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Soil Survey
of
Nansemond County, Virginia

By

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Virginia Agricultural Experiment Station

Bureau of Chemistry and Soils

In cooperation with the Virginia Agricultural Experiment Station

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SOIL SURVEY OF NANSEMOND COUNTY, VIRGINIA

By R. E. DEVEREUX, United States Department of Agriculture, in Charge, and EDWARD SHULKCUM and G. W. PATTESON, Virginia Agricultural Experiment Station

COUNTY SURVEYED

Nansemond County is in the extreme southeastern part of Virginia, its southern boundary forming part of the North Carolina-Virginia State line (fig. 1). Two counties in Virginia separate it from the Atlantic Ocean which lies at an average distance of about 30 miles, in an air line, from the eastern boundary. The northern border touches Hampton Roads, one of the finest deep-water harbors in the world. Suffolk, the county seat and largest town, is 20 miles southwest of Norfolk and 75 miles southeast of Richmond. The county embraces a land area of 423 square miles, or 270,720 acres.

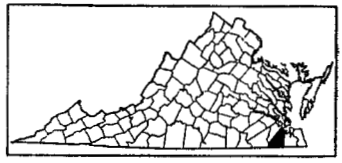


FIGURE 1.—Sketch map showing location of Nansemond County, Va.

This county lies in the tidewater section of Virginia. The surface relief is characterized by broad, flat, almost level areas and undulating, gently rolling, and rolling areas. The most striking change in elevation [1] is marked by an escarpment which begins at the North Carolina line and extends along the western edge of the Dismal Swamp to the northern edge of Suffolk, then swings in a northwest direction and passes out of the northern end of the county at Wills Corner. This escarpment forms the dividing line between the Wicomico terrace, which embraces the southwestern two-thirds of the county and has an average elevation of 50 feet, and the Dismal Swamp terrace which is younger geologically and has a range in elevation from 10 to about 30 feet. This younger and lower terrace, however, has a better drainage system than the higher terrace, as streams draining a considerable part of the county enter the ocean through channels cut across this section. That part of the area occupying the Wicomico terrace and lying west of the escarpment just described established its drainage system before the Dismal Swamp terrace was formed. A large part of the county drains northward through Nansemond River which flows across the Dismal Swamp terrace and thence into Hampton Roads. The rest drains southwestward into Blackwater River and eastward into Dismal Swamp.

The large streams have cut down to sea level for considerable distances back from their mouths, and these parts of their channels have been further widened and deepened by sinking of the coast. The

[1] WENTWORTH, C. K. SAND AND GRAVEL RESOURCES OF THE COASTAL PLAINS OF VIRGINIA Geol. Survey Bull. 32, 146 pp., illus. 1930.

tidal channels are almost entirely in the streams flowing northerly into Hampton Roads and are flanked by rather large areas of tidal marsh, though tides back up the water of Blackwater River and the lower parts of a few of its Nansemond County tributaries. The upper parts of the larger streams in general and smaller drainageways have formed a network of more or less well defined channels, some of which have cut down rather sharply from 20 to 30 feet, to give a degree of drainage to all the county except the flat areas or pocosins. Swampy bottoms, most of which are covered with cypress and gum, are present along most of the smaller streams. The most conspicuous large level area occurs as a broken series of high flats or pocosins, some of which are several square miles in extent, and it extends from a point north of Holland in a southeasterly direction across the county to the North Carolina line. This series of pocosins marks the division of the watershed of Blackwater River, which flows southward and enters the ocean through North Carolina, and the streams emptying into Hampton Roads on the north and Dismal Swamp on the east. The pocosins are probably the remains of a flat plain which at one time covered the entire surface of the Wicomico terrace. The stream heads have not yet worked back into these areas, hence they remain as high, flat, wet areas without any established drainage.

The section of the United States of which Nansemond County is a part was one of the first to be settled. Capt. John Smith sailed up Nansemond River in 1608 and was the first white man to visit the area, and settlement began soon after. In 1634 Virginia was divided into eight shires, according to the English custom, and Nansemond County became a part of Elizabeth City Shire. In 1636 that part of Elizabeth City Shire lying south of James River was cut off and formed into the county of New Norfolk. In 1637 New Norfolk was divided into Upper Norfolk and Lower Norfolk Counties, and in the year 1642 the name of Upper Norfolk was changed to Nansemond, this being the name of a tribe of Indians who inhabited the section when the white man first came. The county was originally much larger than it is at present.

The inhabitants of Nansemond County have taken part in all the important conflicts of the country, from the French and Indian Wars down through the Revolutionary, Civil, and World Wars. Suffolk was burned by the British during the Revolutionary War, and soldiers of both sides camped in the county during the Civil War.

The early white settlers were largely English. Negro slaves were introduced soon after the first permanent white settlement was made, and their numbers increased rapidly, as did the numbers of white settlers. The 1930 census gives the population of the county as 22,530, all of which is classed as rural, as Suffolk, the county seat, is an independent city. The rural population includes a number of small towns. The white population represents 32.5 percent of the total, and Negroes, 67.5 percent. The population of Suffolk in 1930 was 10,271, of which 6,461 were whites and 3,806 Negroes. This city is the most important trading center in the county.

Suffolk is said to be the largest peanut market in the world, and it furnishes an important outlet for cotton, lumber, and other products. Other important towns and trading centers are Whaleyville, Holland, Chuckatuck, Driver, Eclipse, and Crittenden. A cotton, peanut, and

general farm crop experiment station is located just outside of Holland. Eclipse and Crittenden are fishing towns. The nearby cities of Norfolk and Portsmouth, in addition to outlying areas, furnish important markets for much of the farm produce, but most of the truck crops go to northern markets.

Six different railroads traverse the county, namely, the Norfolk & Western, Southern, Atlantic Coast Line, Seaboard Air Line, Virginian, and Norfolk Southern. These furnish excellent transportation facilities east, west, north, and south.

Nansemond River is navigable to a point beyond Suffolk, and several of its tributaries are also navigable for considerable distances. The river itself flows into Hampton Roads, the port for more than 50 steamship lines connecting all parts of the world. Nearly a half million tons of freight are moved annually by water from Suffolk alone, which city is only about 15 miles from Hampton Roads. Chuckatuck Creek is another stream which is navigable for a considerable distance, and it also enters Hampton Roads. Blackwater River, a navigable stream which enters the ocean through North Carolina, touches the county at the southwest corner.

Excellent hard-surfaced through highways cross the county in all directions. Most of them enter Suffolk, or at least connect with roads leading to that city. The secondary roads are also very good and may be traveled by automobile throughout the year. Regular airplane service from Norfolk, 20 miles away, connects with all parts of the country.

This county is very well covered by telephone lines, most of which are well maintained. Schools and churches are conveniently located. Some high schools provide courses in agriculture. A county agricultural agent has his headquarters in Suffolk.

The manufacturing interest is centered in the sale of peanuts, which is conducted in the city of Suffolk. This is an important industry, since the peanut is one of the main cash crops of the county. There are also in Suffolk meat-packing, lumber, fertilizer, textile, and other plants of less importance. The twin towns of Eclipse and Crittenden, in the northern part of the county, are important centers for oystering, fishing, and boat building. The pork-packing plants at Chuckatuck, Holland, and elsewhere are of much significance to the hog raisers. Close by, in an adjoining county, is the town of Smithfield, where the world-famous hams of that name are cured. The meat-packing plants of Nansemond County cure hams and bacon by a similar process from the thousands of hogs which are cheaply raised by the farmers.

Extensive shell marl deposits in the vicinity of Chuckatuck are being worked by a cement company. The marl is loaded on boats in Nansemond River and moved out by this means. There are other extensive and largely unexplored beds in the same section. All of this marl carries a rather large overburden of unconsolidated sand and clay.

CLIMATE

Nansemond County is favored with an oceanic type of climate. The temperature is mild and the rainfall generally abundant.

Owing to the tempering influences of the nearby large bodies of water, rapid changes in temperature rarely take place, and the winters are usually mild and open. Winter cover crops, suitable to sections much farther south, grow well. The weather is not too severe for the production of many winter truck crops, and it is ideal for the production of early spring and late fall truck.

Table 1, compiled from records of the United States Weather Bureau station at Norfolk, gives climatic data which are fairly representative of conditions in Nansemond County.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Norfolk, Norfolk County, Va.*

[Elevation, 91 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1930)	Total amount for the wettest year (1889)	Snow, average depth
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
December	43.1	72	5	3.34	3.02	0.77	2.3
January	40.6	80	5	3.10	4.09	4.88	2.1
February	42.7	81	2	3.22	1.24	4.21	3.0
Winter	42.1	81	2	9.66	8.35	9.86	7.4
March	48.2	92	14	3.77	1.68	7.52	1.8
April	56.8	95	24	3.23	2.38	11.87	(1)
May	66.2	98	38	3.81	1.63	4.58	.0
Spring	57.1	98	14	10.81	5.69	23.97	1.8
June	74.4	102	49	4.22	5.90	4.75	.0
July	78.7	102	57	5.75	2.50	10.69	.0
August	77.4	105	56	5.22	.64	5.93	.0
Summer	76.8	105	49	15.19	9.04	21.37	.0
September	71.6	100	40	3.23	.57	5.41	.0
October	62.5	91	31	3.04	2.00	7.56	(1)
November	51.4	81	18	2.16	1.26	2.55	.3
Fall	61.8	100	18	8.43	3.83	15.52	.3
Year	59.5	105	2	44.09	28.91	70.72	9.5

[1] Trace.

The average frost-free season extends over a period of 237 days, from March 24, the average date of the last killing frost, to November 16, the average date of the first. Frost has occurred as late as April 21 and as early as October 11.

Some slight variations from the data given may occur in the western part of the county, but the differences are not significant. The differences in elevation in different parts of the county are very slight, but the western section is a little farther from large bodies of water. In places where underdrainage has become established, the soils dry out rapidly and may be cultivated at any time of the year. The best drained and more sandy soils may be cultivated within a few hours after rain stops falling.

AGRICULTURAL HISTORY AND STATISTICS

History makes frequent mention of the purchase of corn from the Nansemond Indians to save the colonists at Jamestown from starvation during the first few years of the existence of that colony. A colony was established in the country now included in Nansemond County shortly after the one at Jamestown in 1607, and history indicates that the first settlers were largely occupied in producing enough food to prevent starvation. By the end of the eighteenth century the county had become fairly well settled, and the most important money crops at that time were corn, pork, beef, a little tobacco, cowpeas, and apple brandy, together with forest products, such as tar, turpentine, staves, and lumber. The peanut, a crop of great importance in the more recent development of the county, was also introduced in the eighteenth century by slave traders from Africa. The county developed steadily along these lines throughout the first half of the nineteenth century and until the Civil War interrupted. Because of the position of the county, the war gave agriculture a severe setback, but since 1870, development has been very rapid.

"When the Union Armies disbanded, the soldiers carried a knowledge and an appreciation of peanuts to all parts of the country."[2] Before this time, the crop had been little known outside of the sections in which it was grown. With this impetus, however, it began to develop rapidly. The first plant for handling peanuts in this section was said to have been established prior to 1880. Large lumber plants began to develop the lumber resources, and cotton and livestock (particularly hogs) production began to take on renewed life. More accurate statistical data are available for recent years.

Table 2, compiled from records of the United States Census, shows the acreage devoted to the principal crops in 1879, 1889, 1899, 1909, 1919, and 1929.

TABLE 2.—*Acreage of principal crops in Nansemond County, Va., in stated years*

Crop	1879	1889	1899	1909	1919	1929
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Peanuts		8,784	16,304	18,078	15,921	21,090
Cotton	1,960	2,197	687	1,998	7,632	11,802
Corn	25,750	17,312	24,035	24,316	22,568	17,690
Hay	286	1,247	2,397	1,551	3,587	19,822
Potatoes		2,776	4,134	3,558	4,409	3,439
Sweetpotatoes	1,217	1,110	1,735	1,289	1,133	671

The census data indicate that about 1900, or a little prior to that time, the acreage devoted to peanut and vegetable crops made its most rapid increase. The increase in the peanut acreage is said to have been owing to the extensive development of handling and processing facilities between 1900 and 1910. The rapid development of the trucking industry about the same time has been attributed by local authorities to the perfection of refrigerator cars and fast-freight service to large northern markets. During the last several years the trucking industry has suffered severely from the competition of

[2] CLAY, H. J., and WILLIAMS, P. M. MARKETING PEANUTS. U. S. Dept. Agr. Bull. 1401: 2. 1926.

trucking areas farther south, which have been brought closer to the northern markets by modern and rapid transportation facilities. The large increase in the cotton acreage, beginning about the time of the World War, is probably due to the high war and post-war prices and to the effects of the bollweevil infestation which has seriously threatened the cotton farmers farther south. The large established and widely grown cowpea crop has been almost entirely supplanted by the soybean crop during the last 20 years. Cowpeas were grown largely for food, feed, and seed, but soybeans are grown almost exclusively for feed, and the seed is usually bought outside the county. Soybeans are usually planted with corn and are either cut for hay or grazed off by hogs. Almost every farm in the southern part of the county has at least one Scuppernong grapevine (pl. 1, *A*), and this variety of grape seems to grow to perfection with very little attention. Grapes, the only widely grown fruit except strawberries, are consumed for the most part at home. Poultry and dairy products have increased rather rapidly during the last two decades, perhaps because of the increased demand coming from the growing city of Suffolk. Acre yields of crops have increased, owing, probably, to the increased use of fertilizer and to other improved farm practices. The production of cigarette tobacco increased from practically nothing to more than 150,000 pounds during the last decade. The acreage of good soils for tobacco is somewhat limited, and other cash crops, such as peanuts, cotton, and vegetables for market, are more widely grown.

