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Soil Survey
of
Lenoir County, N. C.

By

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Bureau of Chemistry and Soils

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

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CONTENTS

	Page
County surveyed.....	1
Climate.....	2
Agriculture.....	3
Soils.....	7
Norfolk fine sandy loam.....	10
Norfolk sandy loam.....	11
Norfolk fine sand.....	11
Norfolk sand.....	12
Norfolk loamy sand.....	12
Kalmia sandy loam.....	13
Kalmia fine sandy loam.....	13
Kalmia sand.....	14
Okenee loam.....	14
Okenee sandy loam.....	15
Dunbar fine sandy loam.....	15
Ruston fine sandy loam.....	16
Leaf very fine sandy loam.....	17
Portsmouth fine sandy loam.....	18
Portsmouth fine sand.....	18
Plummer fine sandy loam.....	19
Lenoir very fine sandy loam.....	19
Bladen fine sandy loam.....	20
Coxville fine sandy loam.....	21
Cahaba fine sandy loam.....	21
Leon sand.....	22
Johnston loam.....	22
Swamp.....	23
Summary.....	24

SOIL SURVEY OF LENOIR COUNTY, NORTH CAROLINA

By R. C. JURNEY, U. S. Department of Agriculture, in Charge, and W. A. DAVIS, North Carolina Department of Agriculture and North Carolina Agricultural Experiment Station

COUNTY SURVEYED

Lenoir County is in the eastern part of North Carolina. Kinston, the county seat, is about 83 miles southeast of Raleigh. The county is irregular in outline. The included area is 399 square miles or 255,360 acres.

In general Lenoir County consists of a nearly level plain, dissected by shallow valleys. The relief ranges from almost level to undulating and gently rolling on the uplands and is flat or undulating on the stream terraces. The most nearly level areas lie on interstream divides and near the sources of streams. Extensive areas of such relief occur in the northern part of the county in the vicinity of Dawson and south of Hugo and in the southern and eastern parts of the county south of Woodington School, east of New Home Church, in Bearwell Pocosin, and south of British Church. The more rolling areas occur as belts along streams.

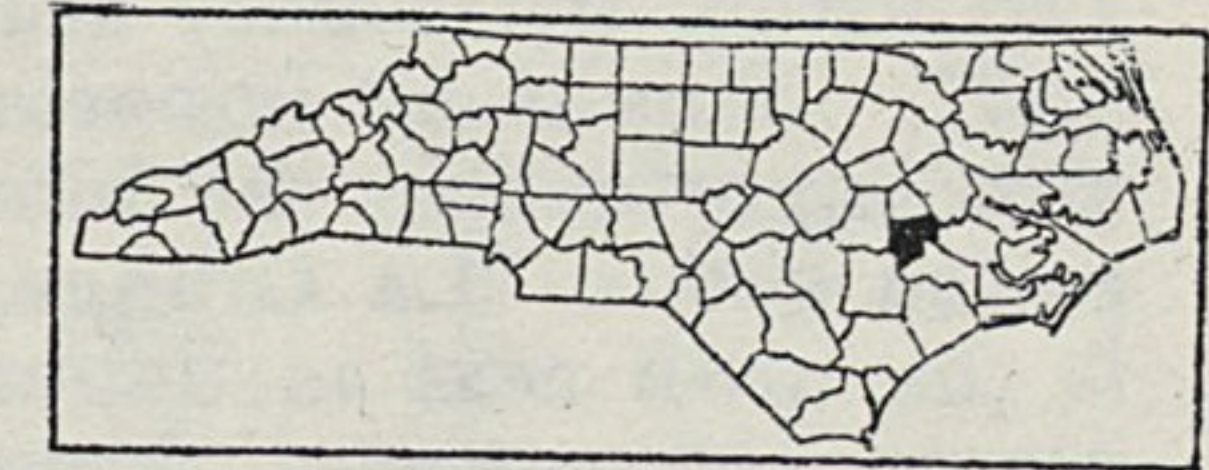


FIGURE 1.—Sketch map showing location of Lenoir County, N. C.

Along Neuse River and Contentnea Creek and some of the other large creeks second bottoms, or terraces, have been formed. These terraces range in width from a few hundred feet to about 4 miles from stream to bluff. Such areas are nearly level.

The slopes leading to drainage ways are gentle, and nearly everywhere a well-defined bluff lies between the uplands and alluvial plains.

The elevation above sea level ranges from about 25 feet in the southeastern part of the county to about 125 feet in the western part. The elevation at British Church, in the northeastern part, is 36 feet, and at Institute, in the northwestern part, is 117 feet. Elevations at other places in the northern half of the county are as follows: Graingers, 74 feet; Fountain Hill, 40 feet; Kinston, 44 feet; Dawson, 100 feet; and Fields, 109 feet. The general slope of the county is eastward.

Neuse River flows eastward across the central part of the county, and, with its tributaries, serves as an outlet for most of the drainage water. A small part of the county is drained northward into Greene County, and a small part southward into Jones County.

In addition to the main drainage ways smaller streams and intermittent drains, to one or more of which nearly every farm is con-

nected directly or by ditches, extend to nearly all parts of the county. In the northern and southern parts broad, flat, and level areas or pocosins are inadequately drained, not being crossed by any well-defined natural drainage way. Other flat poorly drained areas are on the river terraces. The first bottoms and swamps are inadequately drained and are subject to overflow.

The streams have cut their valleys from 10 to 50 feet below the general upland surface and have nearly reached base level. The currents are sluggish. Water power has been developed at places where considerable reserve can be stored. It is used to operate gristmills and sawmills.

Lenoir County was formed from Dobbs County in 1791. The early settlers were English, Scotch, Irish, and Swiss, and the present population consists largely of their descendants and of others who have entered from adjoining territory. According to the 1920 census, the population of the county is 29,555. Except in limited portions in the northern and southern parts it is fairly evenly distributed. The rural population is 19,784 and its average density is 50.7 persons to the square mile.

Kinston, the county seat and largest town, has a population of 9,771. This is an important marketing and shipping point and is also important in the lumber industry and in the manufacture of cotton goods. La Grange, in the northwestern part of the county, is the town next in importance. Smaller towns and local trading places are scattered throughout important agricultural sections.

Good railroad transportation is furnished by the Norfolk Southern, the Atlantic Coast Line, the Carolina, and the Kinston Carolina Railroads. Excellent hard-surfaced State highways also serve nearly all parts of the county. County roads extend to all agricultural sections, connecting them with the State highways. Bus lines connect Kinston with New Bern, Greenville, and Goldsboro.

Telephone lines extend to some rural sections and rural mail routes serve all parts of the county. Churches and schools are conveniently located. Some of the school buildings are modern brick structures.

Kinston and La Grange are important markets for cotton and Kinston is an important tobacco market. Some tobacco is marketed at Wilson and Greenville. Hogs are shipped to Richmond, Va., for sale.

CLIMATE

The climate of Lenoir County may be termed oceanic—that is, the seasonal changes in temperature are not so great as they are farther inland. The heat of summer and the cold of winter are tempered by breezes from the ocean. The climate is characterized by short mild winters and long but not excessively hot summers. Temperatures are pleasant during spring and fall. Snow falls occasionally but seldom lies on the ground more than a day or two. Rainfall is well distributed throughout the year and is sufficient for the crops commonly grown.

The date of the earliest recorded killing frost is October 12, and of the latest is April 26. The average dates of the earliest and latest killing frosts, respectively, are October 31 and April 5. The average length of the frost-free season is 209 days, which is sufficient

for the maturing of crops grown. Cover crops and many hardy truck crops can be grown during the winter and very early spring.

Table 1, which is compiled from records of the Weather Bureau station at Kinston, gives the normal monthly, seasonal, and annual temperature and precipitation in Lenoir County.

