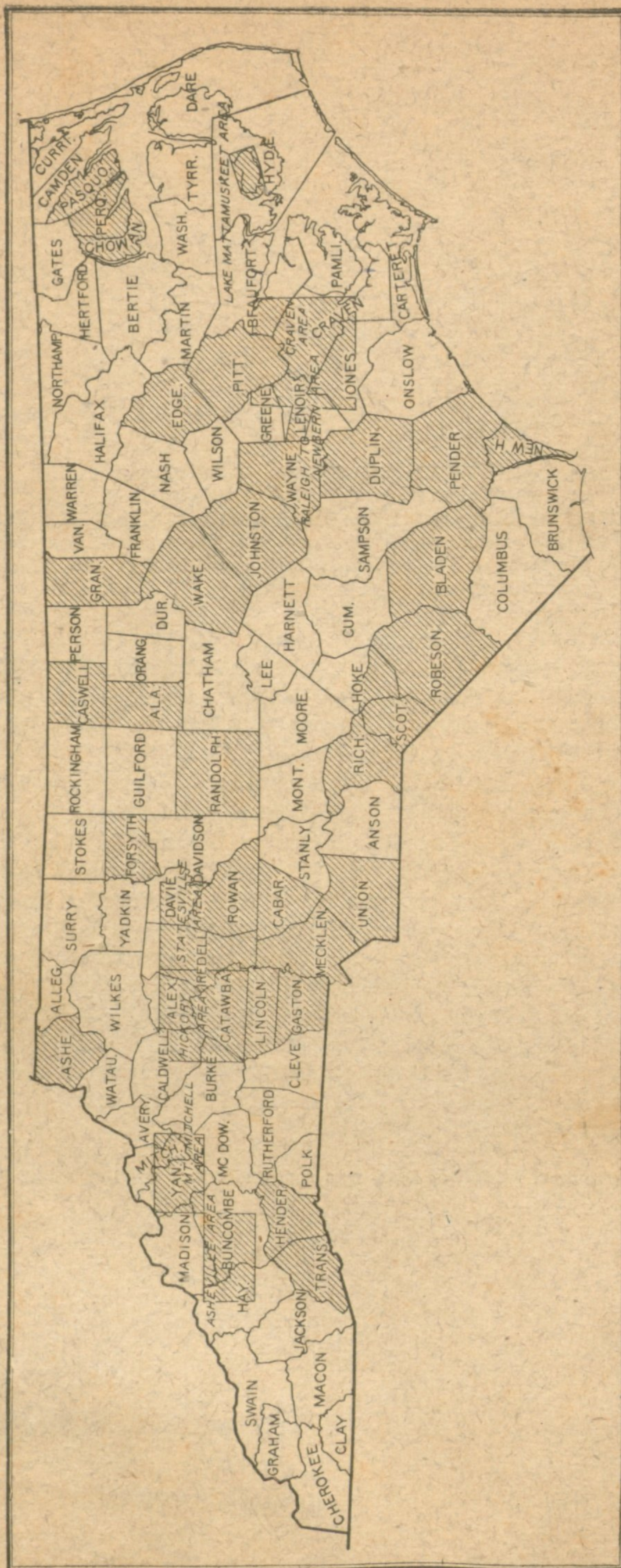
*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,* That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause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