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Soil Survey

of

Chatham County, North Carolina

By

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Bureau of Chemistry and Soils

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

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SOIL SURVEY OF CHATHAM COUNTY, NORTH CAROLINA

By R. C. JURNEY, in Charge, J. T. MILLER, and S. RANKIN BACON

INTRODUCTION

Chatham County lies approximately in the geographical center of North Carolina. The surface features range from comparatively broad, smooth interstream country to steep slopes to drainageways, and the relief is prevailingly undulating.

The county is in a section where the rainfall is ample and the mean annual temperature moderate, although there is a wide difference between the mean temperatures of summer and winter. Crops rarely suffer from protracted drought, and the winters are generally sufficiently mild for growing cover crops and hardy vegetables.

Farming operations in the area now included in this county began many years before the Revolutionary War. The rich bottom lands along the streams and the red upland soils were the first to be farmed. Before the introduction of guano and complete fertilizers, the growth of crops depended largely on the natural fertility of the soils, and when the natural fertility was exhausted, new land was cleared. Owing to this system of farming, practically all the arable land at some time has been farmed. Much of it has been turned back to forest.

The county is underlain by three distinct rock formations. In the central, northern, and western parts, fine-textured rocks of the Carolina slate belt occur. A comparatively large area in the northeastern part and a smaller area in the extreme southeastern part are underlain by granite. In the southern and eastern parts are large areas of Triassic sandstone, shale, and mudstone. With the exception of the alluvial soils along the streams, the soils have been formed, through the soil-forming processes, from the weathered materials of the underlying rocks.

Before the advent of the white man, the territory in which Chatham County is located was covered with forests of pine and oak. Practically all of the original timber has been removed for lumber, and the present forests consist of second-growth pine and oak, with pine predominating in the southern and eastern parts of the county. Approximately 70 percent of the land is forested with trees in various stages of growth.

Agriculture is diversified, and the balance between cash crops and subsistence crops is well maintained throughout most sections. Dairying is increasing rapidly, the production of legumes is increasing, and much attention is given to the prevention of soil erosion. The principal crops are corn, cotton, wheat, oats, hay and forage, and tobacco; and minor crops are rye, barley, sweetpotatoes, cowpeas, vetch, Austrian Winter peas, and alfalfa.

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The soils have developed under forest cover, and, with the exception of the bottom lands, all are deficient in organic matter. They range from slightly acid to strongly acid. Practically all of the soils require applications of ready-mixed or home-mixed fertilizers for the successful production of crops.

There are two main groups of agricultural soils in this county—the red-land soils and the gray-land soils. The red-land soils have light-colored or red surface soils and, in most places, red clay subsoils; and the gray-land soils have light-colored surface soils and yellow or reddish-yellow clay subsoils. The group of red-land soils includes soils of the Georgeville, Davidson, Cecil, Goldston, Wadesboro, Penn, Wickham, and Congaree series. On these soils, much of the corn, hay, and legumes, and most of the wheat, oats, and barley are produced. Only a small part of the cotton and very little tobacco are grown on the soils of this group. The group of gray-land soils includes members of the Appling, Durham, Alamance, Herndon, Granville, Norfolk, Altavista, White Store, Orange, Helena, and Iredell series. Most of the tobacco is grown on these soils, particularly on the Appling, Durham, Granville, and White Store soils. Practically all of the sweetpotatoes produced for sale are grown on the soils of this group, mainly on the White Store, Granville, and Appling soils. A much larger acreage of the gray-land soils is used for cotton than of the red-land soils. The soils of a third group, used primarily for the growing of trees, includes soils with steep relief and stony texture which, because of these characteristics, are not suitable for cultivation or for the production of good pasture grasses.

The surface soils of members of the red-land group are prevailingly fine in texture and form clods if plowed when too wet, and the subsoils consist of red stiff but brittle clay which retains much moisture from rain water. These soils, because of their favorable structural qualities, are responsive to good management and are capable of being built up and maintained in a high state of productivity. The subsoils of the Cecil soils contain a high percentage of potash, whereas the subsoil of the Davidson soil is lower in potash but higher in lime. The Congaree soils are naturally well supplied with all plant nutrients, and they rank high in the production of corn. The Georgeville and Davidson soils are particularly well suited to the production of corn, wheat, barley, red clover, soybeans, and alfalfa. The soils of the red-land group are not so well suited to the production of cotton as are the sandier soils, because they do not warm so early in the spring.

The surface texture of the gray-land soils is lighter than that of the red-land soils, and for this reason they are easier to cultivate and can be cultivated sooner after rains. They also warm earlier in the spring. The Durham and Appling soils have a high content of potash. The Durham, Appling, Granville, Alamance, and White Store soils are well suited to the production of bright-leaf tobacco, and the Alamance soils are particularly well suited to the production of lespedeza.

The livestock system of farming is expanding, but it is localized mainly in the central and northern parts of the county, mostly on the red-land soils. Its main object is the production of whole milk

and cream for sale at nearby towns. Most of the dairy cows are grade Jerseys, and a few are purebred animals. A few beef cattle are raised. Most of the pastures consist of native grasses seeded with lespedeza. This county ranks high in the Piedmont section of the country, in the production of hogs. Considerable cash revenue is obtained from the sale of chickens, turkeys, and eggs.