TABLE 1.—Normal monthly, seasonal, and annual temperature and precipitation at Kinston

[Elevation, 46 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1911)	Total amount for the wettest year (1908)	Snow, average depth
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
December.....	44.6	79	2	2.88	2.62	3.02	0.9
January.....	44.5	80	0	3.25	3.30	6.19	1.5
February.....	44.5	82	0	4.11	1.24	4.54	3.2
Winter.....	44.5	82	0	10.24	7.16	13.75	5.6
March.....	54.0	98	16	4.54	4.02	6.34	.4
April.....	60.2	96	26	3.16	2.22	3.35	.0
May.....	70.1	101	37	3.88	1.60	4.95	.0
Spring.....	61.4	101	16	11.58	7.84	14.64	.4
June.....	76.8	103	47	5.28	.98	6.07	.0
July.....	80.3	105	51	6.66	2.45	15.78	.0
August.....	79.2	105	51	6.31	4.64	8.09	.0
Summer.....	78.8	105	47	18.25	8.07	29.94	.0
September.....	74.0	99	40	3.34	3.77	.47	.0
October.....	63.1	93	26	2.70	2.93	4.53	.0
November.....	51.0	88	14	2.22	3.89	1.44	.3
Fall.....	62.7	99	14	8.26	10.59	6.44	.3
Year.....	61.9	105	0	48.33	33.66	64.77	6.3

AGRICULTURE

Agriculture had its beginning in Lenoir County several years before the Revolutionary War. The first settler started farming east of Kinston in 1740, and a little later another settlement began near the present site of La Grange. Farming was first conducted on the terrace soils along Neuse River, but it soon spread to the uplands. Early agriculture consisted mainly of the production of rice, corn, wheat, cotton, tobacco, apples, peaches, and pears, and the raising of hogs and cattle. Practically all these products were consumed at home. The production of rosin and turpentine was an important industry until about 1880, when the resources were exhausted. Lumbering has been important from the time of earliest settlement. The original longleaf pine timber had practically all been cut by 1900.

Table 2, compiled from census data, gives the acreage and yields of the important farm crops in stated years.

TABLE 2.—Acreage and production of principal crops in Lenoir County, N. C., in census years

Crop	1879		1889		1899	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
Corn.....	29,838	274,010	29,494	261,657	37,561	423,110
Wheat.....	5,067	32,800	2,460	15,461	898	6,190
Oats.....	1,060	12,217	3,002	33,020	1,946	25,630
Sweetpotatoes.....	584	50,995	1,184	82,133	864	78,186
Hay and forage.....	1,120	Tons 92	1,505	Tons 462	2,205	Tons 2,122
Cotton.....	19,150	Bales 8,235	23,770	Bales 5,936	15,273	Bales 7,246
Tobacco.....	45	Pounds 13,500	6	Pounds 3,000	5,992	Pounds 4,975,690

Crop	1909		1919		1924	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
Corn.....	32,192	402,525	36,943	626,216	28,005	496,942
Wheat.....	86	1,064	242	2,230	10	125
Oats.....	1,573	25,483	787	15,351	547	58,324
Sweetpotatoes.....	1,110	112,622	1,086	119,370		
Hay and forage.....	4,314	Tons 3,611	4,077	Tons 2,790	14,018	Tons 3,037
Cotton.....	16,797	Bales 7,797	18,863	Bales 11,860	23,611	Bales 11,843
Tobacco.....	8,337	Pounds 6,588,205	16,125	Pounds 12,143,624	15,724	Pounds 11,311,742

¹ Hay only.

Cotton and tobacco are the cash crops now grown, and corn and hay and forage are the important subsistence crops. Corn is grown in all parts of the county and on nearly every farm. It is used mainly as feed for work animals, but a small part is used for food.

Cotton and tobacco are produced solely for cash, and the economic welfare of the county depends to a large extent on them. On most farms these crops are grown on soils suited to their successful production, but in some places they are grown on soils poorly suited to them because better soils are not available. Though the acreage of tobacco is less than that of cotton, the gross cash revenue from it is greater. The tobacco is bright yellow or lemon colored and is of high quality particularly suited to the manufacture of cigarettes and smoking tobacco. The product compares favorably in yield, color, and quality not only with that produced in other counties in the bright-leaf belt of eastern North Carolina but with the best grown in the world.

Hay and forage crops consist mainly of soybeans, cowpeas, oats, oats and vetch, Sudan grass, millet, and rye. Some of this feed is produced for use on the farms, but much of it is fed at the local dairies. A large acreage of both rye and oats is sown as winter cover crops and for grazing. These crops are plowed under in the spring.

Sweetpotatoes are produced on nearly every farm, mainly for home use, as are also potatoes, cabbage, collards, and other garden vegetables. Most of the farmers have fruit trees and grapevines.

Most of the farmers keep from 10 to 20 hogs, which furnish meat for the home or for sale locally, but many of the tenants have neither

hogs nor cows. The hogs are mainly Duroc-Jersey, Poland China, Hampshire, and Chester White or crosses of these breeds. Many farmers specialize in raising hogs and sell from 50 to 150 a year. Thirty carloads were shipped to Richmond, Va., for sale during 1927. The hogs are fed according to the recommendations of the State extension service and are marketed cooperatively.

There are many more dairy cattle than beef cattle in the county, many of the farmers keeping from 1 to 4 milk cows. The cows are Jerseys, Guernseys, and Holsteins, or crosses of these breeds. About 40 purebred dairy sires are on the farms. The 28 dairies in the county sell their products to residents of Kinston, and to ice-cream plants located there. Much of the dairy feed is shipped in, but approximately 75 per cent of the dairymen produce about 75 per cent of the feed they use. The feed is mixed and fed in accordance with the suggestions of the State extension service.

There are a few herds of sheep and goats, and nearly every farmer keeps chickens and other fowls.

Some areas are in permanent pasture. Carpet grass and Lespedeza compose the favorite pasture mixture, about 8 pounds of carpet grass seed and 20 pounds of Lespedeza being sown to the acre.

About 50 per cent of the land area of this county is cleared and devoted to agriculture. The proportion of land under cultivation bears a direct relation to the character of the soil and to drainage conditions. The farmers recognize the adaptation of certain soils to particular crops. Norfolk fine sandy loam and its deep phase and Norfolk sandy loam are considered well suited to the production of bright-leaf tobacco. Norfolk fine sandy loam and Norfolk sandy loam are also highly prized as cotton soils. Okenee loam and Okenee sandy loam are well suited to corn. Dunbar fine sandy loam gives good yields of cotton, corn, and soybeans.

Most of the farm dwellings are large and substantial, although many of the newer homes are of the smaller urban type. Tenant houses are generally small. The barns are as large as the type of agriculture pursued requires, and there are many outbuildings for storage purposes. Tractors are in use on many farms. The fences are mostly woven wire with barbed wire at the top. The work animals are both mules and horses, but mules predominate. Practically every farmer has an automobile and many have more than one.

Definite crop rotations are not followed in Lenoir County. Some farmers follow a 4-year rotation of cotton, tobacco seeded to rye, corn and soybeans grown together, and cotton. Tobacco is often grown on the same land for three or four years in succession. Corn is produced continuously on the dark land of the river terraces. Tobacco and cotton are frequently followed by rye grown for a winter cover crop.

According to the 1925 census, the purchase of fertilizers at a total outlay of \$682,490, or an average of \$217.70 to the farm, was reported on 3,135 farms from a total of 3,353 farms. Most of the fertilizer is ready mixed, but some farmers use home mixtures of practically the same chemical composition as the commercial grades. A complete fertilizer of the 3-8-3¹ grade is almost universally used.

¹ Percentages, respectively, of nitrogen, phosphoric acid, and potash.

The North Carolina Agricultural Experiment Station recommends the following acre fertilizer treatment: Tobacco, 800 to 1,000 pounds of a 4-8-6 grade; cotton, from 500 to 900 pounds of a mixture in which the percentage of nitrogen is between 4 and 7 per cent, of phosphoric acid between 7 and 9 per cent, and of potash between 3 and 5 per cent; corn, from 300 to 400 pounds of a mixture in which the percentage of nitrogen is between 5 and 6 per cent, of phosphoric acid between 6 and 8 per cent, and of potash between 2 and 3 per cent; small grains, from 300 to 400 pounds of a 5-8-3 grade; potatoes, from 1,000 to 1,200 pounds of a 6 to 7 per cent nitrogen, 6 to 7 per cent phosphoric acid, and 5 to 6 per cent potash grade; sweetpotatoes from 1,000 to 1,200 pounds of a mixture analyzing 4 or 5 per cent nitrogen, 7 or 8 per cent phosphoric acid, and 6 per cent potash; and legumes from 300 to 400 pounds of a 2-10-4 grade. Magnesium limestone is used to some extent on tobacco land to prevent sand drown. To provide a part of the total ammonia, nitrate of soda is applied to cotton as a top-dressing at the rate of 100 or 200 pounds an acre. About the same amounts of this material are applied to corn when the plants are from 2 to 4 feet high. Stable manure is used on the light land for corn. Tobacco land is also given a very light application of stable manure. Lime is used by some farmers on corn and legumes. The home-mixed fertilizer is usually composed of cottonseed meal, superphosphate (acid phosphate), kainit, and nitrate of soda. It is applied to crops in about the same quantities as the ready-mixed grades. With fertilizers for tobacco, one-third of the potash should be derived from muriate of potash and two-thirds from sulphate of potash or sulphate of potash-magnesia.