Although large acreages of the various crops are planted, very little seed is produced locally, except cotton, peanuts, and corn. Large acreages are sown to soybeans, oats, and rye, and some barley is grown. Soybean, oat, and rye seed, in particular, could be produced as cheaply here as elsewhere if harvesting and threshing facilities were available.

Expenditures for fertilizers have increased decidedly, although less money was spent for this purpose in 1929 than in 1919. More than $600,000 were spent for fertilizers in 1929, which purchased about 17,000 tons. Probably not more than 10 percent of this fertilizer was home mixed, whereas 10 years ago perhaps 50 percent was home mixed. This trend toward factory-mixed fertilizers is partly owing to the deflated condition of the fertilizer industry in the nearby Norfolk area, which has brought prices of mixed goods down almost to the prices of materials. There is much variation in the fertilization of truck crops, according to the requirements of the different crops and soils and the ideas of the individual farmer. Cash is paid for one-half or more of the fertilizer now used.

Labor is plentiful, and practically all of it is Negro, employed mainly by the year but paid by the day. The hired man is allowed a house and garden lot but no rations. Women are employed as extra help to assist in chopping and harvesting cotton and tobacco. They are paid at about the same daily rate as is paid for man labor. In the trucking section the extra labor is usually employed by the hour or by piecework; that is, so much a hundred feet of row for cultivation, so much a barrel, crate, or bushel for gathering spinach, kale, or potatoes, or so much a quart for picking strawberries. There is a rather large movement of transient labor during the truck-

harvesting season, when entire families, including people of all ages, come in for the short harvest period and then travel on to sections farther north.

The largest farm expenses are for labor and fertilizer, and considerable amounts are spent for feed and seed.

Table 3 gives an idea of the trend in size and number of farms, and of farm tenancy.

TABLE 3.—*Size, number, and tenure of farms in Nansemond County, Va., in stated years*

Year	Farms	Average size	Operated by		
			Owners	Tenants	Managers
	Number	*Acres*	*Percent*	*Percent*	*Percent*
1930	2,154	70.6	52.1	47.0	0.9
1920	2,133	77.8	64.0	34.7	1.3
1910	2,102	85.2	67.6	31.7	.7
1900	2,129	84.1	64.6	33.7	1.7
1890	1,726	101.0	77.6	22.4	.0
1880	1,351	136.0	84.4	15.6	.0

This table shows the decided trend toward smaller farms and an increase in tenancy. There were formerly many large landholdings, but most of these have been broken up into smaller farms. In this process most of the land has been sold off in smaller tracts, but some farms have been separated into smaller units for rental purposes, while still being retained by the original owner. There are perhaps 10 or 12 farms comprising 1,000 or more acres. The great majority (perhaps 80 percent) of the tenants furnish a team, implements, and two-thirds of the seed and fertilizer and give the landlord one-third of the crop. A smaller number of tenants furnish one-half of the seed and fertilizer only and give the landlord one-half of the crop. Some few rent on a cash basis, and practically all the cash tenants are in the trucking section. Trucking has not been so profitable in the last few years, however, therefore cash tenants are fewer.

Many well-appointed, painted houses have been built throughout the county, particularly in the trucking section. Most of the barns and other outbuildings are rather poor and unpainted, although some large painted barns for housing cattle, work animals, and machinery are seen here and there. The type of machinery is fair. The power work is done chiefly by horses and mules, with single plows for crop cultivation. According to the 1930 census, there were 129 tractors in the county in that year, distributed on 126 farms. The same census reported only slightly more than 2,000 head of cattle, most of which are of indifferent breeding and are kept mainly for the production of milk. Many farmers keep no cows. The few men engaged in dairying as a livelihood keep better bred cattle and better equipment. Almost all the work horses and mules are bought outside of the county. Hogs are the most widely raised class of livestock, and almost every farmer raises some.

Farm land values in the trucking section are fairly high. Very little land is changing hands at present. Poorly drained lands suited only for forestry sell at a nominal figure.

SOILS AND CROPS

Nansemond County, situated in the tidewater section of Virginia, occupies a strategic agricultural position. It has an oceanic climate with abundant rainfall and warm temperature. The large bodies of water in and adjacent to the county have a tempering influence on the temperature. The county is close to the rapidly growing metropolitan Norfolk area. It has excellent transportation facilities afforded by railroads, water transportation, and paved highways for motor transportation.

Only about 40 percent of the total area has been cleared and reclaimed for agriculture. The rest supports a forest growth including some of the original trees but for the most part is comprised of a second growth.

Loblolly pine is the most common forest tree, and probably 90 percent of the forest trees on the well-drained soils are of this variety. There is a rather extensive sprinkling of shortleaf pines and such hardwoods as white oak, post oak, southern red oak, scarlet oak, and hickory on the better drained soils. In the ravines, beech, yellow poplar, elm, sycamore, gum, red maple, black walnut, and butternut grow. Most of the swampy areas are covered with forests of cypress, white cedar (juniper), gum, and red maple. There are large areas of valuable white cedar, particularly in the Dismal Swamp. Much cypress, gum, and red maple (pl. 1, *B*) also grow in the Dismal Swamp. Most of the forests have a dense undergrowth. On the better drained soils the undergrowth is largely gall berry, myrtle, huckleberry, dogwood, holly, brambles, and briers. On the wetter soils the undergrowth is still more dense, with reeds and rushes coming in in various quantities and with increased quantities of brambles, myrtle, gall berry, and bay trees, and fewer dogwood and huckleberry. In areas like the Dismal Swamp the reeds and rushes become very dense in places and in many spots almost entirely replace all other undergrowth. The most common native grasses in the cleared areas are broomsedge, crabgrass, Bermuda grass, and lespedeza (Japan clover). There are also many varieties of native weeds. Some recent plant introductions, like Korean lespedeza and carpet grass, are becoming rather widely scattered.

Perhaps one of the main reasons that some of the soils and especially some of the inherently most fertile soils have not been cultivated is because of inadequate drainage. Large areas of good soil could be reclaimed through drainage and brought under cultivation if economic conditions demanded an increased acreage of farming land. Approximately 40,000 acres of peat occur in the Dismal Swamp. This land should not be drained or reclaimed for farming purposes at present.

Largely as a result of local differences in relief and drainage, soils have developed that differ widely in their physical composition and in their adaptations to various crops.

The agriculture of Nansemond County consists principally of the production of peanuts, cotton, and truck crops, as the main cash crops, and corn as the principal subsistence crop. Peanuts and cotton are the two important staple cash crops, and their large

acreage is due to the fact that the soils and climate are favorable for their production and also because they produce the greatest cash return and the largest profit per acre of the crops that the farmers know how to grow under present economic conditions. Credit can be obtained by the growers of these crops. These crops are not perishable and can be held for some length of time, instead of being rushed to market as soon as harvested. Peanuts find ready sale for cash at all times.

According to the United States Census for 1930, the total value of all truck crops in 1929 was $1,235,555. These crops include kale, spinach, asparagus, peas, beets, broccoli, carrots, cabbage, collards, eggplants, lettuce, cantaloups, onions, squash, tomatoes, turnips, strawberries, peppers, cucumbers, sweetpotatoes, and potatoes. Both the soils and climatic conditions are favorable for the production of truck crops, and these are grown almost entirely in the northern part of the county. Large areas of soil adapted to the production of truck crops could be utilized for that purpose if the demand for such crops were increased.

The high average yield of corn is owing to the fact that some of the corn follows the heavily fertilized truck crops and, therefore, receives the residual effect of some of the fertilizer applied to those crops. Corn is principally a subsistence crop and is grown to more or less extent in all parts of the county and on every type of soil under cultivation. Some of the farmers grow enough corn for home use. Soybeans are planted either in the row with the corn or, occasionally, in alternate rows. Most of the soybeans are hogged off; that is, the hogs are turned into the fields to forage.

A large number of hogs are raised, and many of them are marketed locally in Smithfield, Richmond, or Norfolk. The hogs are raised mainly on peanuts, together with some soybeans. In harvesting the peanuts, some of the nuts are left in the ground, and these are hogged off. Some farmers turn their hogs into the unharvested fields of peanuts. It is considered that soybeans and peanuts give a good flavor to the hams and bacon cured from the hogs fed on these crops.

Around every well-established home, garden vegetables of many varieties are produced. Most of the farmers keep chickens, and they sell chickens and eggs, the sale of which adds greatly to the farm income. Many dollars worth of dairy products are sold annually. Many of the farmers, especially the tenants, do not keep milk cows, and no large dairies are operated except for the purpose of supplying milk to the city of Suffolk.

Considered agriculturally, as regards drainage conditions and in relation to the character of the soil material, the soils of Nansemond County may be divided into three groups, as follows: (1) Light-colored well-drained soils; (2) light-colored poorly drained soils; and (3) miscellaneous classifications of soil material. In the following pages the soils are described in detail, and their agricultural importance is discussed; their distribution is shown on the accompanying soil map; and their acreage and proportionate extent are given in table 4.

TABLE 4.—*Acreage and proportionate extent of the soils mapped in Nansemond County, Va.*

Type of soil	Acres	Per-cent	Type of soil	Acres	Per-cent
Norfolk fine sandy loam	51,520	19.0	Bladen very fine sandy loam	6,208	2.3
Norfolk fine sandy loam, deep phase	20,224	7.5	Bladen fine sandy loam	12,160	4.5
Norfolk fine sand	3,712	1.4	Bladen loam	14,464	5.4
Norfolk sand	2,752	1.0	Bladen clay loam	2,816	1.0
Craven fine sandy loam	22,400	8.3	Plummer fine sandy loam	4,096	1.5
Craven very fine sandy loam	2,880	1.1	Lenoir fine sandy loam	14,592	5.4
Onslow fine sandy loam	22,400	8.3	Lenoir very fine sandy loam	576	.2
Onslow very fine sandy loam	5,504	2.0	Lenoir silty clay loam	1,600	.6
Onslow loamy fine sand	3,328	1.2	Peat	28,672	10.6
Moyock fine sandy loam	7,040	2.6	Peat, shallow phase	12,096	4.5
Moyock fine sandy loam, flat phase	4,672	1.7	Swamp	14,208	5.2
Moyock fine sandy loam, heavy-subsoil phase	704	.3	Tidal marsh	8,768	3.2
Moyock loamy fine sand	3,328	1.2	Total	270,720	

LIGHT-COLORED WELL-DRAINED SOILS

The group of light-colored well-drained soils includes all the soils of the Norfolk, Craven, Onslow, and Moyock series mapped. The total acreage of these soils amounts to 55.6 percent of the total area of the county, and 60 percent of this land is under cultivation. Practically all the original timber has been cut, and most of the second growth on the uncultivated land is loblolly pine, with some white oak and mixed oaks, maple, sweetgum, dogwood, hickory, and other hardwoods.

These are the best drained soils in the county, as they occur on the breaks to streams and in undulating and gently rolling areas. In only a few places along some of the steeper slopes of the Norfolk and Craven soils, however, is there any noticeable erosion. Owing to their favorable surface relief, they are suitable to a diversified type of agriculture, and improved farm machinery may be used to good advantage in most places. These soils are easily cultivated, especially with hand tools and light farm machinery.

These light-colored soils are characterized by light-gray or grayish-yellow surface soils in the Norfolk and Craven members and somewhat darker gray and grayish brown in the Onslow and Moyock members. The texture of the surface soil is dominantly fine sandy loam or very fine sandy loam, although some sand and fine sand are included. The subsoils of the Norfolk soils are deep-yellow fine sandy clays and sands, of the Onslow are yellow and grayish-yellow fine sandy clays, and of the Moyock are mottled gray and yellow fine sandy clays. The Craven soils have heavier subsoils than the rest of the soils of this group. All the soils of the group are acid.

The surface soils are of such texture that they absorb a large amount of rainfall, and the subsoils, with the possible exception of the sands, have a structure that makes it possible for them to absorb and retain sufficient rainfall to maintain good moisture conditions for growing plants and to hold any fertilizers or manures applied to the land.

The soils of this group dominate the agriculture in the production of the main cash crops, that is, peanuts, cotton, and general truck crops. Because of the light texture of the surface soils and

general friability of the subsoils, these soils naturally warm up early in the spring and are consequently the first on which farming operations begin. As their light color reveals, all these soils are deficient in organic matter, and they are leached of practically all soluble plant nutrients. In other words, they are not inherently so fertile as some of the poorly drained soils, but are early soils, and their desirable physical properties are such that they respond favorably to proper fertilization and return the most profitable crops produced in the county. They are therefore correctly considered the best soils for the production of all truck crops, peanuts, cotton, and bright tobacco. Cotton requires an early soil so far north as Nansemond County.

Norfolk fine sandy loam.—Norfolk fine sandy loam is one of the best developed soils in the Atlantic coastal-plain section, extending from southern Virginia to Florida. It is held in high esteem for the production of cotton, peanuts, bright tobacco, and early truck crops.

The 5- to 8-inch surface soil in cultivated fields consists of light-gray or grayish-yellow loamy fine sand or light fine sandy loam. It is underlain by pale-yellow or grayish-yellow loamy fine sand or light fine sandy loam, which continues downward to a depth ranging from 12 to 18 inches. In wooded areas the topmost 1 to 3 inches contains sufficient organic matter to give the material a dark-gray color. The subsoil is yellow fine sandy clay which continues downward to a depth ranging from 24 to 40 inches. This material has no definite structure, but it is friable and may be easily crushed to a mealy mass. Beneath this layer is fine sandy clay material of mottled light-gray, yellow, and light-red colors, which in places reaches a depth ranging from 60 to 80 inches, where it grades into stratified fine sands and sandy clays.