Rotation of crops, including legumes, is followed by some farmers, in order to increase the productivity of the land. This is supplemented in some instances, by terracing of the land to prevent erosion, and the growing and turning under of winter crops to increase the humus content of the soil.

COUNTY SURVEYED

Chatham County is situated near the center of North Carolina (fig. 1). Pittsboro, the county seat, near the central part of the

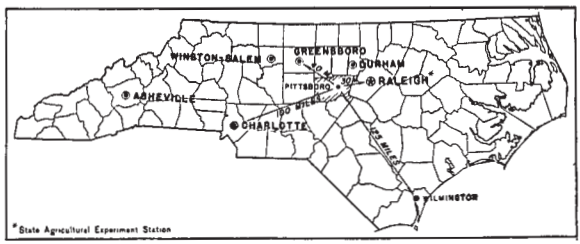

FIGURE 1.—Sketch map showing location of Chatham County, N. C.

county, is about 35 miles west of Raleigh, the State capital; and Siler City, in the western part, is about 30 miles southeast of Greensboro. The county is roughly rectangular in shape, the greater dimension being from east to west. Deep and Cape Fear Rivers form much of the southern boundary. The area of the county is 696 square miles, or 445,440 acres.

Physiographically, Chatham County is a generally level plateau which has been cut by the valleys of numerous streams. Owing to the wearing away of the surface soil, the relief is varied, ranging from nearly level, undulating, and rolling to steep, hilly, and, in places, almost mountainous. The more nearly level areas are the first and second bottoms along the streams. They range in width from a few feet to about 1 mile. Several low mountains are in the northeastern, central, and western sections of the county. Edwards, Oaky, Round Top, and Beck Mountains are the most conspicuous. They rise to an elevation of about 200 feet above the surrounding country.

Beginning near the town of Moncure and extending northward to the Orange County line and also southeastward from Moncure to the vicinity of Corinth, are, roughly, the bounds of an ancient sea bottom. This area extends across the eastern part of the county and is about 10 miles wide. Another section of this old sea bottom, having an average width of about 3 miles, extends parallel to Deep River from a point near Carbonton to a point about 1 mile east of Coalglen. This section is much lower than the general elevation of the rest of

the county, as in most places the rise from the borders of the old sea bottom is sharp and distinct. Another area, although not a part of the old sea bottom but of similar topographic form, extends southwestward from Bonlee to Bennett and White Oak School in the southwestern part of the county. These three areas constitute the largest expanses of smooth upland country within the county. The interstream divides range from almost level to undulating and gently rolling, but near the streams the relief becomes more rolling or steeper, although not so much so as in other sections. Throughout the rest of the county the surface features are characteristic of narrow to comparatively broad, smooth, gently rolling areas of interstream country which, in most places, becomes steeper or more rolling nearer the streams. In some sections, particularly in the northwestern and south-central parts of the county, many flats and gently undulating areas occur, in which drainageways have not developed to so great an extent as in the more rolling country. Many steep, hilly, or broken areas are along Haw, Deep, and Rocky Rivers, near some of the larger creeks, and on the borders of the old sea bottom.

Elevations above sea level for several points in the county are as follows:[1] Siler City, 587 feet; Goldston, 418 feet; Bennett, 251 feet; Gulf, 274 feet; Pittsboro, 384 feet; Moncure, 185 feet; and Merry Oaks, 240 feet. The general slope of the land is southeastward.

Because of the generally rolling relief, drainage in most places is well established, but many of the interstream flats have poor surface and internal drainage. Some of the first bottoms have good drainage, but over large areas of them drainage is poor and canals and ditches are necessary, in order to reclaim the soil. Most of the second bottoms have good drainage, but some small flats are poorly drained. The drainage is effected through Haw, Deep, Cape Fear, and Rocky Rivers. Cape Fear River is formed near Moncure by the junction of Haw and Deep Rivers. Creeks and branches extend from these main drainageways, and practically every farm has one or more drainage outlets. The rivers and most of the creeks are swift-flowing, and the development of water power is possible. Hydroelectric plants are located along Deep, Cape Fear, and Rocky Rivers. Water power from Haw River is used to operate a mill at Bynum, and some gristmills are in operation along Rocky River.

A large part of the land is forested. Shortleaf pine predominates in the eastern, south-central, and southern parts, and practically all the trees are second growth. A small area of longleaf pine is near Merry Oaks. In the northern and western parts, the predominating trees are oaks, including white, red, and black oaks on the more rolling country and post and blackjack oaks on the flat interstream areas. Much cedar grows in the central part of the county. Along the streams the tree growth consists of black gum, sycamore, beech, birch, ironwood, slash pine, and water oak. Other trees growing in the county are hickory, dogwood, walnut, persimmon, maple, sourwood, and locust. The undergrowth in the forest consists of small pines, cedars, oaks, dogwood, redbud, yellow jasmine, azalea, various briers and vines, and, near some of the larger streams, laurel.

[1] GANNETT, H. A DICTIONARY OF ALTITUDES IN THE UNITED STATES. U. S. Geol. Survey Bull. 274, ed. 4, 1,072 pp. 1906.