The labor supply, which is mainly colored, is fairly efficient. The price paid by the month ranges from \$30 to \$35 without board, and from \$20 to \$25 with board. The price by the day ranges from \$1 to \$1.50. Cotton pickers receive from \$1 to \$1.50 a hundred pounds. Laborers in tobacco fields receive from \$1.50 to \$3 a day and tobacco curers from \$25 to \$35 a week.

The 1925 census reports that 67.5 per cent of the land area of the county is in farms averaging 50.3 acres in size. The range in the size of farms is wide, some being very small and some plantations including from 400 to 1,000 acres. Holdings of timbered tracts are also large. Many of the large farms are divided into tenant farms 20 or 30 acres in size.

According to the 1925 census, 27.8 per cent of the farms are operated by owners, 71.6 per cent by tenants, and 0.6 per cent by managers. Tenancy was 55.7 per cent in 1880. Under the share-rental system the landlord furnishes land, work animals, and one-half the fertilizer and receives one-half the crop. A small acreage of land is rented for cash.

In 1925, according to the census, the average value of land was \$53.83 an acre. The price of land varies with the location in respect to towns, markets, good roads, churches, and schools, and with the value of the timber growth. Farm lands command from \$50 to \$250 an acre, the prevailing price being about \$100 an acre.

SOILS

The first broad grouping of soils in Lenoir County is as well-drained and poorly drained soils. The well-drained soils include members of the Norfolk, Kalmia, Dunbar, Ruston, Lenoir, and Cahaba series, and the poorly drained soils are those of the Okenee, Leaf, Portsmouth, Plummer, Bladen, Coxville, Leon, and Johnston series and the miscellaneous class of material, swamp.

The well-drained soils are prevailing light gray or gray in the surface layers, whereas the poorly drained soils range in color from dark gray to black. All the soils developed under forest cover, and except in the swampy areas conditions were not favorable for the accumulation of organic matter. In virgin areas of well-drained soils a noticeable quantity of coarse partly decomposed vegetable matter occurs to a depth ranging from 1 to 3 inches, but this material has not really become a part of the soil as it has in the grass-covered regions of the Central States. The organic matter in the Okenee, Portsmouth, and Johnston soils, which is sufficiently plentiful to give them a black color, has accumulated under swampy conditions.

Active leaching, encouraged by the heavy rainfall, warm temperature, and clean cultivation, has been and is still going on. All the soils are slightly acid and the Portsmouth, Okenee, and Johnston are decidedly acid. Liberal applications of lime give good results.

Below the gray, usually sandy surface layer is the subsoil, or horizon B. In most places the parent soil-forming material, consisting of consolidated beds of clay, sandy clay, and sand, lies at a depth ranging from 3 to 6 feet below the surface. There is no uniformity in color, texture, or structure of this partly weathered material, but there is a noticeable difference in its color under the well-drained soils and the poorly drained soils. Most of this material is rather hard and compact but very brittle, breaking easily and in some places showing slight stratification or bedding. Locally marl deposits were reported, but none of the soft light-gray or white marl comes near enough the surface to influence the soil. The second-bottom or terrace soils developed along Neuse River and Contentnea Creek and the first-bottom soils along these and other streams have been formed from reworked coastal-plain material brought down by the streams and deposited at times of flood. Some of this material has weathered and oxidized and now assumes characteristics somewhat similar to those of some of the upland soils.

The most striking feature of the texture profile of the well-developed soils in the county is the presence in all of them of a comparatively light-textured surface layer, a second layer of heavier texture, in many places much heavier, and a third layer which may vary considerably in texture but which is prevailing lighter than the second layer but in most places heavier than the first. The actual texture of the surface layer, or horizon A, ranges from very fine sandy loam to sand, and of the second layer, or horizon B, from clay to very light sandy loam or sand. The third layer, or horizon C, consists of unconsolidated geologic material and may be extremely variable in texture, structure, and color. The thickness of the various layers also ranges widely.

Norfolk fine sandy loam may be considered the normally well-developed soil of the county. The Ruston soils occupying the slight ridges and slopes are better drained, more thoroughly oxidized, and better aerated than the Norfolk soils. The various stages of soil development are represented by swamp, the Portsmouth soils, the Bladen, the Coxville, the Dunbar, the Norfolk, which are the normally developed soils, and finally the Ruston, representing a further stage of soil development.

The soil profile of Norfolk fine sandy loam shows the following layers: (1) A surface layer 4 inches thick consisting of gray mellow fine sandy loam, containing a small quantity of organic matter; (2) the subsurface layer, occurring between depths of 4 and 15 inches, consisting of pale-yellow loamy fine sand; (3) the subsoil, between depths of 15 and 35 inches, consisting of yellow friable crumbly fine sandy clay, much heavier in texture than the overlying layer; and (4) the substratum, continuing from 35 to 55 or more inches, consisting of mottled yellow, light-gray, and bright-red friable fine sandy clay material.

Lenoir very fine sandy loam consists of the following layers: (1) A surface layer, 3 inches thick, of gray very fine sandy loam, containing a small quantity of organic matter; (2) a subsurface layer, 6 inches thick, of dull-yellow heavy very fine sandy loam slightly colored with gray and brown; (3) the upper subsoil layer, 11 inches thick, of dull-yellow heavy tough compact silty clay faintly mottled with brown, which breaks into irregular-shaped lumps and finally into finer particles; (4) the lower subsoil layer, 10 inches thick, consisting of mottled light-gray, bluish-gray, dull-yellow, and ochreous heavy plastic stiff clay, breaking into large angular lumps which, when dry, break into small angular particles; and (5) the substratum, 15 or more inches thick, of bluish-gray or light-gray heavy soft plastic clay mottled with light red, yellowish red, and yellow and showing a somewhat laminated structure. In this clay are bright-red spots surrounded by yellowish material shading into the gray or bluish gray.

Cahaba fine sandy loam shows the following layers: (1) A 2-inch surface layer of light-gray fine sandy loam containing a small quantity of vegetable matter; (2) a 10-inch subsurface layer of light-brown mellow fine sandy loam; (3) a 23-inch subsoil of brownish-red granular friable fine sandy clay which, when dried, becomes somewhat indurated and breaks into irregular-shaped lumps; and (4) a 25-inch substratum of light reddish-yellow friable crumbly fine sandy clay or loamy fine sand which becomes lighter in color and more friable in consistence with increasing depth.

Soils of a second group including members of the Okenee, Leaf, Portsmouth, Plummer, Bladen, Coxville, Leon, and Johnston series are characterized by the absence of a normally well-developed profile. No definite horizon development is to be seen in some places. These soils have formed under wet or swampy conditions, and in the Okenee, Portsmouth, and Johnston soils large quantities of organic matter have accumulated in the surface soil. The alternate wetting and drying of the Plummer, Coxville, Leaf, Bladen, and Leon soils and the burning off of the surface vegetable matter probably account for the lighter color of these soils. The poor drainage and waterlogged condition of all these soils have prevented aeration and

oxidation of the iron salts, causing a mottled coloration of the subsoil. The dominant color is light gray, with mottles of yellow and rust brown and splotches of red in some places. There is considerable variation in the texture and structure of the subsoils.

The Okenee, Portsmouth, and Johnston soils are similar in color, the surface soil being very dark gray or black and high in organic matter and the subsoil layer being gray or mottled gray and yellow.

The Coxville soils have gray or dark-gray surface layers. The subsoils are mottled yellow and gray heavy but moderately friable clay in the upper part and plastic compact clay mottled drab or gray and yellow, with splotches of bright red in the lower part. The Leaf soils are similar in color, structure, and texture to the Coxville soils.

The Bladen soils have gray or brownish-gray surface layers and subsoils consisting of mottled brown or yellow and steel-gray heavy plastic clay. These soils differ from the Coxville in being less well drained and in showing no red mottling in the subsoil.