Included with this soil in the extreme northern part of the county are small areas of grayish-brown or light-brown loamy fine sand underlain by yellowish-brown or yellowish-red friable fine sandy clay which grades, at a depth ranging from 30 to 40 inches, into brownish-yellow loamy fine sand or fine sandy clay. These areas are similar in their characteristics to the Sassafras soils mapped on the Eastern Shore of Virginia.

In some places the subsoils of the flatter areas, or those areas that are not so well drained and are paler, show slight mottlings of gray at a depth between 20 and 30 inches. In areas of this soil adjoining areas of the Craven and Lenoir soils, the subsoil is heavier and more mottled than typical. In a few places the light sandy surface soil is 20 or 24 inches thick, and in a few other places the fine sandy clay may be within a few inches of the surface. Particularly is the latter condition true on some slopes where surface erosion has been pronounced.

Norfolk fine sandy loam occupies the largest area of the farming soils. Large unbroken bodies are developed in the northwestern part of the county, in the section known as "Milners Neck." Other large areas are in the southwestern part, in the vicinities of Whaleyville, Holly Neck School, and South Quay School, and around Cleopus. Smaller areas are scattered throughout the central part and the extreme northeastern part.

The surface relief ranges from almost level and undulating to gently rolling and gently sloping, and on the breaks bordering the drainageways it is decidedly sloping in places. The land is exceptionally well drained, both in the surface soil and internally.

A large percentage of Norfolk fine sandy loam is under cultivation. The other areas support a tree growth, principally of loblolly pine, together with a few oaks, hickory, and dogwood. Probably 40 percent of the cultivated soil is used for the production of peanuts, 40 percent for cotton, 15 percent for corn and soybeans, and a very small percentage for bright tobacco, truck crops, and garden vegetables. The finest quality peanuts in the county are produced on Norfolk fine sandy loam and its deep phase, and the yields range from 40 to 90 bushels an acre. The general fertilizer practice with most farmers of this section is to use a lime mixture (lime and potash bought ready mixed) for peanuts. Some use light applications of a 2–8–6 or 0–10–6 fertilizer.[3]

Cotton yields from one-third to 1 bale an acre. Many farmers apply from 400 to 800 pounds of 4–8–4 or 4–10–6 an acre for cotton. Many of them give an additional side dressing ranging from 100 to 150 pounds an acre of sulphate of ammonia or nitrate of soda. Corn yields from 15 to 35 bushels an acre, depending on the quantity of fertilizer applied and the content of organic matter in the soil. It is usually fertilized with 300 pounds an acre of a 3–8–3 or 2–8–4 mixture and a side dressing of nitrate of soda when the plants are about 15 or 20 inches high. Acre yields of sweetpotatoes range from 60 to 200 bushels, and this crop is given from 600 to 800 pounds an acre of a 2–8–10 fertilizer. Tobacco produces from 600 to 900 pounds an acre and receives from 800 to 1,200 pounds an acre of 3–8–5 or 4–8–4 mixture, and in a number of cases a higher grade of fertilizer. Potatoes return good yields and are fertilized with from 1,000 to 2,000 pounds an acre of a 7–6–5 mixture. All the truck crops are given heavier applications of a high-grade fertilizer.

Norfolk fine sandy loam is very easily tilled, warms up quickly in the spring, may be cultivated soon after rains, and responds readily to the application of commercial fertilizers or the addition of barnyard manures and also to the turning under of green-manure crops. The effect of turning under green-manure crops or the addition of manure is seen in increased crop yields for several years. This land can be built up to a fair state of productivity and easily maintained in such condition through proper crop rotation and the incorporation of organic matter. Garden vegetables, small fruits, and Scuppernong grapes do well.

Norfolk fine sandy loam, deep phase.—The deep phase of Norfolk fine sandy loam occurs in close association with and in many places adjacent to Norfolk fine sandy loam. It is well distributed over all parts of the county, with the exception of the extreme northern end. The acreage of this soil is large.

This deeper soil differs essentially from the typical soil in that it has a much thicker fine sandy layer over the fine sandy clay subsoil. The surface soil is light-gray loamy fine sand which passes, at a depth of about 4 or 6 inches, into yellow or pale-yellow loamy fine

[3] Percentages, respectively, of nitrogen, phosphoric acid, and potash.

sand, continuing downward to a depth ranging from 30 to 36 inches. Beneath this is yellow or pale-yellow mellow and friable fine sandy clay. In most places the thick loamy fine sandy surface layer is lighter in color, and in many places the subsoil also is slightly lighter in texture than the surface soil and subsoil of the typical soil. In a few places, the loamy fine sand extends downward to a depth of 3 feet or deeper, but such areas are too small to justify separation on a small-scale soil map. Locally, spots of Norfolk fine sand have also been included.

A large part of this land has been cleared, and the rest supports a growth, dominantly, of pine. This soil is not considered so good as Norfolk fine sandy loam, but it is a better soil and can be built up to a higher state of productivity than the Norfolk sands. It is a good soil for the production of early truck crops and is also well suited to the production of bright tobacco and peanuts. The yields of bright tobacco are less than those obtained on the typical fine sandy loam, but the quality is good. This is one of the best soils in the county for the production of peanuts. The staple crops grown and the fertilizer treatment are about the same as those for Norfolk fine sandy loam, but yields are somewhat lower. The land is very easily tilled, warms up quickly in the spring, but will not hold fertilizers or manures so long as the typical soil, owing to the depth of the light-textured material overlying the fine sandy clay.

Norfolk fine sand.—The 6- to 8-inch surface soil of Norfolk fine sand is light-gray or light-brown fine sand. It is underlain by pale-yellow or grayish-yellow fine sand which continues downward to a depth ranging from 40 to 80 or more inches. In some places in the lower part of this layer, slight mottlings of light gray or rust brown occur. This soil is closely associated with Norfolk fine sandy loam, and in such places it occupies the higher knobs or lower slopes of areas of that soil.

Norfolk fine sand occurs in several small areas in the southwestern part of the county, some of the largest of which are along Somerton Creek. Fair-sized bodies lie southwest of Ducks Store, to the northwest of Holland, and about 2 miles west of Whaleyville. Two fair-sized areas are northeast of Suffolk.

Practically all this land is either in forest or has been cut over and is now reforesting itself to loblolly and old-field pines (pl. 2, *A*), with a few scrub oak. The small areas farmed are utilized mainly for the production of corn and peanuts, and small quantities of tobacco and cotton are grown. Yields are low, except where large applications of commercial fertilizer have been made.

Because of its fine texture and mellow condition, this soil furnishes better moisture conditions than are obtained on Norfolk sand. It is difficult to build up and maintain this soil in a productive state. Early truck crops can be grown if the season is favorable and if large quantities of commercial fertilizers are applied. Corn and peanuts are perhaps the best crops for this soil. At present forestry appears to be the best use for it.

Norfolk sand.—Norfolk sand occurs almost exclusively in a strip of country beginning as a narrow point along Blackwater River, 1 mile south of South Quay, and extending south along the river to the North Carolina-Virginia State line. It has an undulating or

gently sloping surface relief and consists, for the greater part, of low ridges and knobs. It is exceptionally well drained.

The sand is the lightest textured and most open and porous soil of the Norfolk series. As it is well drained, it warms up quickly in the spring and can be tilled immediately after rains. Light farming implements are all that are necessary for the plowing and cultivation of this soil. The thickness of the sand ranges from about 5 to 8 feet. The surface soil, to a depth of about 5 or 6 inches, is light-gray or grayish-white sand. It is underlain by pale-yellow loose sand. In wooded areas the upper 1- to 3-inch layer has a slight accumulation of organic matter, giving the material a grayish-brown color.

Nearly all the original growth of timber has been cut, and, with the exception of a few areas which have been farmed, all the land is reforesting itself to loblolly and old-field pines, together with a few scrub oaks. Only a few small areas are under cultivation, and yields of corn and other crops are low. The soil is inherently poor, and this fact, together with the looseness of both the surface soil and subsoil, renders it almost impossible to build up and maintain in a productive capacity. Its best use, under present economic conditions, is forestry.

Craven fine sandy loam.—Craven fine sandy loam is similar to Norfolk fine sandy loam in the color of the surface soil and subsoil, and its main difference from that soil is the heavier character of its subsoil and underlying material.

The surface soil of Craven fine sandy loam is gray fine sandy loam to a depth of 4 or 6 inches. It is underlain by pale-yellow fine sandy loam which becomes slightly heavier in texture with depth and ranges from 8 to 12 inches in thickness. This layer is underlain by yellow tough tenacious clay or heavy plastic and sticky fine sandy clay. This material cracks on drying and breaks into irregular-shaped lumps which are rather hard to pulverize. Between depths of 24 and 30 inches it grades slowly into pale-yellow, mottled gray and yellowish brown, heavy tough clay material which continues downward to a depth of 60 or more inches.

In places along some of the steeper slopes, surface wash has removed the finer surface soil material and left the heavy yellow subsoil exposed. In other places there has been an accumulation of the fine sandy loam surface soil to a depth of 15 or 20 inches. As the Craven soil passes gradually back toward the smooth areas of Lenoir and Bladen soils, the surface soil is generally shallower and the subsoil becomes pale-yellow clay, mottled with gray and brownish yellow at much slighter depth than in the more rolling areas.

Craven fine sandy loam is one of the more extensive and important agricultural soils. The largest continuous areas are in the vicinity of Suffolk and Kilby, north of Reids Ferry extending toward Oakland, and along the west break of Dismal Swamp. Smaller bodies are scattered throughout the county. This soil occurs in close association with the Norfolk and more particularly the Lenoir soils.

The surface relief is almost level or gently sloping and becomes more sloping on the breaks. Natural surface drainage is good, but internal drainage is somewhat retarded, owing to the heavy character of the subsoil and underlying material. Most of this soil occurs in

well-drained positions, lying between the Lenoir soils and the drainageways. Practically all the land lies favorably for agricultural purposes. It does not drain so readily or warm up so quickly as Norfolk fine sandy loam and, therefore, is not quite so early a soil. It is not used so extensively for growing early crops.

About 45 percent of the land is cleared and under cultivation, and the rest is forested to pines, together with several species of oak and some hickory. The chief crops grown are peanuts, cotton, and corn, and some soybeans, sweetpotatoes, oats, and garden vegetables are produced. Here and there a few truck crops are grown. Perhaps from 30 to 40 percent of the cultivated soil is used for the production of peanuts, and the yields range from about 35 to 70 bushels an acre.

Peanuts receive from 200 to 600 pounds an acre of a 2–8–2 or 4–8–4 fertilizer mixture, together with an application ranging from 200 to 400 pounds an acre of land plaster on the plants at blooming time. Cotton yields from about one-third to three-fourths bale an acre, depending on the quantity of fertilizer applied, the stand of plants, and the method of cultivation. It receives from 300 to 600 pounds an acre of a 4–8–4 or 3–8–3 mixture and usually from 100 to 200 pounds an acre of nitrate of soda as a top dressing. The yields of corn and method of fertilization are about the same as those on Norfolk fine sandy loam.

Craven fine sandy loam responds readily to the turning under of green-manure crops and the addition of barnyard manure. It can be built up to a fair state of productivity, and this can be easily maintained through proper crop rotation and the incorporation of organic matter.

Craven very fine sandy loam.—Craven very fine sandy loam is inextensive, and it occurs only in a few areas in the southern part of the county. The largest of these lie southeast of Cypress Chapel in the southeastern part, along Back Swamp, and along the tributaries of Somerton Creek in the extreme southwestern part.

Craven very fine sandy loam differs essentially from Craven fine sandy loam, in that both the surface soil and subsoil contain a higher percentage of finer material, thus giving a heavier soil throughout the profile. In most places the surface soil is shallower and the yellow heavy clay upper subsoil layer is thinner than in Craven fine sandy loam. In the vicinity of Factory Hill are a few small areas which have a gray or grayish-brown surface soil and a brownish-yellow or drab heavy clay subsoil. In a few places the surface soil is gray clay loam or silty clay loam. These areas of textural and color variations are too small to map separately on a soil map of small scale.

Most of this land is forested to oaks and pines. The area under cultivation is used for the growing of the same crops as are grown on Craven fine sandy loam, and yields under the same fertilization and agricultural methods are practically the same as on that soil. Craven very fine sandy loam, being finer in texture and occupying slightly flatter surface relief, does not warm up quite so quickly in the spring as does Craven fine sandy loam.

Onslow fine sandy loam.—The surface soil of Onslow fine sandy loam in cultivated fields is gray or dark-gray loamy fine sand or fine sandy loam from 4 to 6 inches thick. In the wooded areas the topmost 1 to 3 inches of soil is dark gray or almost black, owing to the

presence of organic matter. The outstanding characteristic feature of the Onslow soils and one which distinguishes them from other soils of this county, is the so-called "brown", or hardpan, layer which lies immediately beneath the surface soil and consists of fine sand and silt, cemented with iron, organic matter, or both, into a hard compacted or only slightly compacted layer of light-brown or brown color (pl. 2, *B*). This layer ranges from 1 inch to as much as 6 inches in thickness and is not uniform in thickness, hardness, or compactness over any extended area. In some places it is a rather hard layer, and in other places it is only a brown-stained layer. In a few places no brown layer is present, not even in wooded areas; nor do any concretions occur in the fields. However, the color, texture, and structure of the subsoil and underlying material are typical of the Onslow soils. In many freshly plowed fields, numerous small generally rounded soft or hard brown accretions or concretions are present on the surface. These are the result of the hardpan layer having been turned up and broken by plowing, and exposed to the air.