Chatham County was formed in 1771 from a part of Orange County and was named in honor of the Earl of Chatham. In 1908 some territory in the southern part was cut off to form a part of Lee County. The early settlers in the southeastern part were Scotchmen who came in from the lower Cape Fear River country. People mainly of English descent came from sections farther north in the State and settled in the central and northern parts. The present population consists of descendants of the early settlers and people who have moved into the county from nearby places. It is fairly evenly distributed but is slightly more dense near the towns. According to the 1930 census, the population, all classed as rural, is 24,177, or an average of 34.7 persons a square mile. Pittsboro, the county seat, had in that year a population of 675; Siler City, 1,730; Goldston, 312; Bennett, 248; Bonlee, 228; Bynum, 163; and Moncure, 144.

Railroad facilities are adequate, and nearly all sections are within easy reach of a railway station. The Atlantic & Yadkin Railway serves the western part of the county; the Norfolk Southern Railroad the southern and eastern parts; and the Seaboard Air Line Railway the southeastern and east-central sections. Hard-surfaced State highways cross the county in several places, providing easy access to improved roads for most sections. In addition to the hard-surfaced roads, the State maintains an excellent system of earth and gravel roads which extend to all parts of the county, and most of the farms are located on or not far distant from one of these roads which are kept in good condition for travel throughout the year.

Telephone lines and rural mail routes serve nearly all sections. Churches are located at convenient places throughout the county. Most of the schoolhouses, which are mainly modern in structure, are located in the towns and villages, and the pupils are conveyed to and from school in busses.

Chatham County has several manufacturing industries. Siler City has a cotton-yarn mill, furniture factory, washboard factory, large flour mill, and lumber mills; Pittsboro has a cloth-label mill and lumber mills; a cotton mill is located at Bynum; Bonlee has a large flour mill and lumber mills; lumber mills are at Bennett, Goldston, Gulf, and Farrington; and a coal mine is at Coalglen. Throughout the rural sections, sawmills operate from time to time, depending on the demand for lumber. Many farmeres cut cedar wood and cross ties when the market demands.

CLIMATE

The climate of Chatham County is continental, as this county is situated sufficiently far inland from the ocean to be out of reach of any tempering effects that body of water may have. The difference between the mean winter and summer temperatures is 34.5° F. The winters are comparatively mild, and outdoor farm work can be performed except during a few unusually cold days. At times the ground is frozen to a slight depth, and it remains frozen for only short periods. Winter cover crops and hardy vegetables, such as collards, cabbage, turnips, and kale, can be grown successfully during the winter. The average date of the last killing frost is April 15 and of the first is October 24, giving an average frost-free season of 192

days, which is sufficient for maturing the crops commonly grown. Frost has been recorded as late as May 1 and as early as October 9.

The rainfall is ample for the crops grown, and injury from drought is rare. The mean annual rainfall of 44.23 inches is well distributed throughout the year but is slightly heavier (14.31 inches) in the summer season. The average yearly snowfall is 6 inches, but it remains on the ground for only a short time.

Table 1, compiled from the records of the Weather Bureau station at Moncure in the southern part of the county, gives in detail the normal monthly, seasonal, and annual temperature and precipitation.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Moncure, Chatham County, N. C.*

[Elevation, 232 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1933)	Total amount for the wettest year (1929)	Snow, average depth
	°F	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
December	42.5	77	1	3.45	1.14	2.69	1.2
January	42.1	84	−9	3.31	3.13	2.54	1.2
February	43.0	80	−3	3 82	3.50	7.76	2.7
Winter	42.5	84	−9	10.58	7.77	12.99	5.1
March	51.5	94	13	3.75	1.23	6.72	.4
April	58.9	94	23	3.44	3.39	2.64	.3
May	67.6	100	29	3.76	3.19	6.75	.0
Spring	59.3	100	13	10.95	7.81	16.11	.7
June	75.2	104	44	4.35	1.18	6.93	.0
July	78 5	106	47	4.99	4.37	4.27	.0
August	77.2	102	46	4.97	3.88	4.26	.0
Summer	77.0	106	44	14.31	9.43	15.46	.0
September	72.1	98	36	3.47	.37	2.10	.0
October	60.7	95	24	2.71	.70	13.50	.0
November	50.1	82	9	2.21	1.64	5.04	.2
Fall	61.0	98	9	8.39	2.71	20.64	.2
Year	60.0	106	−9	44 23	27.72	65.20	6.0

AGRICULTURAL HISTORY AND STATISTICS

Agriculture has been the chief industry since the time of the early settlers. Lumbering flourished for some time, but most of the original stand of timber has been cut. Second-growth trees now furnish the lumber supply. At one time coal mining attained some importance in the southern part of the county, but at present this industry is at a standstill. In former years iron ore was mined at Ore Hill and manufactured into pots, plow points, and other articles for local use.

Farming was started many years before the Revolutionary War. Scotch immigrants settled along lower Cape Fear River by the thousands about 1739, and soon afterward many of them moved up the river and located along Haw and Deep Rivers, which unite in Chatham County and form Cape Fear River. A site on a farm near the junction of these two rivers was contemplated for the location of the State capital, but a deciding vote placed the capital at Raleigh.