The Plummer soils have light-gray surface soils and gray or mottled gray and yellow friable sandy clay subsoils which may contain pockets or strata of sand or loamy sand. These soils have lighter-colored surface soils and more friable and crumbly subsoils than members of the Portsmouth series.

The Leon soils are characterized by a brown hardpan layer from 10 to 24 inches below the surface. The surface soil is gray at the surface and becomes light gray with depth. Below the hardpan the material is grayish yellow mottled or stained with brown.

The soils of Lenoir County are grouped in series on the basis of similarity in color, origin, and structural characteristics. The soil series are divided into types on the basis of difference in texture, or the proportion of sand, silt, and clay in the surface soil. The type is the unit of soil classification and mapping. In this county 14 soil series are represented by 22 soil types and 1 phase. In addition swamp, a miscellaneous class of material, is mapped.

In the following pages of this report the soils of the county are described in detail and their relation to agriculture is discussed. The distribution of the soil types is shown on the accompanying map, and their acreage and proportionate extent are given in Table 3.

TABLE 3.—Acreage and proportionate extent of the soils mapped in Lenoir County, N. C.

Type of soil	Acre	Per cent	Type of soil	Acre	Per cent
Norfolk fine sandy loam.....	44,800	21.2	Portsmouth fine sandy loam.....	18,304	7.2
Deep phase.....	9,472		Portsmouth fine sand.....	5,056	2.0
Norfolk sandy loam.....	14,720	5.8	Plummer fine sandy loam.....	12,224	4.8
Norfolk fine sand.....	17,920	7.0	Lenoir very fine sandy loam.....	3,264	1.3
Norfolk sand.....	23,488	9.2	Bladen fine sandy loam.....	2,752	1.1
Norfolk loamy sand.....	2,496	1.0	Coxville fine sandy loam.....	3,456	1.3
Kalmia sandy loam.....	5,888	2.3	Cahaba fine sandy loam.....	2,176	.8
Kalmia fine sandy loam.....	6,784	2.7	Leon sand.....	3,008	1.2
Kalmia sand.....	19,008	7.4	Johnston loam.....	5,760	2.3
Okenee loam.....	10,240	4.0	Swamp.....	13,888	5.4
Okenee sandy loam.....	3,456	1.3			
Dunbar fine sandy loam.....	13,184	5.2			
Ruston fine sandy loam.....	8,896	3.5			
Leaf very fine sandy loam.....	5,120	2.0			
			Total.....	255,360	

NORFOLK FINE SANDY LOAM

In forested areas the 3 or 4 inch surface layer of Norfolk fine sandy loam is gray or brownish-gray fine sandy loam or loamy fine sand. The dark color results from the accumulation of small quantities of organic matter. Beneath this layer the soil is grayish-yellow or pale-yellow mellow light-textured fine sandy loam or loamy fine sand to a depth ranging from 15 to 24 inches. The subsoil of yellow friable crumbly fine sandy clay is underlain at a depth of 34 or more inches by mottled yellow, light-gray, and bright-red friable sandy clay material. In cultivated fields the surface soil is light gray or grayish yellow when air-dry, but slightly brownish yellow when wet. Small gray areas are noticeable in plowed fields, particularly in flat situations and where organic matter has been incorporated.

Norfolk fine sandy loam occurs in nearly all parts of the county, but the largest areas are in the northern and southern parts. The soil occupies interstream divides and gentle slopes. Areas are almost flat, undulating, or gently rolling, those near stream courses being slightly more rolling. Owing to its favorable relief and the porosity and friability of the soil, natural drainage is, in general, well established. Flat areas should be ditched.

Norfolk fine sandy loam is important in the agriculture of the county, and more than 90 per cent of it is used for crops. The remainder is in old fields or forest. The forest growth consists mainly of pine, sweetgum, dogwood, water oak, scrub oak, and myrtle and holly bushes. A small proportion of the land is used for pasture.

The soil is used mainly in the production of cotton, corn, and tobacco. Garden vegetables, potatoes, and sweetpotatoes are grown on nearly every farm, chiefly for home use. Soybeans, cowpeas, oats, and rye are crops of minor importance. Cotton yields from three-fourths bale to 1 bale to the acre and corn from 25 to 40 bushels. Tobacco yields average between 700 and 1,200 pounds to the acre, although with special fertilizer treatment 1,700 pounds have been obtained. Sweetpotatoes yield from 100 to 200 bushels and garden vegetables thrive. Good returns are obtained from soybeans, cowpeas, and oats. Fertilizer treatment is that common in the county.

Norfolk fine sandy loam commands from \$100 to \$250 an acre, depending on the state of improvement and nearness to good roads, towns, and markets.

This soil is deficient in organic matter, owing in part to continuous cropping without the application of stable manure or the incorporation of green manures. The addition of organic matter would be beneficial to cotton and corn land. There is probably a deficiency of potash for tobacco. The North Carolina Agricultural Experiment Station found by experiment that fertilizers with high potash content caused yields of tobacco to increase. In one instance a yield of about 1,800 pounds to the acre was obtained by the use of a 4-8-5 grade of fertilizer. Systematic crop rotation would be beneficial in building up and maintaining the fertility of the soil. A suggested 4-year rotation is as follows: First year, cotton seeded to rye; second year, tobacco followed by oats and vetch grown together;

third year, late corn with soybeans in alternate rows; and fourth year, cotton.

Norfolk fine sandy loam, deep phase.—The surface soil of the deep phase of Norfolk fine sandy loam is similar to that of the typical soil but is much deeper, the yellow friable sandy clay lying at a depth ranging from 24 to 30 inches.

The soil occurs almost exclusively in the southwestern part of the county in close association with Norfolk fine sandy loam. It occupies positions on stream slopes and to some extent on interstream divides. Areas are undulating or gently rolling, being slightly more rolling than the typical soil. Drainage is good.

Norfolk fine sandy loam, deep phase, is of comparatively small extent and for this reason is not important agriculturally. Approximately 60 per cent is cultivated and the remainder supports a growth of pine, sweetgum, small oaks, and dogwood. The crops grown are the same as on the typical soil, but yields are slightly lower. The fertilizer treatment for the two soils is practically the same.

Recommendations for the improvement of Norfolk fine sandy loam also apply to this soil.

NORFOLK SANDY LOAM

In wooded areas the surface soil of Norfolk sandy loam consists of gray loamy sand 4 or 5 inches thick underlain by pale-yellow light sandy loam continuing to a depth ranging from 16 to 20 inches. Below this layer the soil is yellow friable sandy clay which at a depth of 30 or 40 inches becomes mottled with reddish brown and at about 48 inches grades into mottled yellow, gray, and reddish-brown friable sticky sandy loam or loamy sand. In plowed fields the surface soil is grayish yellow or light gray when dry but has a brownish cast when wet.

Norfolk sandy loam occurs in the northern and central parts of the county, comparatively large areas being north of La Grange and Fields, east of Dawson, and east and west of Woodington School. Areas occupy broad interstream ridges and gentle slopes leading to drainage ways. The general relief is undulating or gently rolling, but some areas are nearly level. Near the streams the land is commonly more rolling. All the soil lies well for cultivation. On account of its sandy texture and favorable surface features, it is well drained except in some of the flatter places.

Norfolk sandy loam is important in the agriculture of the county. Practically all of it is cleared for farming. The crops grown, yields obtained, adaptations, and fertilizer treatment are similar to those described for Norfolk fine sandy loam, and the suggestions for improvement of the two soils are the same.

NORFOLK FINE SAND

In wooded areas Norfolk fine sand has a gray fine sand surface layer containing a small amount of organic matter and extending to a depth between 3 and 5 inches. This layer is underlain to a depth of 40 or more inches by pale-yellow incoherent fine sand, which gives way to brownish-yellow loamy fine sand or fine sandy loam. In

cultivated fields the surface is light gray or grayish yellow, appearing slightly darker when wet. Areas of Norfolk sand too small to indicate on the map have been included in mapping.

Norfolk fine sand occurs in the southwestern part of the county and to a smaller extent in the northwestern part. The soil occupies interstream divides and slopes to drainage ways. Areas are undulating or gently rolling, becoming more rolling near streams. Owing to the porosity of the soil and to the surface features, drainage is good.