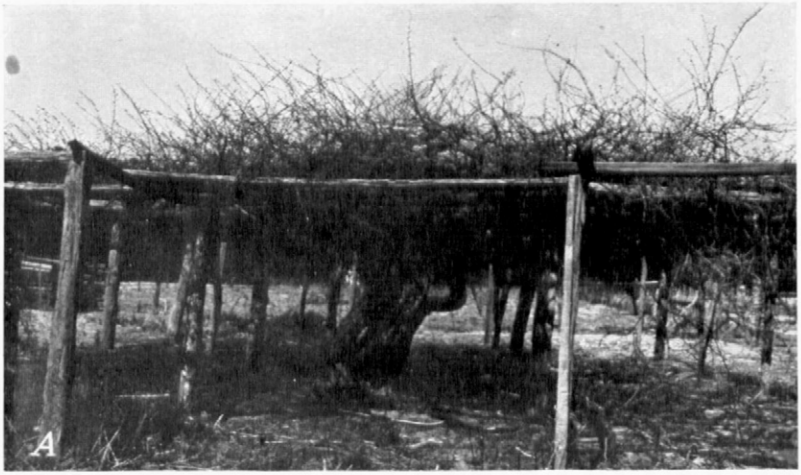
The subsoil, to a depth ranging from 18 to 24 inches, is pale-yellow or grayish-yellow fine sandy loam which quickly changes to fine sandy clay having no definite structure but breaking down into a friable mealy mass. In some places the upper part of the subsoil is slightly stained with brown, whereas the whole layer has a faint olive-green cast. This material grades into grayish-yellow fine sandy clay which is sticky when wet and is mottled with yellowish brown and grayish white, and, at a depth of about 40 or 45 inches, the material becomes light-gray or ash-gray sticky fine sandy clay and is heavier than the typical subsoil. In a few localities the surface soil is thicker and lighter in texture than that in the typically developed areas. In places where this soil borders the Lenoir or Bladen soils, the subsoil is mottled light-gray, yellow, and brown rather heavy fine sandy clay or clay.

Onslow fine sandy loam is well distributed throughout the southern and western parts of the county. It is an extensive and important soil. Some of the largest bodies are developed in the southwestern part in the vicinity of Mount Sinai Church, near Holland, around Myrtle, in the vicinity of Leesville, east and west of Nurney, and along the Virginia-North Carolina State line.

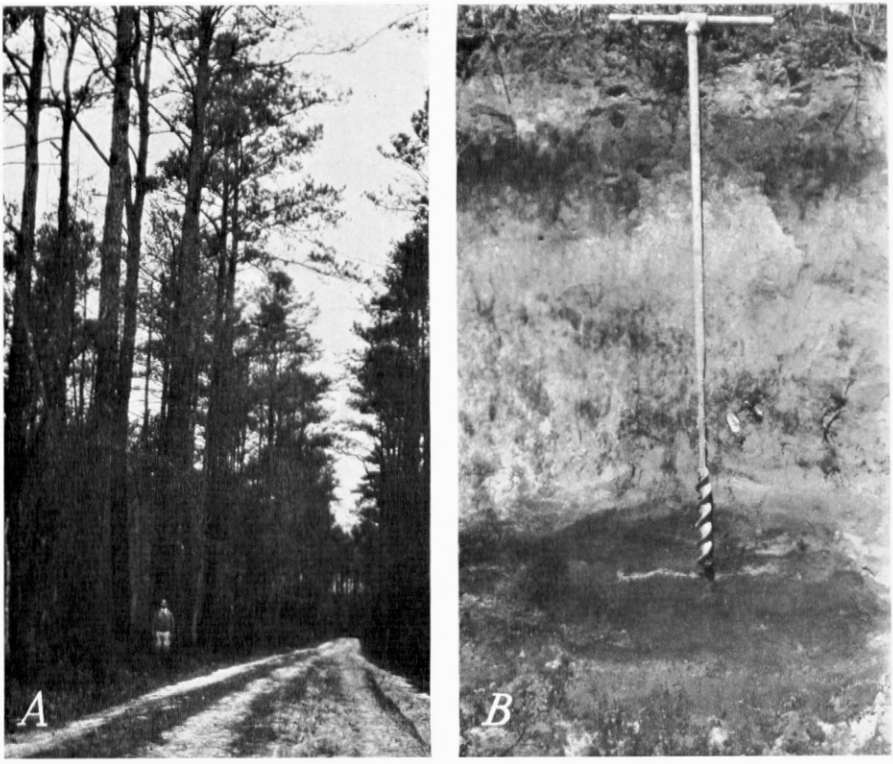
The surface relief ranges from almost level or undulating to gently rolling. The flatter areas are developed on the wider interstream bodies and are not so well drained as the undulating or gently sloping areas which lie near the drainageways. This soil as a whole is not so well drained as the Norfolk soils. Part of the land, however, requires only a small amount of artificial drainage, and all of it could be fairly easily drained. The hardpan layer in some places interferes with the movement of water through the soil, but this condition is alleviated when the land is plowed because the hard layer is then broken up.

A fairly large percentage of this soil is under cultivation, and the rest supports a growth of old-field and loblolly pine, together with some hardwoods. Most of the original native growth of timber has been cut. Pines grow rather fast on this soil.

Onslow fine sandy loam is not quite so early a soil as the Norfolk and Craven fine sandy loams. Cotton, corn, and peanuts are the



A, Typical Scuppernong grapevine on a farm in Nansemond County. *B*, Thicket of gum trees in the Dismal Swamp.



A, Pine trees on Norfolk fine sand. *B*, Profile of Onslow fine sandy loam northwest of Suffolk. The snuff-brown layer here is 4 or more inches thick.

chief crops grown, and sweetpotatoes, potatoes, and garden vegetables are produced mainly for home use. About 40 percent of the cultivated land is used for peanuts, 35 percent for cotton, 20 percent for corn and soybeans, and 5 percent for miscellaneous crops.

Cotton yields from one-fourth to three-fourths bale an acre, corn from 12 to 30 bushels, and peanuts from 30 to 70 bushels. Fertilizer treatment is about the same as for Norfolk fine sandy loam and Lenoir fine sandy loam, which are described in subsequent pages. The yields of corn, soybeans, and hay are as high as on Norfolk fine sandy loam. Good yields of peanuts can be obtained, but the hulls are dark, owing to the presence of organic matter in the soil and to slightly poorer drainage. Therefore, they do not bring such good prices as peanuts grown on the Norfolk and Craven soils.

Onslow very fine sandy loam.—Onslow very fine sandy loam is closely related, both in color and position, to Onslow fine sandy loam. It differs essentially from that soil, in that both the surface soil and subsoil contain finer grades of sand and more silt and clay, thereby giving it a very fine sandy loam texture. The color of the surface soil is dark gray in the wooded areas and gray in cultivated fields. The dark-brown compact layer, so characteristic of Onslow fine sandy loam and Onslow loamy fine sand, is not well developed throughout areas of this soil. The subsoil is pale-yellow or greenish-yellow heavy fine sandy clay which becomes mottled with gray and in some places with rust brown below a depth ranging from 20 to 30 inches. Where this soil adjoins the Lenoir soils, the subsoil is much heavier than that of the typical areas.

Onslow very fine sandy loam occurs only in several large bodies in the southeastern part of the county. The larger and more continuous areas are developed in the vicinity of Harrell Siding, between Whaley and St. Marys Church, south of Cypress, and north of Nurneysville. The surface relief ranges from almost level to undulating. Natural surface drainage is poor, and open ditches are necessary for draining this soil. Because of the character of its surface relief and rather heavy subsoil, the land does not drain so readily or warm up so quickly in the spring as the fine sandy loam and loamy fine sand members of the Onslow series.

Only a small proportion of this soil is under cultivation. Some of the land formerly cultivated and the cut-over land are reforesting to loblolly pine, some shortleaf pine, and some oaks. The undergrowth, which is rather dense in many places, consists of myrtle, gall berry, and various briers.

Onslow very fine sandy loam is used for the production of peanuts, cotton, corn, and soybeans, and it is fertilized and cultivated in the same manner as Onslow fine sandy loam. It is not so good a soil for the production of peanuts and cotton as Onslow fine sandy loam, and yields of these crops are lower than those obtained on the fine sandy loam. Some sweetpotatoes and garden vegetables are grown, mainly for home use.

Onslow loamy fine sand.—Onslow loamy fine sand occupies only a small acreage in this county, and it occurs in several scattered areas. some of the largest of which are in the vicinity of Pleasant Hill School, southwest and northeast of Laurel Hill School, northeast

of Holland, east of Purvis Station, west of Whaley, and in the extreme southwest corner. It is closely associated with Onslow fine sandy loam.

In cultivated fields the surface soil is gray or light-gray loamy fine sand, but in wooded areas it contains enough organic matter in the topmost 1 to 3 inches to give the material a dark-gray color. The characteristic compact brown layer of fine sand ranges in thickness from 1 to 6 or more inches, being more pronounced in the loamy fine sand than in the fine sandy loam. Underneath this layer is pale-yellow or yellowish-gray loamy fine sand which continues downward to a depth of 3 feet or deeper, or which may grade into fine sandy loam at a depth ranging from 28 to 36 inches below the surface.

The surface relief ranges from level to undulating and in places to gently sloping, and surface drainage is fair. Internal drainage is impeded to some extent by the compact layer.

Only a comparatively small proportion of this soil is under cultivation. The rest is being reforested, mainly to old-field pine, together with a few hardwoods. On areas of this soil adjoining Onslow fine sandy loam and other agricultural soils, the methods of handling the land are similar to those in use on the adjoining soils. The principal crops grown on Onslow loamy fine sand are peanuts, cotton, and corn, and yields are less than those obtained on Onslow fine sandy loam.

Moyock fine sandy loam.—The 6- or 8-inch surface soil of Moyock fine sandy loam consists of grayish-brown fine sandy loam or loamy fine sand. Although it dries out in cultivated fields to a considerably lighter color, its characteristic grayish-brown cast readily distinguishes it from the Norfolk soils. In wooded areas the topmost 2 to 4 inches may contain sufficient organic matter to impart a dark-gray color to the material. Beneath the surface soil and continuing downward to a depth of 12 or 15 inches is brownish-yellow or grayish-yellow fine sandy loam which grades into mottled light-gray and brownish-yellow fine sandy loam or light fine sandy clay. This material continues downward to a depth ranging from about 24 to 30 inches. The subsoil has no definite structure but has a rather dry crumbly feel and is readily crushed to a mealy mass. Beneath this layer is mottled yellowish-gray and yellow loamy fine sand or fine sandy clay. In some places there is gray or gray and yellow loose fine sand.

This soil occurs exclusively in the northern part of the county, north of Suffolk. The largest bodies lie along Nansemond River and Chuckatuck Creek, and between Shoulders Hill and Pig Point. In some places this soil extends all the way to the sharp stream breaks characteristic of this part of the county, but in many places it is separated from the stream valleys by a narrow fringe of Norfolk fine sandy loam or Craven fine sandy loam.

Moyock fine sandy loam has almost level, undulating, or gently sloping surface relief. The land is, for the most part, naturally well drained. Both the surface soil and subsoil are mellow and friable, and rain water readily percolates through the soil material.

All areas of Moyock fine sandy loam are characterized by a surface relief favorable for agricultural purposes, and most of the land has been cleared, a large part of which is in cultivation. The forested

areas support a growth of old-field and loblolly pines. About 60 percent of the cultivated area is used for the production of truck crops, as kale, spinach, turnips, beets, cabbage, English peas, snap beans, and a few others. The remaining 40 percent is devoted to the production of peanuts, corn, and general farm crops. All the truck crops receive heavy applications of high-grade ready-mixed fertilizers. The English peas, beets, and snap beans receive about 1,000 pounds an acre of a 9–8–3 and 9–6–5 mixture, respectively. Cabbage is given about 2,000 pounds an acre of 9–6–5, and turnips receive 500 pounds of 7–6–5. The ordinary farm crops which follow the truck crops are not fertilized. Very little cotton is grown in this part of the county, particularly on this type of soil. Yields of corn range from 20 to 35 bushels an acre, and of peanuts from 30 to 70 bushels.

Moyock fine sandy loam occupies a unique geographic position as regards climate and water transportation. Its location probably accounts for the growing of early truck crops in the northern part of the county, in conjunction with the Norfolk trucking section of the State. Although this soil is not so well drained as Norfolk fine sandy loam and, therefore, does not warm up so early in the spring, it possesses those physical qualities which render it well adapted to the production of a wide range of truck crops. It is considered the best soil in the county for the production of spinach, kale, and some other truck crops.

Moyock fine sandy loam, flat phase.—Moyock fine sandy loam, flat phase, differs essentially from typical Moyock fine sandy loam in surface relief and drainage conditions. It occurs in close association with the fine sandy loam, but is developed farther away from the streams or on the flats on the broader divides. Its surface relief is almost level or undulating, and drainage is poor, both on the surface and internally. All areas of this soil require artificial drainage in order to reclaim them for agricultural use.

The surface soil is somewhat darker; that is, it is more brown or dark gray; and the subsoil is lighter than the corresponding layers of Moyock fine sandy loam. In texture and structure this soil is not materially different from the typical fine sandy loam. The light-gray color of the subsoil of this flat land is due to poor aeration and oxidation.

Moyock fine sandy loam, flat phase, is developed in the northern end of the county, and in many places is surrounded by Moyock fine sandy loam. The largest areas lie east of Nansemond River, between Shoulders Hill and Pig Point. Another fair-sized body is east of Chuckatuck. Only a small part of the land is in cultivation. Most of it supports a second growth of pine, a few hardwoods, and a rather dense undergrowth of myrtle, gall berry, and other bushes.

The areas under cultivation are used for the production of truck crops common to this part of the county. Spinach and kale do not appear to do so well, however, and the yields are lower than those obtained on Moyock fine sandy loam. This flat soil is not so desirable for the production of a wide variety of truck crops as is the fine sandy loam. Corn and soybeans do fairly well.