The early settlers first farmed the rich bottom lands along the rivers, but a few years prior to 1785 the red lands near Pittsboro in the east-central part of the county were settled and farmed. The town of Pittsboro was founded in 1785 on a 100-acre tract of land.

From its early beginning on the fertile alluvial soils and the strong red upland soils, farming gradually spread to all sections, and, with the exception of the very steep land and some of the interstream flats, practically all the land at some time has been under cultivation. Prior to the War between the States, large plantations were located in the central part of the county.

The early agriculture consisted in the production of corn, wheat, oats, rye, hemp, flax, tobacco, fruit, sweetpotatoes, and vegetables, together with the raising of cattle, sheep, and hogs. Wild game was abundant in the forests. Cotton and wool were spun in the homes for a supply of cloth, and hides were tanned into leather for shoes and harness. Farm implements were made on the farms, and grain was ground into flour or meal at local gristmills for a home supply of bread. Before the railroad was extended from Fayetteville to Sanford, a steamboat plied Cape Fear River from Fayetteville, an important shipping and trading point, to Lockport near Moncure, providing an outlet for the surplus products.

Before the introduction of Peruvian guano and commercial fertilizers, crops depended on the natural fertility of the soil, with the addition of stable manure only. A common practice was to farm the land until the natural fertility was exhausted through cropping and subsequent erosion of the surface soil, and, when the production of crops was no longer profitable, the land was abandoned, and forested land was cleared for crop use. This practice was continued until comparatively recent times, as evidence of recent land abandonment still may be seen in the central, southern, and eastern parts of the county, where second-growth pine trees cover much land formerly cultivated. In many places old furrows are discernible, although the land is covered with pine forest.

Some years before the War between the States, Peruvian guano was introduced and it was applied by many farmers on land used for the production of wheat and corn. The use of commercial fertilizers began about the year 1870. Improved farm implements and machinery came into use about 1895.

Table 2, compiled from the Federal census reports, shows the acreage devoted to the more important crops in 1879, 1889, 1899, 1909, 1919, 1929, and 1934.

TABLE 2.—*Acreage of the principal crops grown in Chatham County, N. C., in stated years*

Crop	1879	1889	1899	1909	1919	1929	1934
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Corn	43,087	40,346	43,790	37,699	34,509	23,121	28,485
Wheat	28,930	30,148	27,299	18,489	23,390	12,641	17,565
Cotton	13,478	18,520	12,329	13,916	12,802	12,996	----------
Tobacco	141	1,173	759	1,110	2,281	3,070	2,442
Hay and forage	67	2,762	1,896	2,746	5,307	8,524	8,061
Oats	19,861	16,162	7,362	7,764	3,278	1,521	2,869
Dry peas	----------	----------	667	1,030	1,054	680	----------
Sweetpotatoes	622	793	708	570	604	495	900
Sorgo	----------	454	405	294	634	104	----------

As shown in table 2, the acreage in corn remained fairly constant during the period from 1879 to 1909, but it has decreased since that time. Wheat and cotton show some variations, with a tendency toward a smaller acreage. The acreage in tobacco showed a large increase in 1929 over that in 1879, but it decreased between 1929 and 1934. A very large increase is shown in the acreage devoted to hay and forage crops. The acreage in oats has decreased decidedly. The acreage devoted to sweetpotatoes remained fairly constant (averaging about 650 acres) until 1929, when it decreased to 500 acres. In 1934 it made a marked increase to 900 acres.

Fertilizers are used on nearly all farms. The 1930 census reported that fertilizer was used on 89.4 percent of the farms in 1929. The total amount spent for fertilizer was $210,063, or an average of $73.65 a farm. Most of the fertilizer is bought ready mixed, and some farmers mix the different ingredients. The commercial fertilizer grades most commonly used are 2–8–2 [2] and 3–8–3, but higher grades, such as 3–8–6, 4–8–6, and 3–8–10, are applied by some. The home mixtures are made to analyze approximately 2–8–2 or 3–8–3 grades, and some farmers make a higher grade mixture. Many farmers apply stable manure to the land in such quantities as are available. On many farms the land is improved by growing and turning under leguminous crops. Applications of lime are made by some farmers. Many use superphosphate alone on wheatland and apply a top dressing of nitrate of soda or sulphate of ammonia in the spring. A few farmers use nitrate of soda as a side dressing for corn.

Additional help is hired on comparatively few farms. According to the 1930 census only 18.4 percent of the farms reported the hire of labor in 1929. The total cash outlay for this purpose was $41,387, or an average of $70.51 a farm. Farm labor is plentiful, and both white and colored help are employed. The price paid for labor depends on the economic conditions at the time.

In 1935 there were 3,243 farms, an increase of 52 over the number in 1930. Most of the farms are between 20 and 200 acres in size, but the average size is 95.5 acres. The average assessed value of the land, including buildings, is $15.68 an acre.

The proportion of tenant-operated farms is comparatively low. The 1935 census reports that 68.7 percent of the farms are operated by owners and part owners, 31.2 percent by tenants, and 0.1 percent by managers. Practically all of the tenant farms are rented on the share-crop basis. Three systems are in use, depending on the kind of crop grown. In the grain sections, if the landlord furnishes one-fourth of the fertilizer and the tenant three-fourths of the fertilizer and the implements, the landlord receives one-fourth of the crop; in cotton farming, if the landlord furnishes one-third of the fertilizer, he receives one-third of the crop; and on cotton and tobacco farms, if the landlord supplies one-half of the fertilizer and the work animals, he receives one-half of the crop.