Norfolk fine sand is not important agriculturally because of its comparatively small extent. Approximately 60 per cent of it is cleared for cultivation. Some old fields are partly grown up with scrub pine. The remainder of the soil is wooded mainly with pine and scrub oak, together with a few sweetgum, water oak, and dogwood. Crops grown are the same as on Norfolk fine sandy loam, but yields are somewhat lower. Fertilizer treatment is also about the same as on Norfolk fine sandy loam.

Norfolk fine sand is deficient in organic matter, which can be supplied by growing and turning under such crops as crimson clover, cowpeas, rye, and vetch.

NORFOLK SAND

In wooded areas Norfolk sand consists of gray material from 3 to 5 inches thick underlain by pale-yellow loose medium sand which continues to a depth of 40 or more inches, where it grades into yellow or brownish-yellow loamy sand. In cultivated fields the surface layer is light gray or grayish yellow when dry but assumes a darker hue when wet. In places the subsurface layer of sand is slightly reddish yellow.

Norfolk sand occurs mainly in the western and extreme southern parts of the county, but scattered areas are elsewhere. The largest areas are east, south, and west of La Grange, north of Falling Creek, north of Liddell, and east of Pink Hill.

This soil occupies slopes to drainage ways and river terraces and also occurs on broad interstream country. Areas are undulating or gently rolling and southwest of La Grange are very rolling in places. Drainage is good, owing to the favorable relief and porosity of the soil.

Norfolk sand is extensive. About one-half of the total area is used for farming, and the remainder supports a forest growth consisting principally of pine and scrub oak, with some sweetgum and dogwood. Some old abandoned fields are grown up with scrub pine.

The crops grown and yields obtained on this soil are about the same as on Norfolk fine sand, and the fertilizer treatment is similar to that for the same crops on Norfolk fine sandy loam.

NORFOLK LOAMY SAND

To a depth of 5 or 6 inches Norfolk loamy sand consists of gray loamy sand or sand which contains a small quantity of organic matter. The next lower material is pale-yellow loamy sand underlain at a depth ranging from 24 to 36 inches by dull-yellow or brownish-yellow sticky sandy loam. In cultivated fields the surface soil is light gray or grayish yellow when dry and somewhat darker when wet. Areas of the deep phase of Norfolk sandy loam were included

in mapping. Pale-yellow friable sandy clay occurs below a depth ranging from 24 to 30 inches, and this grades, at a depth of about 40 inches, into mottled gray, yellow, and brownish-red friable sandy clay.

Norfolk loamy sand occupies a small acreage in the county. The largest areas are in the vicinity of La Grange and near Pink Hill. Areas are undulating or gently rolling, and drainage is good.

This soil is unimportant agriculturally on account of its comparatively small extent. About 65 per cent of it is cultivated and the remainder is wooded with pine, small oaks, sweetgum, and dogwood. The crops produced are about the same as on the other Norfolk soils, but yields are not quite so high as on Norfolk fine sandy loam. The fertilizer treatment is similar to that for the same crops on Norfolk fine sandy loam.

KALMIA SANDY LOAM

Kalmia sandy loam in wooded areas has a 3 or 4 inch surface layer of light-gray loamy sand or sandy loam containing a small quantity of organic matter. This layer is underlain to a depth of about 15 inches by pale-yellow mellow sandy loam. The subsoil of yellow friable crumbly sandy clay grades, at a depth between 32 and 36 inches, into yellow friable sticky sandy clay or loamy sand slightly mottled with rust brown and streaked with whitish layers of loose loamy sand. The material in this layer is much lighter in texture than that of the subsoil. In cultivated fields the surface soil is dull yellow or grayish yellow when dry and slightly brownish when wet.

Kalmia sandy loam occurs on terraces, mainly along Neuse River. Areas range from nearly level to gently undulating and have a slight gradient toward the stream. Drainage is well established on much of the soil, but the more nearly level areas must be ditched.

Kalmia sandy loam, although comparatively inextensive, is an important farming soil and is practically all cleared for farming. On a few small forested areas the tree growth consists of pine, sweetgum, and a few water oak. There are a few old fields of scrub pine.

The principal crops are corn, cotton, and tobacco. Soybeans, cowpeas, oats, and rye are grown to a small extent, as are garden vegetables, sweetpotatoes, watermelons, and cantaloupes. Cotton yields from one-half to 1 bale to the acre, corn from 15 to 40 bushels, and tobacco from 600 to 1,000 pounds. The other crops give good yields. Fertilizer treatment is that common in the county.

Kalmia sandy loam is well suited to the production of cotton. It is somewhat similar to Norfolk sandy loam, and the suggestions for improving that soil apply to it.

KALMIA FINE SANDY LOAM

In forested areas Kalmia fine sandy loam has a 3 or 4 inch surface layer of light-gray mellow fine sandy loam, underlain by pale-yellow mellow fine sandy loam or loamy fine sand continuous to a depth of about 15 inches. The subsoil is yellow friable fine sandy clay which grades, at a depth ranging from 30 to about 36 inches, into mottled yellow, gray, and rust-brown friable sandy clay material slightly

coarser and lighter than the subsoil. The surface soil in cultivated fields is light gray or yellowish gray when dry and somewhat darker when wet.

Kalmia fine sandy loam occurs in close association with other Kalmia soils on the terraces along Neuse River, Contentnea Creek, and Southwest Creek. The largest areas are north of Hardys Bridge and Harpers Landing, near Suttons Landing, and near and southeast of Fountain Hill. The land is level or slightly undulating, with a gradual slope toward the stream. Drainage is fairly well established, but in the flatter situations ditches are necessary to insure its adequacy.

Kalmia fine sandy loam is inextensive in this county. It is practically all farmed. The tree growth on the few small wooded areas consists mainly of pine, sweetgum, and water oak. The crops produced and the fertilizer treatment are the same as on Kalmia sandy loam and crop yields are practically the same.

KALMIA SAND

In forested areas Kalmia sand consists of gray sand containing a small proportion of organic matter underlain at a depth of 3 or 4 inches by pale-yellow loose medium sand which, at a depth between 36 and 40 inches, grades into yellow or slightly reddish-yellow loamy sand. In many places the loose sand is several feet deep. In plowed fields the surface soil is light gray or grayish yellow when dry but becomes darker when wet. Included with this soil in mapping are areas of Kalmia fine sand. The largest included area is southeast of Fountain Hill.

Kalmia sand occurs on the terraces along Neuse River and Contentnea Creek. Areas are undulating or gently rolling and ridgy. Wind action has apparently changed the surface configuration in some places, leaving a hummocky and slightly ridged relief. Owing to its porosity and to the favorable relief, drainage is good.

About 60 per cent of the Kalmia sand is used for crops. A part of the remainder is in abandoned fields partly grown up with old-field pine, and a part is forested with pine, sweetgum, scrub oak, water oak, dogwood, and myrtle bushes. The crops common to the county are grown. Crop yields are lower than on Kalmia sandy loam. The fertilizer treatment for the two soils is practically the same.

OKENEEL LOAM

To a depth ranging from 12 to 18 inches Okeneel loam consists of very dark-gray or black loam. The dark color is contributed by the decayed vegetable matter which has accumulated in large quantities under swampy conditions. The subsoil consists of gray slightly plastic and somewhat friable sandy clay underlain at a depth of 30 or 40 inches by light-gray loamy fine sand or fine sand. In some places the subsurface layer is mottled yellow and gray, gray and brown, or brown. In plowed fields the surface soil is gray or dark gray when dry but commonly is black when wet. The surface soil is mucky in some of the more poorly drained situations, and in forested areas the soil to a depth of about 6 inches is matted with the roots of growing plants.

Okeneel loam occurs on the terraces along Neuse River, Contentnea Creek, and Southwest Creek, typically in the flat situations adjacent to the uplands. Large areas are on the terraces south of La Grange, east and west of Falling Creek Station, north of Whitfield Crossroads, southeast of British Church, and south of Fountain Hill.

The land is nearly level and lies slightly lower than the surrounding soils. In its natural state the soil is poorly drained, owing both to the accumulation of seepage near the terrace bluffs and to the absence of natural drainage ways. A large part of the soil has been reclaimed for agriculture by ditching.

Okeneel loam is important in the agriculture of the county. Approximately 70 per cent of it is used for crops. Much of the remainder is poorly drained. The forest growth consists of sweetgum, pine, water oak, and a heavy undergrowth of gall berry, briers, and reeds. Some of the sweetgum and pine are suitable for lumber.