Moyock fine sandy loam, heavy-subsoil phase.—The heavy-subsoil phase is differentiated from typical Moyock fine sandy loam be-

cause of the heavier character of the subsoil. The 8-inch surface soil is grayish-brown fine sandy loam. It is underlain by brownish-yellow or pale-yellow, in places mottled with gray, fine sandy loam, continuing downward to a depth ranging from 18 to 24 inches. Below this is the characteristic heavy tough mottled gray and brownish-yellow fine sandy clay. This heavy layer may range from 1 to 2 feet in thickness, and beneath it is gray heavy fine sandy loam or fine sandy clay loam, more or less mottled with brown.

This soil occupies a total area of slightly more than 1 square mile. Most of it lies west of Nansemond River. Two bodies occur about 3 miles north of Suffolk, and some areas are south and northeast of Chuckatuck. The surface relief is almost level or undulating. Owing to the heavy character of the subsoil, the land does not drain so readily as the typical fine sandy loam.

Moyock fine sandy loam, heavy-subsoil phase, is, for the most part, cleared and under cultivation. It is used for the production of general farm crops, and the yields are about the same as the average yields for the staple crops on the Moyock or Lenoir fine sandy loams.

Moyock loamy fine sand.—The loamy fine sand of the Moyock series differs from the fine sandy loam member mainly in the texture of the surface soil, which contains a larger percentage of fine sand, and in the consistence of the subsoil, which in most places is only slightly heavier than the surface soil and ranges from loamy fine sand to light fine sandy loam. The subsoil is also of slighter depth, and the material underneath is grayish-yellow, gray, or gray and yellow loose fine sand.

Because of its slightly more rolling surface relief, light texture, and consequent better drainage, Moyock loamy fine sand is a somewhat earlier soil than Moyock fine sandy loam, and, although it cannot be built up to and maintained in so high a state of productivity as that soil, it is well adapted to growing general truck crops, especially those requiring good drainage.

The largest body of this soil lies on the divide between Bennett Creek and Nansemond River, extending from Driver north to the Nansemond River bridge. Smaller areas occur in close association with typical Moyock fine sandy loam.

Nearly all this land is in cultivation, and it is utilized for about the same crops as Moyock fine sandy loam. Yields are somewhat less under similar soil treatment.

LIGHT-COLORED POORLY DRAINED SOILS

The group of light-colored poorly drained soils embraces 20.9 percent of the county. The soils of this group include all the Bladen, Lenoir, and Plummer soils mapped. Most of the original timber has been cut from these soils, but much of the cut-over land supports a second-growth forest, some of which, if protected, will be merchantable timber in a few years. These soils are distributed throughout the greater part of the county but in the main occupy the flatter areas adjoining the Norfolk, Craven, and Onslow soils.

The surface relief ranges from that of broad, level areas of the Bladen and Plummer soils to that of undulating or very gently sloping areas of some of the Lenoir soils. The flatter areas have not been invaded by natural drainageways and would require canals supple-

mented by ditches to render them suitable for agricultural use. With the exception of Plummer fine sandy loam, the soils of this group have rather heavy subsoils, and consequently open ditches on them stand up exceptionally well and are, therefore, lasting and serviceable. As these soils are developed on more or less flat surface relief and as their heavy character prevents ready penetration of water, most of the drainage must be from the surface. Therefore surface ditches are essential.

In general, the soils of this group contain only a small quantity of organic matter, and this is merely an admixture of forest debris, hence they have light-colored surface soils. Some areas, particularly of Bladen loam, have a rather high content of organic matter in the topmost 6 or 7 inches and have dark-gray surface soils. On the whole, these soils are slightly heavier in the surface soil and have heavier textured subsoils than the soils of the first group, or light-colored well-drained soils. The texture of the surface soils of the poorly drained soils ranges from fine sandy loam to clay loam. The subsoils of the Bladen and Lenoir soils are heavy somewhat plastic tough clays mottled gray, yellow, and brownish yellow. The mottled appearance of the subsoils indicates poor internal drainage. The Lenoir soils are somewhat better drained than the Bladen soils, and they are less gray and more yellow from the surface down. The Plummer soil differs mainly from the Bladen soils in the light texture of the surface soil and subsoil.

The soils of this group, because of their level surface relief, can be farmed to good advantage with improved machinery. They do not warm up early in the spring, however, and therefore cannot be cultivated so early as the soils of the first group nor can they be cultivated so soon after rains. As a result, they are not so well adapted to such crops as truck, cotton, or peanuts as the better drained soils. Corn, soybeans, and grass do best on these soils, but cotton and peanuts are grown on them because the farmer needs the cash that these crops furnish and has no other soil on which to produce such crops. In dry seasons the best yields of all crops grown are usually obtained on these soils. The quality of peanuts is never so good as that of those grown on the better drained soils, and hence they bring from one-half to 1 cent less a pound than peanuts grown on the well-drained soils.

In wooded areas, where there have been repeated fires, much charred material has accumulated in the topmost few inches of these soils, giving them a black appearance. The soils of this group make better pastures than the more sandy soils. In eastern North Carolina, South Carolina, Georgia, and Florida, Bladen loam and Bladen fine sandy loam are the choice soils for the production of potatoes.

Bladen very fine sandy loam.—The surface soil of Bladen very fine sandy loam consists of a 4- to 6-inch layer of gray or grayish-brown very fine sandy loam underlain by light-gray, mottled with brown, sticky very fine sandy loam which continues downward to a depth ranging from 8 to 12 inches. The subsoil is steel-gray or light-gray, mottled or streaked with yellowish brown or ocherous colored, heavy plastic clay or very fine sandy clay, which extends to a depth ranging from 50 to 60 inches. The clay is plastic and

sticky when moist and on drying becomes very hard. Beneath this is heavy plastic clay which is dominantly light gray, with little or no mottling. In some wooded areas the topmost inch or two of the surface soil is grayish brown, and it contains much organic matter, but after cultivation and subsequent leaching the surface soil becomes light gray. In a few places the very fine sandy loam topsoil extends to a depth ranging from 15 to 20 inches.

Bladen very fine sandy loam is the most extensive poorly drained agricultural soil. It occurs mainly in the southeastern part of the county in rather large irregular-shaped areas, locally known as pocosins. The largest bodies lie east and west of St. Marys Church, in Parker Pocosin, and in Raby Pocosin, and smaller areas are scattered here and there.

The surface relief of Bladen very fine sandy loam is flat or almost level. The land is naturally poorly drained, and in some places water stands on the surface for a few days after hard rains. Open ditches are necessary for drainage of this soil. The ditch banks, owing to the heavy character of the subsoil and underlying material, stand up well and are, therefore, lasting.

About 15 percent of this soil is under cultivation, and the rest is forested to gum, maple, and pine, together with a rather thick undergrowth of myrtle, reeds, and briers. Perhaps 60 percent of the cultivated area is devoted to the production of corn and soybeans. The yields of corn range from about 25 to 40 bushels an acre, and the customary fertilizer application ranges from 200 to 400 pounds an acre of a 3–8–3 mixture. About 30 percent of the land is in cotton which yields from one-third to three-fourths bale an acre, depending on the quantity of fertilizer applied, which is usually from 400 to 600 pounds an acre. Soybeans do well on this soil. Peanuts yield about the same as on the well-drained soils, but the quality, particularly the dark color of the shell, places them in a lower grade. In some places good pasture grasses are produced on this soil, and there seems to be no reason why the acreage in pasture could not be extended. Lime is needed, and beneficial results are obtained wherever it is applied, particularly for peanuts.

Bladen fine sandy loam.—Bladen fine sandy loam differs essentially from Bladen very fine sandy loam in the texture of the surface soil and subsoil and, to some extent, in surface relief and drainage conditions. The surface soil of Bladen fine sandy loam is gray or brownish-gray fine sandy loam to a depth of 5 or 6 inches, where it passes into light-gray, mottled with brown, fine sandy loam which continues downward to a depth ranging from 10 to 15 inches. Beneath this is steel-gray or light-gray, mottled with brownish yellow, heavy plastic clay or fine sandy clay, similar in structural characteristics to the subsoil of Bladen very fine sandy loam. Areas of this soil bordering the Dismal Swamp or peat, shallow phase, have brown or almost black surface soils containing a large quantity of organic matter, and the subsoil is dominantly light gray, showing very few of the ocherous-yellow or yellowish-brown mottlings.

Bladen fine sandy loam occurs mainly across the central part of the county. The largest body is developed in the vicinity of Purvis Station and extends southeasterly beyond Lummis. The next largest and most important area lies along the Atlantic Coast Line Railroad

north of Nansemond. A strip about one-fourth of a mile in width borders the west side of Dismal Swamp, beginning at the Virginia-North Carolina State line and extending to a point east of Suffolk. A fair-sized body lies north of Russell, and an irregular-shaped area is east and south of Laurel Hill School. Several smaller bodies are scattered here and there over the southern part of the county and in the extreme western part, southeast of South Quay.

Bladen fine sandy loam is one of the good strong soils of Nansemond County. It is used for the production of the same kinds of crops as those grown on Bladen very fine sandy loam, and approximately the same yields are obtained under the same fertilization and tillage methods. The fact that it is lighter in texture and somewhat better drained gives it a slight advantage over Bladen very fine sandy loam for the production of cotton and peanuts. It is well suited to the production of potatoes and is used extensively for this crop in parts of South Carolina, Georgia, and Florida.

Bladen loam.—Bladen loam is developed in broad flat areas or slight depressions. The largest body of this soil lies northeast of Suffolk adjacent to the shallow peat area of Dismal Swamp. This area is crossed by the Virginian Railway and Seaboard Air Line Railway and lies along the Nansemond-Norfolk County line. Several other large bodies are in the central and the extreme northeastern parts of the county. Some of the largest are in Devils Pocosin, south of Holland, south of Manning, in Cross Swamp west of Driver, and along the eastern boundary of the county northeast of Shoulders Hill. Small bodies are scattered here and there throughout the county.

Bladen loam differs from Bladen fine sandy loam and Bladen very fine sandy loam in the texture and color of the surface soil. The topmost 6 or 8 inches of Bladen loam consist of dark grayish-brown or almost black loam. The dark color is caused by the presence of a large quantity of organic matter, which has accumulated under swampy conditions, and by lack of leaching. The subsoil is steel-gray or light-gray, mottled with brownish yellow or ocherous colored, heavy plastic clay which continues downward to a depth ranging from 5 to 6 feet.

Along the northern edge of Dismal Swamp, in Cross Swamp, and in a few small areas north of Driver and in the vicinity of Belleville, the heavy plastic clay subsoil, below a depth ranging from 30 to 40 inches, grades into gray fine sandy loam or loamy fine sand. This light-textured material does not stand up well in ditch banks and, therefore, ditches in this phase of the soil are not so permanent as those in the areas of typical soil. Areas of Bladen loam bordering peat, shallow phase, in Dismal Swamp, and areas in Cross Swamp apparently had at one time a thin covering of peat or muck. This in many places has been burned.

Bladen loam, because of its flat surface relief, is naturally poorly drained. A large part of this soil is in a wet or semiswampy condition throughout the year. Practically all the land supports a second-growth forest consisting of loblolly pine, a few hardwoods, some gum, and an undergrowth of heather, reeds, myrtle, and other bushes. A very small acreage of this land has been cleared for agricultural purposes.

Bladen loam is naturally one of the best soils in this county and, if properly drained, could produce excellent yields of corn, soybeans, and potatoes. In North Carolina, South Carolina, and Georg a, Bladen loam is considered one of the best soils for the production of potatoes.

Bladen clay loam.—Bladen clay loam is the heaviest textured soil of the Bladen series in Nansemond County. The 8- to 10-inch surface soil is clay loam or silty clay loam, which is sticky and plastic when moist and rather hard when dry. It is underlain by gray, mottled and streaked with yellow and brown, heavy plastic clay which is slightly heavier than the subsoils underlying the sandy loams of the Bladen series.

The largest body of this soil lies about 2 miles east of Suffolk and is crossed by the Norfolk & Western Railway. It adjoins peat, shallow phase, in Dismal Swamp. Several small areas are in the southeastern corner of the county, and two fair-sized bodies occur in the southwestern part, south of Marsh Hill School.

Bladen clay loam is developed in flats and slight depressions, and water remains on the surface for a long time after heavy rains. None of this soil, except possibly bodies which join areas of better drained soils, is under cultivation. Practically all the native forest growth has been cut, but a second growth of pines, gums, and oaks is springing up. The best use for Bladen clay loam is for pasture and forestry.

Plummer fine sandy loam.—The surface soil of Plummer fine sandy loam in wooded areas, to a depth ranging from 1 to 4 inches, is dark-gray loamy fine sand or fine sandy loam. This material is underlain by light-gray fine sandy loam mottled or splotched with brown. This, in turn, at a depth ranging from 8 to 15 inches, grades into light-gray or yellowish-gray fine sandy loam containing some brown mottles. In most places, below a depth of 28 inches, the material is mottled yellow and light-gray fine sandy loam or fine sandy clay. In a few places it is gray loamy fine sand known as quicksand by the natives. In a few places the surface soil is dark-gray or almost black very fine sandy loam to a depth of about 12 inches. Such areas are underlain by steel-gray fine sandy clay which shows slight mottlings of yellow and brown. The areas having the black surface soil have somewhat the same characteristics as Portsmouth fine sandy loam.

Plummer fine sandy loam is developed in the south-central part of the county. The largest areas lie south and north of Leesville, north of Whaley, in Daughtrey Pocosin, and in a few other places. The surface relief is dominantly flat, with here and there slight undulations, and in some places this soil occurs in slight depressions. The land is naturally poorly drained, and artificial drainage is necessary to reclaim it for agricultural purposes. It is somewhat difficult to drain by means of open ditches, because the subsoil is not sufficiently heavy to stand up well in the banks, and the material from the sides of the banks would sluff off and partly fill the artificial drainageways.