The farm homes on the owner-operated farms are substantial, and many are of the modern suburban type, but most of the tenant houses are small. Barns are of good construction and are large enough for the care of the livestock. In addition most farms have several out-

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

buildings for storage purposes. Most of the fences are of barbed wire, some are of woven wire, and a few rail fences are in use. Both horses and mules serve as work animals, mules predominating.

The average farm equipment includes a moldboard turning plow, shovel plows, walking cultivators, a spike-tooth harrow, a corn sheller, a corn planter, and a cotton planter. On many farms the equipment includes two-horse walking shovel and twin plows, riding cultivators, single-shovel plows, disk harrows, fertilizer distributors, cotton and corn planters, mowing machines, hayrakes, hay balers, manure spreaders, lime spreaders, grain drills, reapers, and binders, and on a few farms there are power-driven tractors and tractor equipment. A few soybean harvesters are used, and threshing machines travel from farm to farm to thresh grain.

The number of cows kept on a farm ranges from one to six. In the cotton and tobacco sections, the number of cows kept on the individual farm is smaller than in the grain sections. Most of the cows are grade Jerseys, and a few farmers have purebred Jerseys or cows of some other breed.

Hogs are kept on nearly all the farms, the larger numbers in the grain sections. Chatham County ranks high in the Piedmont section in the production of hogs. Hogs are raised, not only for a home supply of meat and lard, but to produce pork for sale at Greensboro, Durham, and Raleigh. The principal breeds of hogs are Poland China and Duroc-Jersey, and some Berkshire, Hampshire, Essex, and Tamworth are raised. In the cattle-raising section, where most of the hogs are kept, the number, in general, ranges from 2 to 6 a farm, although many farmers raise from 15 to 20. Hogs are least numerous in the tobacco sections. In the cattle-raising section many farmers feed the hogs a balanced ration of grain products and animal protein.

Sheep are of little commercial importance, but several flocks are kept, mainly in the cattle-raising section. Most of the sheep are of the Hampshire and Shropshire breeds.

Chickens are kept on nearly every farm, and considerable cash revenue is derived annually from the sale of chickens and eggs. Most of the chickens for sale are raised in the grain-growing section, and improved flocks are kept on many farms. About 15 carloads of chickens are shipped to northern markets annually, and large numbers are sold on the local markets at Greensboro, Durham, Raleigh, and Southern Pines. About 1,000 farmers raise turkeys, many of which are sold at the local markets or shipped to northern markets annually.

There is considerable wild game in the county. Quail and rabbits are the most plentiful, and there are some squirrels and wild turkeys. Several hunting lodges and much leased land for quail hunting are in the central part of the county. For a long time Chatham County has been noted for wild rabbits, and at one time a large quantity of rabbit meat was shipped to northern markets.

SOILS AND CROPS

Chatham County is situated entirely in the Piedmont Plateau. The southeastern corner is only a few miles distant from the Coastal Plain. The underlying rock formations are varied, but, in general,

they range from slates and other fine-grained rocks in the central and western parts of the county to granite and sandstone of medium to fine texture in the eastern and southern parts. The weathering of these rocks has produced material which has been acted on by the soil-forming processes and has given rise to a wide variety of distinct soil types, probably a greater variety than in any other county in the Piedmont. The soil types differ greatly in chemical composition, physical structure, and crop adaptation. Climatic conditions are equable over the county, but important soil differences exist, due to variations in the parent rocks and in relief.

In many places the soils are developed in rather large continuous areas, ranging from 1 to 5 square miles, but in other places the areas are small and somewhat scattered. Throughout much of the county relief has been a modifying factor in soil formation, particularly as regards the depth and character of the surface soil and the depth of the subsoil. On many of the steeper slopes and in some of the more rolling country the light-textured surface soil has been washed away, and the heavier underlying material is exposed. As a result heavier soil types, such as silty clay loam or "galled" spots of clay, are in evidence. In many places the thickness of the surface layer of sandy loam soils has been reduced considerably by erosion, and comparatively large areas of steep and hilly soils occur, in which the subsoil is relatively shallow because erosion has kept almost even pace with soil formation.

Although the farming land is well distributed over the county, those soils having the more favorable relief have the highest content of mineral plant nutrients, or are the easiest to cultivate, control the agriculture, and determine the location of most farms.

According to an estimate made from the 1935 census, about 25 percent of the land is cleared and classed as land available for crops—that is, harvested, crop failure, idle, and fallow land, in addition to plowable pasture. The rest probably represents some form of forested land. Most of the original timber of pine and oak has been cut for lumber, and the present stand is second-growth pine and oak, together with considerable cedar in the central part of the county. The pine is in various stages of growth, and much of it is growing on land formerly cultivated. The value of a large part of the forested land depends on the present and future growth of the timber. At present considerable revenue is derived from the sale of lumber, cross ties, cedar wood, and pine pulpwood.