Corn is the principal crop on Okeneel loam. Cowpeas, soybeans, rye, and oats are of minor importance. Garden vegetables are grown for home use. Corn yields from 35 to 50 bushels to the acre and other crops give proportionately good yields. From 300 to 400 pounds to the acre of a 3-8-3 fertilizer, with an additional application of 100 to 150 pounds of nitrate of soda, is used on corn. Many farmers apply from 1 to 2 tons of lime to the acre.

OKENEEL SANDY LOAM

The surface soil of Okeneel sandy loam consists of dark-gray or black sandy loam containing a large proportion of organic matter and extending to a depth between 12 and 15 inches. The subsoil of gray friable sandy clay grades, at a depth ranging from 30 to 36 inches, into gray loamy sand or sticky sand of somewhat lighter texture. In places the subsurface layer is mottled yellow and gray or is stained with brown. The surface soil in cultivated fields is gray when dry but becomes dark gray or black when wet. Small areas in which most of the organic matter has been lost from the surface layer through cultivation or leaching and in which the subsurface layer is friable gray loamy sand or light sandy loam have been included in mapping. Had these areas been sufficiently extensive they would have been mapped as Myatt sandy loam.

Okeneel sandy loam occurs on terraces along Neuse River, in close association with Okeneel loam. It occupies positions in the flatter parts of the terraces, mainly near or adjoining the bluff lands. In its natural state the soil is poorly drained, but most of it has been reclaimed for agriculture by canals and ditches. The timber growth on the uncleared areas consists of sweetgum, pine, and water oak, with an undergrowth of gall berry, reeds, and briers.

This soil is less extensive than Okeneel loam. The crops grown and fertilizer treatment are practically the same on the two soils, but crop yields are slightly lower on the sandy loam.

DUNBAR FINE SANDY LOAM

In forested areas Dunbar fine sandy loam has a gray or brownish-gray fine sandy loam or loamy fine sand surface layer 3 or 4 inches thick underlain by grayish-yellow mellow fine sandy loam extending

to a depth of 8 or 10 inches. The next lower layer is pale-yellow or dull-yellow somewhat heavy and sticky fine sandy clay which grades, at a depth ranging from 18 to 22 inches, into mottled yellow and gray rather heavy plastic fine sandy clay or clay with faint splotches of red. At a depth of about 40 inches the gray and red colors become more pronounced. In cultivated fields the surface soil is light gray or grayish yellow when dry and slightly darker, with a brownish cast, when wet. In some places the surface soil is medium sandy loam in texture. Some areas of this texture occur east of Woodington School, but they are not of sufficient extent to warrant separation on the soil map.

Dunbar fine sandy loam occurs mainly in the northeastern part of the county, but smaller areas are scattered in nearly all parts. The soil occurs in flat places on interstream divides near the source of small streams. Areas are nearly level or slightly undulating. The soil, owing to the relief, is only fairly well drained and ditching is necessary for crops to succeed.

This soil, although of comparatively small extent, is rather important in the agriculture of the county. About 60 per cent of it is used for crops and the remainder supports a timber growth consisting mainly of pine, sweetgum, black gum, water oak, and scrub oak, with an undergrowth of gall berry bushes. Crops common in the county are grown and yields are good. The fertilizer treatment is about the same as on Norfolk fine sandy loam.

Land of this kind commands from \$100 to \$150 an acre, depending on the state of improvement, nearness to good roads, towns, and markets, and the value of the timber growth.

Dunbar fine sandy loam would be improved by liming to correct the acidity. The turning under of cover crops and legumes would also be beneficial. The land is well suited to the production of cotton, corn, soybeans, cowpeas, oats, and grasses.

RUSTON FINE SANDY LOAM

Ruston fine sandy loam in forested areas has a light-gray fine sandy loam or loamy fine sand surface layer 3 or 4 inches thick, underlain by dull-yellow or brownish-yellow fine sandy loam which extends to a depth of 15 or 18 inches. The subsoil is brownish-red, brownish-yellow, or yellowish-red fine sandy clay, friable but slightly heavier than the subsoil of Norfolk fine sandy loam. At a depth ranging from 30 to 36 inches this grades into mottled yellow and gray, with faint spots of red, friable fine sandy clay material continuous to a depth of about 48 inches. The underlying layer is mottled yellow, purplish-red, and gray friable sticky sandy clay.

In plowed fields the surface soil is grayish yellow or pale yellow when dry but brownish when wet. Some of the steeper slopes are eroded in places, and when plowed the soil shows spots and streaks of yellowish red. Included with mapped areas of this soil are patches of Ruston sandy loam which would have been mapped separately had they been of sufficient size and agricultural difference. Such areas occur in the northwestern part of the county and near the river bluff land in the central part. Ruston fine sandy loam occurs in close association with the Norfolk soils.

Ruston fine sandy loam is mapped mainly in the northern half of the county, although scattered areas occur in the southern part. The soil occupies positions on slopes leading to drainage ways. Areas range from undulating to gently rolling and rolling, but most of the land is gently sloping. On account of the favorable relief, the soil is well drained and on some of the steeper slopes surface drainage is excessive, causing erosion.

Ruston fine sandy loam is an important agricultural soil and about 65 per cent of it is used for crops. The remainder is wooded with pine, oak, sweetgum, and dogwood, with an undergrowth of myrtle and holly. The soil is well suited to the production of cotton, a large acreage of which crop is grown. Other general farm crops are produced. Cotton yields from one-half to 1¼ bales, corn from 25 to 35 bushels, and tobacco from 800 to 1,000 pounds to the acre. The fertilizer treatment is about the same as for similar crops on Norfolk fine sandy loam.

Land of this kind has a current selling price ranging from \$100 to \$250 an acre, depending on the state of improvement and location in respect to good roads, towns, and markets.

Ruston fine sandy loam is deficient in organic matter, which can be supplied by turning under green-manure crops. The suggestions for the improvement of Norfolk fine sandy loam apply equally well to this soil.

LEAF VERY FINE SANDY LOAM

In wooded areas Leaf very fine sandy loam has a gray very fine sandy loam or fine sandy loam 1 or 2 inch surface layer underlain to a depth of 8 or 10 inches by light-gray heavy mellow very fine sandy loam or fine sandy loam with spots of brown. Roots of plants are numerous in this layer. The subsoil is mottled ochreous-yellow and gray heavy tough plastic clay, with splotches of dull red in places. In cultivated fields the soil is light gray when dry but becomes darker when wet.

Leaf very fine sandy loam occurs on terraces along Neuse River and Contentnea Creek next to the bluffs or between areas of the Okenee and Kalmia soils. The largest areas are north of Rockford Bridge, southwest of Falling Creek, and between Graingers and Fountain Hill. The areas are nearly level or gently undulating, with a gradual slope toward the stream. In the flatter places drainage is poorly established and on the gently undulating situations is only fair because of the heaviness and comparative imperviousness of the clay subsoil. Ditching is necessary for successful farming on this soil.

About 60 per cent of this soil is cultivated and some of it is in pasture. The remainder supports a timber growth of pine, sweetgum, post oak, water oak, and maple. Gall berry bushes, myrtle, and holly form the undergrowth. Cotton and corn are the most important crops, and oats, soybeans, cowpeas, rye, and hay are grown to some extent. Yields are somewhat lower than on Norfolk fine sandy loam. The fertilizer treatment is similar to that on the latter soil.

Soil of this kind is usually sold in conjunction with surrounding soils and its price depends on their value.

Leaf very fine sandy loam is suited to corn, cotton, legumes, and grasses. On account of its comparatively heavy texture, it clods

and is hard to cultivate. Heavy applications of lime and the incorporation of large quantities of organic matter improve the working qualities of the land.

PORTSMOUTH FINE SANDY LOAM

The 8 or 10 inch surface layer of Portsmouth fine sandy loam is dark-gray or black mellow fine sandy loam having a large content of organic matter. In wooded areas the soil, to a depth of a few inches, is matted with the roots of plants. The subsoil is light-gray or gray friable fine sandy clay which, at a depth of about 18 inches, gives way to mottled yellow and gray slightly plastic friable fine sandy clay. The water table is reached at a depth of about 30 inches. In cultivated fields the surface soil is gray or dark gray when dry and slightly darker when wet. A few areas of Portsmouth loam and Portsmouth sandy loam, not of sufficient extent to indicate on the soil map, were included in mapping. In some places the surface soil is mucky, owing to the abundance of organic matter from decayed vegetation.