Plummer fine sandy loam is a soil of low productivity, and it should all remain forested or, if cleared, should be seeded to grasses and used for pastures.

Lenoir fine sandy loam.—Lenoir fine sandy loam occupies a large acreage and is scattered over all parts of the county, with the exception of the extreme northeastern end. The largest areas are developed in the central part around and northeast of Suffolk. Areas lie south and in the vicinity of Manning, north of Purvis Station, south of Holland, and west of Kings Fork.

This soil occupies an intermediate position, as regards drainage and the character of the subsoil, between the Craven soils and the Bladen soils. The surface soil ranges from light-gray to gray fine sandy loam which passes, at a depth ranging from 4 to 10 inches, into light-gray or yellowish-gray, mottled with brownish yellow or brown, fine sandy loam, and this continues downward to a depth between 10 and 18 inches. There is a gradational layer of heavy fine sandy loam from 1 to 3 inches thick between the surface soil and the heavy material beneath. Below this and continuing downward to a depth of 40 or more inches is mottled light-gray, yellow, and brown rather heavy clay or heavy fine sandy clay. In some places it is an intensively mottled yellow and gray heavy clay. When wet this clay material is plastic, but on drying it becomes hard and breaks into irregular-shaped lumps. In most places, below a depth of 40 inches, the material is light-gray or steel-gray, streaked with brownish yellow, silty clay or heavy stieky fine sandy clay. In places specks of rust brown and red are present in this lower layer, and in some places they occur higher up in the subsoil. In several places the subsoil has a high content of fine sand, and it is sticky when wet and crumbly when dry. Bordering the Bladen areas, the subsoil approaches in character that of the Bladen soil, and where this soil adjoins the Craven and Norfolk soils, the subsoil is more yellow or drab. In wooded areas there is a thin covering of leaf mold in some places, and the topmost inch or two of the soil contains enough organic matter to give it a dark-gray color.

Although this soil is better drained than the Bladen and Plummer soils, because of its practically flat surface and heavy character of the subsoil rain water does not run off so quickly nor does the soil warm up so soon as the fine sandy loam types of the well-drained soils. About 30 percent of this soil is farmed, and the rest is in forest consisting mainly of pine, together with some oaks and gums. Approximately 40 percent of the cultivated area is devoted to the production of corn and soybeans. Yields of corn range from 15 to 35 bushels an acre. Soybeans do well, and their production should be extended. Cotton is one of the main crops, and the yields range from one-half to three-fourths bale an acre. About one-fourth of this land is in peanuts, yields of which range from 40 to 70 bushels an acre. The fertilizers used are about the same as those used on Craven fine sandy loam.

Lenoir fine sandy loam is a fairly good soil for the production of peanuts. It is better for this purpose than Bladen fine sandy loam but is not so good for corn as the Bladen soil.

Lenoir very fine sandy loam.—Lenoir very fine sandy loam is very inextensive. It occurs in close association with Lenoir fine sandy loam in the southern part of the county. The surface soil is finer in texture and shallower and the subsoil is heavier than the corresponding layers of Lenoir fine sandy loam. The subsoil is heavy,

tough, and in some places plastic clay which in most places is within 8 or 10 inches of the surface. In a few places the surface soil is only a few inches thick. This soil is developed on level or undulating surface relief and for the most part is naturally poorly drained. Water stands on the surface in places after rains, because it cannot easily penetrate the heavy subsoil. The land is only slightly better drained than the Bladen soils.

Lenoir very fine sandy loam is not so easily tilled nor does it warm up so quickly in the spring as Lenoir fine sandy loam. The greater part of this soil supports a forest growth consisting principally of loblolly pine, together with some gum and oak. The small amount of land under cultivation is used for the same crops, the same kind of fertilizers are applied, and the same methods of cultivation are carried on as on Lenoir fine sandy loam. Crop yields are about the same or slightly less than on the fine sandy loam.

Lenoir silty clay loam.—Lenoir silty clay loam occurs in the southwestern corner of the county, the largest area lying about 1 mile south of Cleopus. The surface relief ranges from level to gently undulating, and the land becomes gently sloping toward the drainageways. Both surface and internal drainage are poor, the latter owing to the extremely heavy character of the soil material. Practically all the merchantable timber has been cut from this land, and it now supports a second growth consisting principally of pine and various species of oak, together with an undergrowth of myrtle, some dogwood, and holly.

Very little of this land has ever been cleared and farmed, and most of that once cleared for cultivation has been abandoned. This is due primarily to the fact that this soil, because of its extremely heavy character, is exceptionally hard to handle, especially with the prevailing light farm machinery used in this section.

The topmost few inches of this soil consist of grayish-brown silty clay loam resting directly on yellowish-gray heavy silty clay loam which extends to a depth ranging from 4 to 8 inches. This layer passes rather abruptly into the heavy tenacious clay or silty clay subsoil which is dominantly light brownish gray, with mottlings of brownish yellow and occasional splotches of brick red. At a depth ranging from 20 to 30 inches a gradual change takes place to slate-gray very heavy tenacious impervious clay mottled with brownish yellow. The lower part of this layer fades out into a lighter shade of gray and, at a depth ranging from 50 to 64 inches, becomes soft, sticky, and slightly plastic clay material with a fairly high content of very fine sand. The color here is rather light gray mottled with ocherous yellow. As the drainageways are approached, the surface soil is gray very fine sandy loam and the subsoil is heavy tough brownish-yellow or drab clay.

This is the heaviest soil in the county from the surface downward, and, although it is somewhat better drained than the Bladen soils, because of its heavy surface character it can best be utilized for forest under present conditions. Perhaps some grasses will be found which may afford good grazing for cattle. One difficulty with this soil is that water penetrates it very slowly, and when wet the land dries slowly, but when dry it is very hard and compact. Large

quantities of organic matter incorporated in the soil would improve the topmost few inches, and applications of lime may also give beneficial results.

MISCELLANEOUS CLASSIFICATIONS OF SOIL MATERIAL

This group of materials includes peat, peat, shallow phase, swamp, and tidal marsh, which comprise, for the most part, the organic soil materials of Nansemond County. None of these materials is used at present for agriculture, owing in large measure to the wet condition and peaty character of the material. With the exception of tidal marsh, these materials are valuable for the production of timber and should remain in forest.

Peat.—Peat occurs in one large unbroken area in the southeast corner of the county. It covers that part which includes a part of the nationally known Dismal Swamp. With the exception of Lake Drummond, the peat comprises an area 4½ miles wide and about 12 miles long. It begins at the Virginia-North Carolina State line and extends north beyond Suffolk.

Peat in the Dismal Swamp proper ranges from 3 to 12 feet in thickness. There is no uniformity in the color, texture, or thickness of the various layers in this formation. In places the surface layer, to a depth of a few inches, is light loose reddish-brown organic matter. This condition is particularly applicable to the peat derived largely from juniper, or white cedar. In other places there is a fairly finely divided brown peat. In many places the brown fibrous peat on the surface is underlain by dark-brown or black finely divided peat, and this extends to the mineral material beneath; whereas in other places there are alternate layers of brown fibrous peat and black fine well-decomposed organic matter. Throughout this section, at varying depths, are well-preserved fibers of grass, sedges, reeds, bark, and leaf litter and well-preserved logs and stumps from a mixed forest. A study of the peat profile reveals that 2 or 3 distinct forests of different ages, together with the sedges, have produced this enormous thickness. Underlying this peat are mineral materials, such as fine sand, silt loam, and clay, all of which are light gray, except in places where the upper layer of the mineral material is stained by the dark-colored organic matter.

Peat, therefore, is an accumulation of partly decomposed litter from sedges, plants, and trees which have grown in wet or saturated land. Being permanently saturated or covered with water, the forest debris, such as logs and stumps, have been preserved. Except near the outer border of the peat areas, where mineral material has blown in and become mixed with the peat to a slight extent, only a small amount of mineral matter is present in the true peat material. Locally the organic matter is black finely divided material having the characteristics of muck, but such areas, under present conditions of forest growth and water, could not easily be separated on the soil map.

The peat land is saturated or covered with water during the greater part of the year. None of it is under cultivation, but it is forested mainly with juniper and cypress, together with some gum, maple and a few pines. If the peat were drained, it would settle a

great deal and when dry would burn readily if set afire. It would be difficult to control the water table at a definite level for the most efficient moisture conditions for the production of crops. According to present knowledge and prevailing conditions, the growing of forests and the preservation of the area for its natural beauty are the best utilization for the vast area of peat in the Dismal Swamp.

Lake Drummond, a beautiful body of water, lies within this area of peat. The water table of Lake Drummond ranges from about 4 to 6 feet higher than in the main areas of the surrounding peat. The peat land has been built up to form a rim or cone around the lake.

Peat, shallow phase.—Peat, shallow phase, comprises a strip of peat land having an average width of three-fourths of a mile bordering the typical peat area on the west and north and extending in a handlelike shape about 4 miles north of the main area.

This shallow peat differs from typical peat mainly in that the depth to the mineral material is much less. Most of the area of shallow peat lying north of the main area of peat has been burned over, and the surface is very uneven. On the new Portsmouth-Suffolk highway and about 3 miles east of Magnolia, there are large areas of peat, shallow phase, which have been burned to a depth ranging from 1 to 3 feet. A reddish-yellow or orange-colored ash covers the surface to a depth ranging from 3 to 10 inches in many places. This is underlain by a 1- to 2-inch layer of woody, charcoallike angular particles mixed with dark-brown fibrous peat. This material grades into dark-brown or black smooth slightly plastic dense peat which contains a few woody particles, some fibrous material, and the roots of shrubs and plants. This layer extends downward to a depth ranging from 20 to 30 inches. It is underlain by bluish-gray or steel-gray heavy plastic clay similar to the subsoil of the adjoining Bladen soils. Some logs and stumps are found buried in the peat in this area. The original forest growth was gum, cedar, and cypress, but practically all of this has been cut.

In other places peat, shallow phase, consists of dark-brown or black peat, which is fairly well decomposed organic material a few inches thick, overlying brown fibrous peat. It is underlain at a depth ranging from 2 to 3 feet by gray fine sand, sandy loam, or clay. Locally the black well-decomposed organic matter extends from the surface to the mineral material beneath.

Peat, shallow phase, ranges in depth from a few inches, in places where it borders the mineral soils, to as much as 3 feet or more where it merges imperceptibly into typical peat. Some of the organic material is so well decomposed and contains enough mineral matter as to render it fairly heavy and sticky. Such material is really muck.

Under present economic conditions, the best use for peat, shallow phase, is for forestry. It would be very expensive to drain and reclaim these areas, and when once drained and dry the material would readily burn if set afire.

Swamp.—Swamp areas occur mainly in the southern half of the county. The largest and most continuous strips are in the first

bottoms along Jones, Cypress, Chapel, Quaker, and Adams Swamps. They range in width from a few hundred feet to as much as one-half mile. The swamp areas are either covered by water a greater part of the time or the material is in a saturated condition.

There is no uniformity in the color or texture of the soil material, as it consists of recent alluvial material deposited by the streams. The surface material, to a depth of a few inches, ranges from gray to dark-gray or black loam, sandy loam, or clay. In most places the underlying material is light gray, mottled with yellowish brown or rust brown, and it ranges in texture from sandy loam to silty loam or clay loam. Included with swamp in mapping are a few areas which occupy slightly higher positions and are a little better drained, but the soil material is variable. Such areas are not permanently wet, and they produce grasses which furnish fair grazing for cattle during the summer.

The main bodies of swamp are forested, principally with gum and cypress, and the best present use for the swamp areas is for forestry.

Tidal marsh.—Tidal marsh occurs as marshy areas lying between the upland soils and the tidal streams. Large areas lie along Nansemond River, from a short distance north of Suffolk extending throughout the course of this river in the county. Small areas are along Western Branch, Chuckatuck Creek, and Bennett Creek.

The material composing tidal marsh is gray, dark-gray, or drab slick oozy silty material containing decomposed vegetable matter and large quantities of grass fibers in all stages of decomposition. In most places, below a depth ranging from 30 to 40 inches, the material is bluish-gray, steel-gray, or drab silty clay which is rather heavy and somewhat plastic. Marsh is subject to inundation by tides, and none of it has been reclaimed for agricultural purposes.

The native vegetation consists of coarse marsh grasses which furnish scant grazing for cattle. In some places the tall grasses are cut, cured, and used for packing material. Over part of the tidal marsh areas, the matured grasses and rushes are burned, in order that the young succulent sprouts coming up in the spring can be used for pasturage. Locally along the marginal edges bordering the upland soils and in a few of the higher spots in tidal marsh, a few bushes and small pines are growing.

AGRICULTURAL METHODS AND MANAGEMENT

The Virginia Truck Experiment Station, located east of Norfolk, has conducted field experiments on soils similar to some of the soils in Nansemond County, and table 5 shows the kind of fertilizer and the proper application per acre for the various truck crops grown in the tidewater section of Virginia.