The agriculture is diversified, and no single crop predominates. A good balance between cash crops and feed, grain, and subsistence crops is maintained throughout most of the county. Although cotton and tobacco are produced as cash crops, neither of these is grown generally, but they are segregated in several sections of the county. Dairying is developing rapidly in the central and northern parts, poultry produces considerable revenue, and comparatively large numbers of hogs are raised. Improved farm machinery is used on nearly all farms. The production of legumes is increasing, and much attention is given to conservation of the soil.

The soils are very low in organic matter, and they range from slightly to strongly acid. Most of the soluble plant nutrients have been leached from the soil, and, on account of the rolling relief, most

of the soils are subject to erosion when improperly managed. Under these conditions the farmer has constantly before him the problem of soil improvement. Many of the soils, however, can be built up to and maintained in a good state of productivity. Although nearly all the land requires fertilizer in some form, many farmers grow legumes and turn under green-manure crops to hold the expense of supplying plant nutrients to a minimum. In recent years many farmers have reduced the amount of fertilizer purchased, or have not used any, but only fair yields have been obtained. In the production of cotton and tobacco complete fertilizers are necessary for satisfactory yields.

The present-day agriculture consists in the production of corn, cotton, wheat, oats, hay and forage crops, and tobacco as the leading crops, and rye, barley, sweetpotatoes, cowpeas, vetch, Austrian Winter peas, and alfalfa as minor crops.

Corn is grown as a subsistence crop for cattle, hogs, and work animals, and a small proportion is ground into meal to be made into bread. This crop is produced in all parts of the county, but much of it is grown on the fertile river bottoms and on the red lands in the central part.

Cotton is the main cash crop, and the economic welfare of a large number of people depends on it. The crop is grown in nearly all sections of the county on both red and gray land, but its distribution is uneven. Most of it is produced in the southern and western parts, mainly in Gulf Township. In the central and eastern parts the acreage is comparatively small. Although none of the soils in the county ranks high as a producer of cotton, the crop is grown because it meets the demands for immediate cash income as well as any other crop commonly grown under the existing scheme of agriculture. It has been a cash crop for a long time, and most of the farmers who grow it understand how to handle it better than they do tobacco or some other cash crop. Cotton is sold at the local mills or at nearby towns in other counties.

Although some wheat is grown in nearly all parts of the county, it is confined mainly to the red lands in the central and western parts. It is grown primarily as a subsistence crop and is ground into flour at the local mills. A small quantity is sold as seed to outside markets.

Hay and sorgo (sweet sorghum) for forage are important crops. They are used as feed for cattle and work animals on the farms. These crops are produced mainly on the red soils in the central and western parts of the county and to some extent on the better drained bottom lands.

Tobacco is an important cash crop in some sections, mainly in the eastern part of the county, especially in William and New Hope Townships. A comparatively small acreage in Cape Fear Township is devoted to this crop. It is produced on gray sandy land consisting of the Durham, Appling, White Store, and Granville soils. A small acreage is planted in the northwestern and western parts of the county, mainly on the Alamance soils. The tobacco grown is a bright-leaf variety, and most of it is sold at Durham, although some is marketed at Sanford, Mebane, Reidsville, and Winston-Salem, N. C., and at Danville, Va.

Sweetpotatoes are a cash crop in the eastern part of the county, where they are grown mainly on the Appling, White Store, and Granville soils. Sweetpotatoes are stored in special houses or dirt banks and are sold on local and northern markets as the trade demands. The soils are well suited to this crop, and large yields are obtained.

Lespedeza[3] is the principal legume grown for hay and soil building, and it occupies a large acreage. It is grown in all sections of the county, and it is sown in nearly all pastures. The gray gravelly land, or Alamance gravelly silt loam, in the southwestern part is best suited to this crop, but good yields are obtained on all the soils where it is grown. Most of the hay is cut from the bottom lands, and the crop on the uplands is used for seed and soil building. Much of the seed is used locally, and some is sold on the market for distribution in other parts of the State.

Barley, rye, cowpeas, vetch, Austrian Winter peas, and alfalfa are grown on small acreages. The production of barley is increasing. This crop is grown in the same localities as wheat, and the grain is used as feed for cattle. Rye is grown in the sections where wheat, cotton, and tobacco are produced. It is used as a cover crop for tobacco and cotton land in many places, and for seed or feed for cattle in the wheat section. Some grain is sold on outside markets. Vetch and Austrian Winter peas are grown both as cover crops and in grain mixtures for hay. These crops are produced to a small extent in nearly all parts of the county. Most of the alfalfa is grown on a small acreage in the central part, and it returns good yields of hay. It is grown mainly on the red soils of the Davidson and Georgeville series.

On nearly every farm, snap beans, English peas, tomatoes, cabbage, sweet corn, okra, and strawberries are produced for summer use, and turnips, collards, and kale for a winter supply of vegetables. Some farmers sell small quantities of vegetables locally or at nearby markets. Many farmers have cantaloup and watermelon patches, and most of them have home orchards of apple, peach, plum, and cherry trees. A large number have small fields of sorgo (sorghum cane) for a home supply of sirup.