Portsmouth fine sandy loam occurs in nearly all parts of the county in areas ranging from a few acres to tracts including from 1 to nearly 3 square miles. The largest areas occur in the southern part of the county south of Woodington School. Other fair-sized areas are in the vicinity of Institute, near White School, and east and west of Airy Grove School in the northern part of the county.

The soil occurs in pocosins, flats, and slight depressions in the interstream country. Most areas are near the heads of small streams. The land is prevailing level and on account of its position and surface features is poorly drained.

Portsmouth fine sandy loam, although of comparatively large extent, is unimportant in the agriculture of the county. Less than 10 per cent of it is used for crops. The remainder is forested with pine, sweetgum, black gum, water oak, and a bush growth of gall berry, myrtle, and bay. Some merchantable pine timber remains, but much of it has recently been cut.

Corn is the principal crop and some cotton is produced. Oats, soybeans, and cowpeas are of minor importance. Corn yields from 20 to 30 bushels to the acre and other crops give fair returns. The common fertilizer treatment is followed.

The price of this land depends largely on the value of the timber.

If properly drained and limed Portsmouth fine sandy loam is good corn and cotton land and is also suited to the production of oats, legumes, and grasses.

PORTSMOUTH FINE SAND

The surface layer of Portsmouth fine sand consists of dark-gray fine sand containing a large proportion of organic matter from an accumulation of decayed vegetable matter. The surface layer is 8 or 10 inches thick and is underlain by light-gray or almost white loose crepey sand which in places is stained brown. Locally the surface material is mucky, due to the abundance of organic matter present.

Portsmouth fine sand occurs in the northern and southern parts of the county in both small and large areas. The largest areas are southeast and southwest of Dawson and near Bearwell Pocosin. The soil has developed in and on the edges of pocosins and in flats at the sources of small streams. Areas are about level and drainage is poorly established.

This soil is not used for agriculture. It is forested, mainly with pine together with sweetgum, water oak, and black gum, and an undergrowth of gall berry and bay bushes.

The price of the land is governed by the value of the timber growth or of the farmed lands in connection with which it is usually sold.

Portsmouth fine sand is probably best suited to forestry, as such soil gives low yields when farmed.

PLUMMER FINE SANDY LOAM

The 3 or 4 inch surface layer of Plummer fine sandy loam is gray or dark-gray fine sandy loam containing considerable organic matter. This is underlain to a depth of about 15 inches by light-gray fine sandy loam. Numerous roots of plants are in the upper part of the surface layer. The subsoil is mottled gray and rust-yellow loose, friable, crumbly, slightly sticky fine sandy clay becoming more friable with increasing depth and grading, at a depth ranging from 36 to 40 inches, into light-gray crepey sand or loamy sand. The water table is found at a depth of about 30 inches. In some places the dark part of the surface layer is 5 or 6 inches thick, owing to a heavier accumulation of organic matter. Included with this soil are a few small unimportant areas of Plummer sandy loam.

Plummer fine sandy loam occurs mainly in the northern and southern parts of the county, but smaller areas are elsewhere. The largest continuous areas are east of Dawson, in the vicinity of Beulah Church, south of Jackson's Store, in the vicinity of New Home Church, and in Bearwell Pocosin. Areas occupy broad nearly flat situations in which natural drainage ways have not fully developed, and on gradual slopes leading to streams.

On account of its relief, the soil is poorly drained. It is difficult to dig ditches in it because the friable loose subsoil soon crumbles and caves, filling the ditches.

Plummer fine sandy loam is not an agricultural soil in this county, though a few spots are farmed on the boundary of other soils. Oats and corn are grown, but yields are low. Practically all the soil is forested, the growth consisting of pine, sweetgum, black gum, water oak, maple, and an undergrowth of gall berry, reeds, and coarse grasses. The merchantable timber has largely been cut. The forests are a source of firewood for homes and tobacco barns.

The selling price of this soil depends largely on the value of the timber growth. The soil is probably best suited to forestry or pasturage purposes.

LENOIR VERY FINE SANDY LOAM

In forested areas Lenoir very fine sandy loam has a 2 or 3 inch gray fine sandy loam surface layer containing a small amount of organic matter. The next lower material is dull-yellow heavy very fine sandy loam showing shades of grayish yellow and brownish

yellow. The subsoil, below a depth of about 10 inches, consists of dull-yellow heavy tough compact silty clay faintly mottled with brown. The soil breaks into irregular-shaped lumps. Below a depth of about 20 inches is mottled light-gray, bluish-gray, and dull-yellow heavy stiff plastic clay which breaks into irregular lumps and crumbles into small angular particles when dry. This layer extends to a depth of about 30 inches and there gives way to bluish-gray or light-gray heavy plastic somewhat laminated soft clay mottled and streaked with light red, yellowish-red, and yellow. In some places bright-red spots are surrounded by yellowish material which shades into gray. In plowed fields the surface soil is light gray or grayish yellow when dry but has a brownish hue when wet.

Lenoir very fine sandy loam occurs mainly in the northeastern and eastern parts of the county on slight slopes leading to drainage ways and to some extent on interstream country. The areas are undulating or gently rolling, becoming more rolling on some of the steeper slopes. Surface drainage is fairly well established, although ditches are necessary in the flatter situations.

This soil aggregates a small acreage in the county and for this reason is not agriculturally important. About 65 per cent of it is farmed and the remainder is in timber consisting of loblolly and short-leaf pines, scrub oak, sweetgum, maple, and an undergrowth of gall berry bushes.

General crops are grown and yields are fair. The fertilizer treatment is about the same as for similar crops on Norfolk fine sandy loam. The soil is deficient in organic matter and would probably be benefited by liming.

BLADEN FINE SANDY LOAM

In wooded areas Bladen fine sandy loam has a gray or steel-gray heavy fine sandy loam surface layer slightly flecked with brown. This is underlain at a depth of 10 or 12 inches by mottled steel-gray and ochreous-yellow heavy stiff plastic clay continuous to a depth of 40 or more inches. In cultivated fields the soil is gray or brownish gray when dry but becomes darker when wet. A few included areas consist of Bladen sandy loam.

Bladen fine sandy loam occurs mainly in the northern part of the county on flats in the interstream country. Drainage, owing to the level surface and the heavy and almost impervious clay substratum, is not well established. Ditches are necessary for successful farming.

Bladen fine sandy loam is inextensive and not agriculturally important in this county. Approximately 75 per cent of it is cultivated and the remainder supports a growth of pine, sweetgum, scrub oak, water oak, and gall berry bushes.

Corn and cotton are the main crops, and oats, soybeans, rye, cowpeas, and hay are produced to some extent. Cotton yields from one-half to three-fourths bale to the acre and corn from 25 to 30 bushels. Other crops yield well.

Bladen fine sandy loam would be benefited by the addition of organic matter, which can be supplied by turning under green-manure crops. Lime would probably improve the working qualities of the soil, as well as correct the acidity. In some sections of the State this soil is used for the production of potatoes.

COXVILLE FINE SANDY LOAM

The surface layer of Coxville fine sandy loam in wooded areas is gray fine sandy loam containing a rather large proportion of organic matter and continuing to a depth ranging from 3 to 5 inches. This is underlain to a depth of about 10 inches by light-gray heavy fine sandy loam. The subsoil of mottled yellow and gray heavy plastic clay or fine sandy clay extends to a depth of 30 or 40 inches and is underlain by mottled yellow, gray, and red heavy plastic clay which at a depth of about 48 inches becomes friable. In some places the red mottles do not appear.

Coxville fine sandy loam occurs almost exclusively in the extreme eastern part of the county, mainly in one large area south of British Church. It occurs in flats and pocosins, and natural drainage is poor, owing to the lack of relief and the heaviness and comparative imperviousness of the clay layer.

Coxville fine sandy loam is not important agriculturally. Only a few small areas are farmed and a small acreage is used for pasture. The remainder is in forest, consisting of pine, sweetgum, black gum, water oak, scrub oak, and an undergrowth of gall berry bushes. Much of the land has been cut over for timber, but some merchantable timber remains.

This soil is probably best suited to forestry. If drained and limed it would give fair yields of corn, cotton, oats, soybeans, forage, and hay crops.