TABLE 5.—*Planting and harvesting dates and other data for truck crops grown in Nansemond County, Va.*

Crop	Planting date	Harvesting date	Fertilizer recommended		Optimum pH range	References [2]
			Analysis [1]	Acre application		
				Pounds		
Asparagus	Mar.-Apr.	Apr.-May	5-8-5	1,000	6 -6.5	
Snap beans	Mar. 15-Aug. 15.	May 15-Nov. 15.	5-8-5		5.5-6.5	
Lima beans	May 1-Aug. 15.	Aug. 1-Nov. 1.	5-8-5	500-1,000	5.5-6.5	
Beets	Feb. 15-May 15.	Apr. 15-Aug. 1.	5-8-5	1,000	6 -6.5	
	Aug. 15 (fall)	Nov.-Dec.				
Broccoli	July	Oct. 1-Jan. 1	9-6-5	2,000		
Cabbage	June-July	Nov. 1-Apr. 1.	9-6-5	2,000	5.5-6.5	Bulletin 50, Cabbage Fertilizers.
	Sept. (spring)	Apr. 1-July 1				
Carrots	Feb. 15-Apr. 30.	May 15-Sept. 1.	5-8-5	1,000	5.5-6.5	
	Aug. (fall)	Nov.-Dec.				
Celery	Jan. 15	June-July	7-6-5	2,000	6 -6.5	
Collards	July 15-Aug. 15.	Sept. 1-May 15.	9-6-5	2,000		
Cucumbers	Mar. 15-Apr. 15.	June 1-Oct. 1	5-8-5	1,000	5.5-6.5	
Eggplants	Jan. 15	July 1-Nov. 1	5-8-5	2,000	5.5-6.5	Bulletin 55, Eggplant Culture.
Kale (Scotch)	July 1-15	Sept. 1-May 15.	9-6-5	1,000	5.5-6.5	Bulletin 9, Kale Fertilizers, and Bulletin 54, Kale Fertilizers.
Lettuce	Mar. (field); Sept. (fall field).	Oct.-Nov	7-6-5	1,000	6 -6.5	
Cantaloups	Apr. 1-30	July 1-Oct. 1	5-8-5	1,000	6 -6.5	Bulletin 51, Cantaloup Culture with Plants Started under Glass.
Onion sets	Jan. 1-Mar. 15.	Apr. 1-Aug. 1	4-8-4	1,000	6 -6.5	Bulletin 72, Onion Culture.
Peas	Feb. 15-Apr. 1.	Apr. 15-July 1.	5-8-5	1,000	6 -6.5	
	Sept. 1-Sept. 15.	Oct. 15-Nov. 15.				
Peppers	Feb. 1-28	June 1-Nov. 15.	5-8-5	1,000	5.5-6.5	
Potatoes	Feb. 1-Apr. 1.	May 15-Aug. 1.	7-6-5	2,000	5 -5.4	Bulletin 21, Potato Fertilizers.
	July 1-Aug. 1.	November				
Sweetpotatoes	Mar. 15-Apr. 1.	Sept. 1-Nov. 1.	3-3-15	1,000	5 -5.5	Bulletin 66, Sweet potato Fertilizers.
Radishes	Jan. 15-Mar. 15.	Mar. 1-May 15.	7-6-5	1,000	5.2-6.5	
Spinach	Sept. 1-Feb. 1	Oct. 1-May 15.	9-8-3	1,000	6 -6.5	Bulletins 44, Spinach Fertilizers; 48, Spinach Fertilizers (second report); and 63, Spinach Fertilization with Synthetic Nitrogen Salts.
Tomatoes	Feb. 1-June 15.	June 15-Nov. 15.	4-8-4	1,000	5.5-6.5	
Turnips	Oct. 1-Apr. 1	Nov. 1-June 1	7-6-5		5.5-6.5	
Strawberries	Feb. 15-Apr. 15.	May 1-July 1	7-6-5		5 -6.5	

[1] Percentages, respectively, of nitrogen, phosphoric acid, and potash.
[2] Bulletins of the Virginia Truck Experiment Station.

Table 5 discloses that all the truck crops grown, especially those produced commercially, are heavily fertilized with high-grade commercial fertilizers. Some farmers, however, purchase the fertilizer ingredients, mix them at home, and apply them to the soil. Some of the best farmers have found that about 400 pounds of 4–8–4 is the best fertilizer for corn on Norfolk fine sandy loam and Craven fine sandy loam. This is supplemented by a side dressing of 50 or 100 pounds an acre of nitrate of soda. Peanuts receive from 300 to 400 pounds of 2–6–4 or 2–8–4, and cotton about 600 pounds of 4–10–4, this being supplemented by a side dressing of 75 or 100 pounds an acre of nitrate of soda or its equivalent of sulphate of ammonia immediately after chopping.

As Nansemond County is climatically about the northern limit for the production of cotton, it is essential that the proper fertilization and certain soils be selected for this crop, in order to obtain the best

yields. In this section it has been demonstrated that cotton matures better on the soils which warm up quickly in the spring and are naturally well drained. This means that Norfolk fine sandy loam, Norfolk fine sandy loam, deep phase, and Craven fine sandy loam are the best soils for growing cotton in this latitude. The danger to cotton caused by the bollweevil is much less in this section than farther south in the main Cotton Belt.

The soils of this county range from acid to strongly acid, and some of the crops grown, especially peanuts and the leguminous crops, and corn on the more poorly drained soils, give an increased yield where a liberal application of lime has been applied to the soil. This is particularly true on the Bladen and Lenoir, and, to less extent, on the Onslow soils. Ground oyster shells will serve the same purpose as lime.

All the light-colored well-drained soils are deficient in organic matter which can be supplied by growing and turning under organic crops, such as vetch, soybeans, cowpeas, and clovers. Soybeans are probably the most profitable crop to work in the rotation. If they are cut for hay, little can be turned under for soil improvement, but if the seed is harvested with the harvester and the rest of the crop plowed into the land, considerable improvement in the organic-matter content and nitrogen supply of the soil and in its producing power would result. Farmers realize that where this has been done less nitrogen is required in the ready-mixed fertilizer.

Deeper plowing than is customary here is not necessary on the light-textured sandy soils, but the heavier soils should be plowed deeper and thoroughly pulverized by harrowing before the seed is planted. It is also true that the heavier soils require stronger work animals and heavier farm machinery for their more efficient handling. Terracing of the land, except on some of the slopes near the larger streams, has not been practiced here. Some of the soils on the sloping areas, however, should be terraced or strip farmed, in order to hold the original surface soil. For a large proportion of the soils, drainage is probably the most essential factor in crop production. Some of the more fertile lands, such as the Bladen soils, are barred from the production of large crop yields by poor drainage. In a few localities canals have been built, and small open ditches lead into them. This system of drainage is perhaps the best under existing conditions, because the heavy subsoils do not allow free passage of the rain water through them, and the only means of escape for the excess water is through open ditches. The banks of the ditches stand up exceptionally well in the Bladen and Lenoir soils, owing to the heavy character of the subsoils.

Table 6 shows the adaptability of the various soils for the production of truck crops.

TABLE 6.—*Truck crops that may be grown on the soils of Nansemond County, Va., under natural conditions and when artificially drained*[1]

Soil	Drainage	Crops recommended on—	
		Virgin land	Artificially drained land
Norfolk	Good	Asparagus, beans, beets, broccoli, carrots, cabbage, collards, sweetpotatoes, eggplants, kale, lettuce, cantaloups, onions, peas, potatoes, radishes, squash, tomatoes, turnips, strawberries, peppers, and cucumbers.	(2).
Craven	Fair	Late beans, spinach, tomatoes, strawberries, potatoes, radishes, broccoli, collards, cucumbers, late peas, late beets, cabbage, turnips, and kale.	Same as on Norfolk soils.
Moyock	do	Same as on Craven soils, but later	Same as on Norfolk soils, but normally slightly later.
Onslow	Fair to poor	Late beans, late cabbage, late beets, and late collards.	Same as on Norfolk soils, provided impervious layer is broken by plow.
Lenoir	Poor	Late beans, late tomatoes, late strawberries, late cabbage, late potatoes, and late turnips.	General truck crops when earliness is not a factor.
Bladen	do	Same as on Lenoir soils	Same as on Lenoir soils.

[1] Recommendations made by L. B. Dietrick, Extension Service, Virginia Polytechnic Institute, and E. C. Parker, Virginia Truck Experiment Station.
[2] These soils are normally well drained, therefore require no artificial drainage.

A good grass mixture consists of carpet grass, lespedeza, and Dallis grass. A promising legume for many of the soils is Korean lespedeza. Throughout the county are areas of soils, some very large, which under present conditions are probably best suited to forestry.

FORESTS

The forests of Nansemond County,[4] as they relate to soils, may be divided into four main groups as follows: Those growing on the peat soils of the Dismal Swamp, those occupying the narrow strips of poorly drained land, which border practically all streams (except tidal marshes), those occupying the steep slopes on the sides of ravines, and upland forests which occupy the greater part of the land area.

In the Dismal Swamp, three general types of forest growth are recognized—the juniper-glade forest, the gum-swamp forest, and a mixed forest. The glade forests support dense pure stands of southern white cedar, or juniper, as it is called locally, and they are generally regarded as containing the most valuable timber in this section. They seem to be confined to areas of deep acid peat, where all conditions were favorable for their establishment at the time the land was reforesting. Where fires consume the top layers of peat or some obstruction raises the water level, cedar seedlings, because they start slowly, are apt to be drowned before the tops get above water. Cypress, red maple, black gum, and sweetgum all sprout vigorously and have seedlings which grow rapidly in early youth. These are able to survive the flooding, and they give rise

[4] This section of the report was written by J. W. O'Byrne, farm forest specialist, Virginia Polytechnic Institute.

to the forests known as the gum-swamp forests. On the other hand, where drainage is better than average or for some reason water in the swamp is unusually low, most of the cedar seedlings perish from lack of adequate moisture. The surviving trees mix with all the species which grow in the gum-swamp forest and various others, as yellow poplar, loblolly pine, pond pine, and swamp oaks, which can survive in wet land, but not real swamp, to form the mixed swamp growth.

Lumbering, fires, and drainage are modifying large areas of the Dismal Swamp. Lumbering operations leave behind a heavy slash which interferes with the establishment of seedlings, especially the dense stands of white cedar. Fires which burn at a time when the swamp is full of water, get rid of most of this slash without damaging the soil, but those which burn when the swamp is dry consume the top layers of peat, including all seed which may be there, and the swamp forest reverts to a sprout growth of the less desirable species. Drainage, by lowering the water level, has a tendency to increase the mixed growth at the expense of both other types of forest. It also increases the danger of disastrous fires. Ground fires are the most difficult forest fires to control.

The river swamps make up a small part of the county, but a part which is not apt to be reduced, as drainage, in most places, is impractical. Black gum, sweetgum, red maple, and cypress occupy the wetter areas, with sycamore, birch, loblolly pine, elm, and yellow poplar growing along the outer edges where water does not stand for long periods. Cypress is probably the most valuable tree in these river swamps, but gum, yellow poplar, sycamore, and pines are cut extensively for veneer.

The ravine forests occupy the steeper slopes of the Norfolk and Craven soils, between the river swamps and the level uplands. They comprise a small part of the total forest area but, as they contain practically all of the merchantable oak, are of considerable local importance, especially in the northern part of the county where they have been severely cut. In these logging operations, white oak and yellow poplar, being of greater value, have usually been cut closer than the beech, gum, hickory, elm, sycamore, and other inferior species and are therefore being gradually eliminated from the forest.

The upland forest, which originally covered most of the county, was essentially a pine forest. Loblolly pine was the dominant species and probably occurred in almost pure stands on all but a few areas of well-drained heavy soils represented by the Craven series. Here shortleaf pine was fairly common. Repeated cuttings, which took all the merchantable pine and left the hardwoods behind, have increased considerably the proportion of hardwood, especially as regards numbers. Defects and poor form of the average hardwood trees, however, have prevented a corresponding increase in the proportion of merchantable material. Where the cuttings have taken all the pines which were large enough to produce seed and have then been followed by fires, hardwoods—mostly a sprout growth—have taken possession of the land. Such areas hold little promise for the near future, unless they are cleared for cultivation or assisted by artificial reforestation. On the vast majority of the land, however, pines have come back in spite of abuse and have remained the dominant species.

From the point of view of timber production, there seems to be little choice among the upland soils. All are capable of producing first-class pine. The question is one of their most profitable use. Soils of the Norfolk series are the best agricultural soils, but the sandier phases are subject to wind erosion. Where large areas are cleared soil drifting is a serious problem. Areas were observed from which the soil had blown from around pine stumps for a depth of 2 or 3 feet, leaving the stumps standing on their exposed roots. When such soils are cultivated they should either be opened up in limited areas or protected by systematic windbreaks. The best timber observed was growing on Norfolk fine sand, and, since this type of soil is too leachy for successful cultivation and is particularly susceptible to wind erosion, most of it should be devoted permanently to timber production. The other Norfolk soils are essentially agricultural and will eventually be devoted to timber growing only as a residual use and for windbreak purposes.

Timber growth and timber-growth possibilities on the Craven soils are similar to those on the Norfolk soils, except that shortleaf pine and upland oaks make up a larger proportion of the stand and there is small danger of serious wind erosion. Timber growing will be a permanent use only on those areas least suitable for farming.

The Onslow, Moyock, and Lenoir soils lie between the well-drained Norfolk and Craven soils and the poorly drained pocosin soils in their usefulness for both agriculture and tree growing. Considerable drainage is necessary for successful agriculture, and, in the forest, undergrowth increases as drainage decreases. Loblolly pine thrives and is capable of making good use of all soils not being used for cultivated crops.

The pocosin soils are, as a whole, better suited to tree growth than to agricultural use. Loblolly pine is the principal species on these soils. Growth is rapid, and the trees reach large size, but the wood is reported as having a different character from that growing on drier land. A dense undergrowth of waxmyrtle, bamboo brier, and small gums accompanies the pine in most places, especially in the more moist areas, where pools on the surface persist throughout most of the year. The rest of the pocosins will probably be the last of the upland soils to be extensively cleared and put to agricultural use.