Chatham County includes soils belonging mainly to three geological divisions. In the central, northern, and western parts, the underlying material is a formation known as the Carolina slate belt which underlies about two-thirds of the county. The predominating rocks in this belt have a very fine texture, slaty structure, and range in color from light gray to dark bluish gray or dark greenish gray, but some of the rocks are of coarse texture and some contain embedded gravel. Through weathering and other processes of soil formation these rocks have developed into soils differing in color, texture, structure, and depth. In this county, soils of the Georgeville, Goldston, Alamance, Orange, and Herndon series have been derived from this formation.

A rather large division of a different rock formation occurs east of Haw River in the northeastern part of the county and to a small extent in the extreme southeastern part near the Harnett County line. The rock is mainly granite, and boulders and smaller fragments are scattered on the surface in many open fields. In breaking down,

[3] Information furnished by county agricultural adviser.

through the agencies of weathering and soil formation, this rock forms gray sandy soils which are members of the Appling, Durham, Helena, and Cecil series.

A third large division is the Triassic sandstone and shale belt underlying the soils in the southern and eastern parts of the county, adjoining the slate and granite belts. The rocks are brown sandstone and purplish-red or Indian-red shale and mudstone. The sandstone ranges from medium to fine in texture, and the shale is silty. The soils derived from decomposition of these rocks are members of the White Store, Granville, Wadesboro, and Penn series.

Within these main divisions are dikes, or intrusions, of dark-colored dense massive fine-textured traprock, mainly diorite. Most of these intrusions occur in the central part of the county in the slate belt. From this dark-colored rock are formed soils of the Davidson and Iredell series.

The map accompanying this report shows the location and extent of the different soils by means of colors. The character of the relief and areas of the typical soils or their phases, containing a large quantity of stone or rock fragments, are designated by symbols.

The soils shown on the map and described in the following pages have been identified and mapped on the basis of those characteristics that could readily be observed in the field or determined by simple tests. Emphasis has been placed on those important characteristics of the soils which have an effect on the growth of cultivated crops, grasses, and trees—in other words, on such characteristics as the farmer takes into consideration in judging the agricultural value of his land.

A soil profile, which may be exposed in road cuts or ditches, shows a number of horizontal layers, or horizons, commonly known as the surface soil, subsoil, and substratum, that do not owe their origin entirely to the parent material but are the result of biological, physical, and chemical changes that have taken place in the material since its deposition.

The soils of this county may be divided, according to soil characteristics, into soil series, types, and phases. The soil series is the broader group and may include a number of soil types. As now defined, the series includes soils that have the same fundamental characteristics, including color, structure, consistence, relative position of the various horizons, drainage conditions, and kind of parent material. A soil series usually takes its name from a place in the vicinity of which the soil was first mapped. The soil types within a series are separated on the basis of texture, that is, the proportion of coarse, medium, or fine sand, silt, and clay. The soil type is the unit of mapping, and the names given on the soil map and described in the report are those of soil types. The type takes the name of the series to which it belongs plus its texture designation. For example, Goldston gravelly silt loam takes the name of the locality in which the Goldston soils were first mapped and gravelly silt loam indicates the texture. Variations within the type are called phases. For example, that part of the area of a given soil type in which the surface soil is eroded noticeably, is extremely gravelly or stony, or differences in relief occur is designated as a phase.

The soils of Chatham County are arranged, according to their characteristics, agricultural use, and crop adaptation, in three groups as follows: Red-land soils, gray-land soils, and miscellaneous soils and land types.

In the following pages the soils are described in detail and their relation to the agriculture of the county is discussed. In the latter part of the report, in a section entitled "Morphology and Genesis of Soils", are discussed those features of the soils which are of special interest to the student and the scientist. Table 3 gives the acreage and proportionate extent of the soils mapped.

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

Type of soil	Acres	Per-cent	Type of soil	Acres	Per-cent
Georgeville silt loam	25,216	5.7	Granville silt loam	704	0.2
Georgeville gravelly silt loam	24,128	5.4	Norfolk loamy sand	256	.1
Georgeville silty clay loam	44,800	10.0	Altavista fine sandy loam	4,800	1.1
Georgeville gravelly silty clay loam	8,576	1.9	White Store sandy loam	13,952	3.1
Davidson clay loam	20,928	4.7	White Store fine sandy loam	26,752	6.0
Cecil fine sandy loam	384	.1	White Store fine sandy loam, gravelly phase	1,088	.2
Cecil sandy loam	1,152	.3	White Store very fine sandy loam	1,600	.4
Cecil clay loam	1,536	.3	Helena sandy loam	960	.2
Goldston gravelly silt loam	38,080	8.5	Iredell loam	2,432	.5
Wadesboro fine sandy loam	2,240	.5	Georgeville stony silt loam	21,888	4.9
Wadesboro fine sandy loam, gravelly phase	640	.1	Davidson clay loam, hilly phase	1,344	.3
Penn silt loam	448	.1	Cecil clay loam, steep phase	896	.2
Wickham fine sandy loam	960	.2	Herndon silt loam, stony phase	10,432	2.3
Congaree silt loam	11,968	2.7	Appling stony sandy loam, steep phase	2,816	.6
Congaree fine sandy loam	704	.2	White Store fine sandy loam, eroded phase	19,200	4.3
Appling sandy loam	7,552	1.7	Wehadkee silt loam	8,704	2.0
Appling stony sandy loam	14,080	3.2	Alluvial soils, undifferentiated	3,648	.8
Durham sandy loam	2,560	.6	Orange silt loam	9,344	2.1
Alamance silt loam	34,560	7.8	Orange silt loam, gravelly phase	4,352	1.0
Alamance gravelly silt loam	50,752	11.4	Roanoke silt loam	960	.2
Alamance very fine sandy loam	2,432	.5	Rough stony land	1,664	.4
Herndon silt loam	6,336	1.4			
Herndon silt loam, gravelly phase	2,048	.5	Total	445,440	
Granville fine sandy loam	5,440	1.2			
Granville fine sandy loam, gravelly phase	128	.1			