CAHABA FINE SANDY LOAM

Cahaba fine sandy loam in forested areas has a 2 or 3 inch gray or light grayish-brown fine sandy loam surface layer. The next lower material is light-brown or dull-yellow mellow fine sandy loam. Few roots of plants occur in this layer, which extends to a depth of 12 or 15 inches. The subsoil consists of brownish-red or yellowish-red friable fine sandy clay which continues to a depth between 34 and 40 inches. Numerous roots and some worm casts appear in this zone, which is underlain by light reddish-yellow friable fine sandy loam or loamy fine sand becoming lighter in color and more friable with increasing depth. In cultivated fields the soil is grayish yellow or light brownish yellow when dry and slightly darker when wet. The surface of freshly plowed fields shows spots and streaks of yellowish red where the surface mantle is shallow. Small areas having a medium sandy loam texture have been included in mapping.

Cahaba fine sandy loam occurs on the terraces along Neuse River, mainly in the western part of the county. The largest areas lie north and southeast of Rockford Bridge and north of Moss Hill School. The land is gently undulating and drainage is well established.

On account of its comparatively small extent, this soil is not important agriculturally. Most of it is used for crops. In the few small wooded areas the timber growth consists of pine, dogwood, sweetgum, and water oak. The principal crops are cotton and corn, and oats, cowpeas, soybeans, and rye are grown to a small extent. Crop yields are good. The fertilizer treatment is about the same as for similar crops on Norfolk fine sandy loam.

Cahaba fine sandy loam is a strong soil and is well suited to the production of cotton. It is deficient in organic matter, which can be supplied by turning under green-manure crops.

LEON SAND

Leon sand typically has a gray or dark-gray sand surface layer from 3 to 6 inches thick. This layer contains a small proportion of organic matter and is filled with the small roots of plants. The subsurface layer is very light-gray or almost white loose sand of single-grained structure and practically free from organic matter. At a depth ranging from 12 to 24 inches this layer is underlain by a dark-brown hardpan composed of sand cemented with organic matter. The hardpan is from 4 to 8 inches thick and is underlain by grayish-yellow sand mottled with brown. At a depth of about 40 inches the material is light gray or drab.

In poorly drained areas the material to a depth ranging from 4 to 8 inches is black sand carrying more organic matter than typical. Such areas would have been mapped as St. Johns sand had they been of sufficient extent. On some of the higher and better-drained areas adjoining the Norfolk soils the surface soil is almost white and the hardpan layer lies deeper and consists of brown or yellowish-brown slightly compact or hardened sand.

Leon sand occurs in the extreme southern point of the county on broad interstream divides. Areas are gently undulating or nearly level. Surface drainage is fairly good, but on account of the underlying hardpan the downward percolation of soil water is somewhat retarded. The water table is in places immediately below the hardpan.

Leon sand is not an agricultural soil in Lenoir County. It supports a timber growth of slash pine, scrub pine, black gum, sweetgum, water oak, and some maple, with an undergrowth of gall berry, myrtle, bay, and wire grass.

Leon sand is probably best suited to forestry, as crop yields would be low on such soil.

JOHNSTON LOAM

To a depth of 12 or 15 inches Johnston loam consists of dark-gray or black loam or silt loam containing a large proportion of decayed vegetable matter. This is underlain by gray, brownish-gray, or brown rather heavy sticky fine sandy clay or silty clay continuous to a depth ranging from 32 to 40 inches, where it generally grades into light-gray friable fine sandy clay or loamy fine sand. The lower material is somewhat lighter in texture than the layer above. In some places the surface soil is mucky, owing to the accumulation of an abundance of organic matter. Included with Johnston loam in mapping are a few areas of Ochlockonee loam too inextensive to warrant separation. These areas are brown or dark brown in the surface layer and are mottled brown, gray, and in places yellow in the subsurface layer.

Johnston loam occurs on the first bottoms along several of the streams of the county. The widest areas are along Bear Creek and Falling Creek in the northwestern part. Areas are nearly level, with a slight grade toward the stream and in the direction of its flow. In its natural state the soil is poorly drained and is water-logged part of the time. It is subject to stream overflow. Along a part of Bear Creek canals have been built and part of the land reclaimed for agriculture. Some of the other streams have been

ditched, but these ditches are now partly filled or the banks are grown up with bushes.

Johnston loam is not agriculturally important in the county at present. The soil is generally considered well suited to corn, but along Bear Creek low yields are reported. At present much of the land is pasture or hay land. Along Falling Creek land which was formerly used for corn and other crops is now idle and grown up with Johnson grass or other coarse grasses.

Approximately 60 per cent of the Johnston loam is cleared for agricultural purposes. The remainder supports a tree growth of sweetgum, black gum, water oak, and a few pines. There is an undergrowth of various water-loving plants.

Johnston loam, when thoroughly drained and limed, is considered an excellent corn soil. It is also well suited to the production of oats, soybeans, cowpeas, and hay crops.

SWAMP

Swamp includes soil material so variable in color, texture, and structure that definite type separations can not be made. The color of the surface soil ranges from gray to dark gray, brown, and black, and the texture from sand to fine sandy loam and silt loam. In some places the surface material is black muck, and is underlain by sand or sandy clay and silty clay ranging in color from gray to yellow and brown or mottled yellow and gray. In some places the soil is light-gray loose sand and in other places is mottled yellow and gray sandy clay. On some of the smaller streams colluvial wash from adjoining slopes has modified the texture somewhat, and sand bars occur in places. Locally along Neuse River the surface soil is brown silt loam, the material (Congaree) having been brought from the piedmont section of the State and deposited by flood waters. The surface material in such areas is 6 or 8 inches thick and is underlain by brown or yellowish sand or loamy sand. In a few places the subsurface layer is mottled yellow and brown or yellow and gray silt loam. In some areas the surface soil is gray or brown fine sandy loam or silt loam and the subsoil is yellow fine sandy clay or silty clay. Such areas would have been mapped as Thompson fine sandy loam had they been of sufficient extent.

Swamp occurs in the first bottoms along many of the streams of the county in strips ranging from a few hundred feet to one-half mile or more in width. The widest areas occur along Neuse River and Southwest Creek. Areas are nearly level, with a slight grade toward the stream. Along Neuse River the surface in many places is cut and scarred by sloughs and ancient drainage ways. The soil is water-logged or covered by water during part of the year. In places it is kept wet by seepage from adjoining slopes. The soil is all subject to overflow during seasons of high water.

Swamp is not an agricultural soil in this county and almost none of it has been cleared for cultivation. A few small areas are used for corn and hay. The tree growth consists of sweetgum, black gum, water oak, cypress, pine, sycamore, and birch, together with an undergrowth of water-loving plants. Along Neuse River the soil affords summer pasturage for cattle.

SUMMARY

Lenoir County is in the eastern part of North Carolina and has a land area of 399 square miles, or 255,360 acres. The relief ranges from almost level to undulating and gently rolling. The elevation above sea level ranges from about 25 to 125 feet.

Drainage conditions vary from good to moderate and inadequate. A large percentage of the land is well drained.

A county was formed in 1791. Kinston is the county seat and largest town. Railroad facilities are good and hard-surfaced State highways extend to nearly all parts of the county. Kinston and La Grange are important cotton markets and Kinston is also an important tobacco market.

The climate is mild, the average length of the frost-free season being 209 days.

Agriculture began in the county prior to the Revolutionary War. At present it consists of the production of cotton and tobacco as cash crops, and of corn, hay, and forage as subsistence crops. Dairy- and hog raising are of minor importance.

Definite systems of crop rotation are not followed. Commercial fertilizer is in general use. A large percentage of the land is farmed by tenants. The average value of the land in 1925 was \$53.83 an acre.

The soils of Lenoir County are divided into two groups, the well-drained and the poorly drained soils. The well-drained soils include members of the Norfolk, Kalmia, Dunbar, Ruston, Lenoir, and Cahaba series, and the poorly drained include the Okenee, Leaf, Portsmouth, Plummer, Bladen, Coxville, Leon, and Johnston soils, and swamp.

The important farming soils are Norfolk fine sandy loam, Norfolk sandy loam, Kalmia sandy loam, Kalmia sand, Okenee loam, Okenee sandy loam, Dunbar fine sandy loam, Ruston fine sandy loam, and Leaf very fine sandy loam. The minor farming soils are the fine sandy loam, deep phase, fine sand, sand, and loamy sand of the Norfolk series, Kalmia fine sandy loam, Leon very fine sandy loam, Bladen fine sandy loam, Cahaba fine sandy loam, and Johnston loam.



[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, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]