SOILS AND THEIR INTERPRETATION

Nansemond County lies in the Yellow soil region of the United States, in the flat seaward part of the Atlantic coastal plain. In elevation it ranges from sea level in the tidal-marsh areas to 70 feet or more above in the Norfolk fine sandy loam areas. A large part of the land has an almost level or undulating surface relief, and natural surface drainage for the greater part is poor. Many areas have not been invaded by natural drainageways, and the surface relief of these areas maintains the constructional form of the land as laid down by the sea. The northern part of the county is more dissected by drainageways than the central and southern parts, and over a large part of this section the water table has been reduced below the B horizon.

All the soils have developed under a forest cover. In the wooded areas there is a thin layer of leaf mold, and the soil, to a depth ranging from 1 to 3 inches, is darkened by an admixture of partly decomposed organic matter. The soils having dark-gray or black surface soils have remained in a wet or semiswampy condition for a long time, and vegetation has flourished. The soils range from acid to strongly acid throughout their profiles.

Table 7 shows the pH determinations of the important soils. These determinations were made in the laboratory of the Bureau of Chemistry and Soils by the hydrogen-electrode method.

TABLE 7.—*pH determinations of several soils from Nansemond County, Va.*

Soil type and sample no.	Depth	pH	Soil type and sample no.	Depth	pH
Norfolk fine sandy loam:	*Inches*		Moyock fine sandy loam:	*Inches*	
212125	0–1	4.5	212103	0–2	3.9
212126	1–5	4.6	212104	2–6	5.3
212127	5–12	4.8	212105	6–14	6.2
212128	12–30	4.9	212106	14–20	5.0
212129	30–44	5.1	212107	20–60	4.8
212130	44–70	5.2	Bladen very fine sandy loam:		
Craven very fine sandy loam:			212108	0–2	3.8
212117	0–1	6.0	212109	2–5	3.9
212118	1–4	4.9	212110	5–10	4.2
212119	4–20	4.8	212111	10–36	4.5
212120	20–30	4.9	212112	36–62	4.7
212121	30–50	5.0			
Onslow fine sandy loam:					
212131	0–4	4.3			
212132	4–8	5.3			
212133	8–20	5.0			
212134	20–44	5.0			
212135	44–70	4.9			

In a climate of heavy rainfall and mild temperature, active leaching has been and still is going on. In the Norfolk, Craven, and Onslow soils, considerable eluviation has taken place in the A_1 and A_2 layers. The B horizon indicates the illuvial action; that is, the accumulation of fine material uniform in color, texture, and structure. Very little erosion has taken place, except on the slopes and breaks of the Norfolk and Craven soils bordering the streams, swamps, or tidal-marsh areas. In a few places there has been a noticeable translocation of material from higher areas to the bases of the slopes, either by the action of water or wind, as is evidenced by the differences in thickness of the A layer.

The parent soil-forming material which underlies this general region consists of unconsolidated beds of sands, sandy clays, and clays; and the color, texture, and structure of the partly weathered material is not uniform. The parent material under the Norfolk, Onslow, and Moyock soils is more friable and contains more sand and fine sand than that under the Craven, Lenoir, and Bladen soils. Under the last-named soils, the materials of the C horizon are heavy fine sandy clays or clays of a dominantly steel-gray color, containing mottlings of yellow or rust brown. A direct relationship exists between the parent material and the character of the B horizons in the various soil profiles.

By far the greater part of the soils have not developed a normal soil profile, as the soil-forming processes have not had an opportunity

to act on the original material and produce uniform color, texture, or structure, owing to the fact that large areas of these soils are extremely poorly drained, and some of them have been in a saturated condition for a long time, thus preventing aeration and oxidation. Drainage has been one of the important factors in the development of the soil profiles in this county.

Norfolk fine sandy loam and Norfolk fine sandy loam, deep phase, may be considered the only soils which have developed a normal soil profile belonging to the group of yellow soils. Craven fine sandy loam and Craven very fine sandy loam, in the comparatively shallow B_1 layer, indicate a part-normal profile. The most striking features of the texture profile of all the well-developed soils are the presence of a comparatively light textured surface layer, a light-textured A or A_1 layer, a heavier textured B layer, and a C layer which varies considerably in texture but is prevailingly lighter than the B layer. The C layer consists of unconsolidated sands, sandy clays, and clays. which are extremely variable in texture, structure, and color.

There are two main groups of soils, the mineral soils, comprising about four-fifths of the county, and the cumulose soils which cover about one-fifth. The soils can best be interpreted by individual profile descriptions of a few of the important soil types and by a comparison of the other soil series and types.

Following is a description of the profile of Norfolk fine sandy loam, as observed in an area of virgin soil 2 miles southeast of Myrtle in a Norfolk & Western Railway cut at a grade crossing:

A_1. 0 to 1 inch, grayish-brown leaf mold.
A_2. 1 to 5 inches, yellowish-gray loamy fine sand.
A_3. 5 to 12 inches, pale-yellow loamy fine sand.

These three layers constitute the illuviated A horizon.

B_1. 12 to 30 inches, uniformly bright-yellow friable and crumbly fine sandy clay which has no definite structural characteristics but crumbles easily into a fine mealy mass. Here and there root holes are filled with light-gray material from the A horizon. This is the illuviated layer in the profile.

B_2. 30 to 44 inches, yellow friable fine sandy clay which is slightly lighter in texture than that in the B_1 layer. The yellow color is splotched or faintly mottled with gray and yellowish brown. The splotches and mottles become more pronounced with depth, and near the bottom of the layer faint red splotches appear.

C. 44 to 70 inches, mottled yellow and brownish-yellow, with splotches of bright red, fine sandy clay. The material in this layer becomes gradually lighter in texture with depth and is somewhat more friable than that in the B_2 layer.

The Craven soils are similar in the A horizon to the Norfolk soils, except they are slightly darker gray, but the yellow heavy clay B_1 horizon is much heavier and thinner. Beneath this layer is light-gray, mottled or splotched with light red and brown, clay or heavy fine sandy clay.

The Onslow soils are ground-water Podzols, characterized by a brown slightly compacted or compacted layer, or ortstein, at a depth ranging from 4 to 6 inches below the surface. This ortstein layer is made up mainly of fine sand cemented with iron, organic matter, or both. It was probably formed at the top of the water table, and the drainage conditions of these areas have changed since its formation.

On exposure to air the material hardens, and in plowed fields it breaks into small lumps or concretions. The B horizon consists of pale-yellow or grayish-yellow friable and crumbly fine sandy clay having a faint olive-green cast. The B_2 layer, beginning between depths of 20 and 40 inches, is mottled light-gray and yellow friable and yet slightly sticky fine sandy clay, the greener color becoming more pronounced in the lower part of the layer. Beneath this is light-gray sticky fine sandy clay. The color throughout the profile is dull, compared with the distinct gray and yellow colors of the Norfolk soils.

The Moyock soils are essentially different from any other upland soil because of their structureless characteristics throughout the profile, particularly as revealed by the mellow, friable, crumbly character of the B horizon. In these soils no definite horizons are developed. The A layer of grayish-brown loamy fine sand grades into yellow loamy fine sand, and this grades into mottled grayish-brown and yellowish-brown fine sandy loam or light sandy clay, which, at a depth between 20 and 60 inches, passes into mottled light-gray and yellow loamy fine sand or light sandy loam.

Following is a description of a profile of Bladen fine sandy loam, as observed about 2 miles southwest of Leesville:

A_1. 0 to 5 inches, gray or grayish-brown fine sandy loam.
A_2. 5 to 10 inches, light-gray or steel-gray heavy fine sandy loam mottled with brown.
B. 10 to 36 inches, steel-gray, mottled and streaked with yellowish brown or ocherous brown, heavy plastic clay containing a noticeable quantity of fine sand.
C. 36 to 62 inches, steel-gray heavy plastic clay containing some yellow mottles, the gray color becoming more pronounced with depth. This clay is so sticky and plastic that querls can readily be pulled from the channels of a soil auger.

A description of a profile of Lenoir fine sandy loam, as observed in an area at Manning, is as follows:

A_1. 0 to 4 inches, dark-gray fine sandy loam.
A_2. 4 to 10 inches, light-gray, mottled with yellow, heavy fine sandy loam which is sticky when wet.
B_1. 10 to 34 inches, light-gray, intensely mottled with yellow, together with a small amount of brown mottlings, heavy tough or plastic clay which breaks into irregular-shaped lumps, is hard when dry, and is plastic and sticky when wet.
C. 34 to 60 inches, light-gray heavy tough clay faintly mottled with yellow, brown, and light red.

Plummer fine sandy loam is the only member of the Plummer series mapped in Nansemond County. It has a dark-gray A_1 layer and a light-gray subsurface layer grading into light-gray, mottled with yellow and rust brown, fine sandy loam or fine sandy clay material having no definite structure. The water table normally is about 12 inches below the surface.

The cumulose soils, that is, peat and peat, shallow phase, occur in the southeast corner of the county in Dismal Swamp.

A description[5] of a profile of peat, 5 miles east of the Suffolk-Sunbury highway and one-half mile north of the Virginia-North Carolina State line is as follows: (1) The surface of peat is covered

[5] Description furnished by A. P. Dachnowski-Stokes, physiologist, Bureau of Chemistry and Soils.

with a loose, leafy litter derived largely from deciduous trees, mainly gums and maple, and ericaceous shrubs, mixed with needles of pine and cedar. In most places this cover is thin and is underlain by dark-colored partly decomposed material grading into a reddish-brown granular residue which ranges from a few inches to more than 14 inches in thickness. The layer contains, in addition, water-soaked woody fragments and forest litter in all stages of decomposition. At a depth between 5 and 10 inches below the surface there is a network of roots and underground woody shoots, which are confined chiefly to areas where moisture conditions favorably affect the activities of the growing vegetation and soil micro-organisms. The underlying material is in general water-soaked, coarser in texture, and light in weight when dry. Stumps, including cypress stumps in an upright position with roots penetrating to lower levels, are present. (2) Finely divided chocolate-brown material, heavy in texture and comparatively impervious and plastic when wet, which extends from a depth of 14 to a depth of more than 30 inches and contains woody fragments from "knees" of cypress, roots of gum, cone scales, and coniferous pollen. The lower part of the layer is grayish brown, contains achenes of sedges, here and there a few rhizomes of *Arundinaria*, and small quantities of gritty sand, probably transported during periods of flooding and erosion. This layer passes more or less abruptly into (3) a layer of woody peat showing well-preserved stumps of deciduous and coniferous trees. It consists of a mixture of reddish-brown moderately decomposed foliage and plant remains from ferns, fallen timber, and interwoven roots. The intervening spaces are filled with dark-colored organic residue.

At a depth ranging from 5 to 7 feet below the surface occurs (4) a layer of sedimentary fibrous peat which has developed from a wet-marsh vegetation. The color of the material is essentially gray brown. A large proportion of the upper part of this layer contains flat-pressed rhizomes of reeds and sedges; lower down the content of plastic finely divided material is a conspicuous feature. This layer is underlain by varying amounts of woody material composed of roots of trees and small ligneous fragments from shrubs. The accumulation probably indicates a stage of shrubby vegetation and islands of trees that became established in dried parts of the marsh. Beneath it is sedimentary and partly coarse fibrous peat similar in general character to the overlying accumulation of wet-marsh peat.

This layer grades, at a depth of 9 feet, into (5) a basal layer of brown, chaffy, woody peat containing stumps of trees indicating that they are in a place where they grew. Roots penetrate downward into a greenish-brown organic residue more or less sharply demarked from an underlying mineral soil consisting of coarse gray sand.

Peat areas which originated under the influence of an excess of water and contain only one layer of woody peat, are represented mainly by the shallower areas lying on the margins of the Dismal Swamp.

SUMMARY

Nansemond County is situated in the southeastern part of Virginia, in the tidewater section. It borders the North Carolina State line. The surface relief ranges from broad, level, and undulating

to gently rolling, in some places becoming rolling and sloping as the drainageways are approached. Part of the nationally known Dismal Swamp covers the southeastern part of the county. The northern part is drained by Nansemond River and its tributaries and the southern part by Blackwater River. The general slope of the land is to the east, and the elevation ranges from almost sea level to 100 feet above. The total area is 423 square miles. The population, all classed as rural, is 22,530, 32.5 percent of which is white and 67.5 percent colored.

Nansemond County is favored by exceptionally good railroad transportation facilities, several paved highways, and deep-water routes to the inland coastal canal and to the sea.

The climate in general is mild, although temperatures range from 2° to 105° F. The average annual rainfall is 44.09 inches and is well distributed throughout the growing season. The climate is such that a large number of vegetables and truck crops can be produced during the winter and early spring.

The agriculture consists of the growing of peanuts, cotton, and a wide variety of truck crops as the chief cash crops, and the production of corn, soybeans, and garden vegetables as subsistence crops. Large areas of soil and climatic conditions are favorable for increased production of truck crops and peanuts.

This is one of the leading truck-producing counties in the State. Large quantities of peanuts are grown, and Suffolk is the leading peanut market of the world. The northern end of the county is strategically located, as regards climate, as it is bordered by large bodies of tidewater.

The well-drained soils, such as the Norfolk, Craven, and part of the Moyock and Onslow, dominate the agriculture, especially the production of truck crops. These soils respond readily to fertilization, are easily tilled, and warm up quickly in the spring. The Bladen and Lenoir soils are best suited to the growing of corn, soybeans, and pasture grasses, although they are used for the production of cotton and peanuts in places where the farmers have no other soils on which to grow these crops. Large areas of these soils are poorly drained and have not been reclaimed for general farming purposes. These soils, particularly the Bladen, constitute potential good farming soils, and when economic conditions warrant greater production of corn and soybeans and the raising of more hogs, large areas will probably be brought into cultivation.

All the peat, swamp, Plummer soil, and tidal marsh, under present conditions, should remain forested.

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