RED-LAND SOILS

The soils of this group, generally called "red-clay lands", occupy a total area of 284 square miles, or 40.7 percent of the area of the county. These soils occur mainly in the central, northern, and western parts and to a small extent in the southern and southeastern parts.

With the exception of the Congaree and Wickham soils, all these soils have undulating or rolling relief. Surface drainage is good, and internal drainage through the subsoil ranges from fair to good. On most of the cultivated soils erosion is active, and on the steeper slopes gullies form rapidly. The surface soils are prevailingly fine in texture, although areas of the Cecil and Wadesboro soils contain some fine sand or medium sand in the surface layer. In large areas, scattered over the surface and embedded in the soil, are numerous small quartz particles and slate fragments. The subsoils of the various soils are dominantly red stiff clays or silty clays, which are brittle and comparatively penetrable to water. The soft parent rock in all these soils lies from 30 to 70 inches below the surface.

These soils are low in organic-matter content, but, as a whole, contain more than the soils of any other group. Their fine texture causes the soil materials to run together when wet, and the surface soils form large clods which remain for a long time if the land is plowed when not in proper moisture condition. Because of the heavy character of the subsoils, these soils, when plowed deeply or subsoiled, will absorb and retain large quantities of moisture from rainfall. Because of the generally favorable structure of the subsoil, stable manure or green-manure crops when applied to the land will have lasting effects. Owing to the heavy textures of the surface soils and their slowness in draining, these soils do not warm up so early in the spring as the light sandy soils.

The subsoils of these soils, although for the most part heavy, brittle, stiff clays, are not plastic or waxy but are slick and sticky when wet and hard and compact when dry. The subsoils of the Georgeville and Cecil soils are prevailingly high in potash, and the subsoil of the Davidson soil is not so high in potash but contains a higher percentage of lime than do the Georgeville or Cecil soils. The Congaree soils are naturally well balanced as regards plant nutrients.

The red-land soils predominate in the production of corn, wheat, oats, and legumes, and they are the best suited soils for these crops. Cotton occupies a fairly large acreage, but very little tobacco is grown. These soils are not so well suited to cotton because they do not warm so early in the spring as the more sandy soils in the State.

Georgeville silt loam.—The 6- or 8-inch surface soil of Georgeville silt loam consists of grayish-yellow, brownish-yellow, or slightly reddish yellow smooth silt loam. The subsoil is red or light-red rather stiff but brittle smooth silty clay which continues to a depth ranging from 40 to 45 inches, where it is underlain by mingled brownish-red, yellow, purple, gray, and pinkish-red soft smooth decayed slate material. Erosion is frequently active on this soil, and cultivated fields include spots and streaks of red silty clay loam or silty clay which have been caused by the rapid run-off of the surface water, carrying away the surface soil. Included with this soil, as mapped, are small areas in which angular quartz fragments or small particles of slate occur on the surface.

Georgeville silt loam is developed mainly in the northwestern and western parts of the county, and smaller areas are in the central and east-central parts. The largest developments are west of Silk Hope, west and southwest of Siler City, and in the vicinity of Bonlee.

Approximately 35 percent of the land is farmed. Corn occupies about 50 percent of the farmed acreage, wheat 25 percent, cotton 10 percent, and oats, red clover, lespedeza, and soybeans a total of about 10 percent. Acre yields of corn range from 20 to 35 bushels, wheat 12 to 20 bushels, cotton one-half to three-fourths of a bale, oats 20 to 30 bushels, and legumes 1 to 1½ tons of hay.

Corn receives about 200 pounds an acre of 2–8–2 or 3–8–3 fertilizer or a home mixture of 16-percent superphosphate, cottonseed meal, and nitrate of soda. Some farmers side-dress the corn with about 50 pounds an acre of nitrate of soda. Clover is plowed under by some farmers in order to add organic matter to the soil, and when this is done a fertilizer containing only superphosphate and potash is added. Wheat is fertilized mainly with 16-percent superphosphate, although

some farmers use a complete fertilizer, generally from 150 to 200 pounds an acre of a 3–8–3 grade. Many farmers top-dress wheat in the spring with from 50 to 75 pounds an acre of nitrate of soda or sulphate of ammonia. Land for cotton receives from 200 to 300 pounds an acre of a 3–8–3 grade of fertilizer. Oats are fertilized by some farmers in about the same manner as wheat. Soybeans are given an acre application ranging from 100 to 150 pounds of 2–8–2 or 3–8–3 fertilizer or a home mixture of about the same analysis. Lespedeza does well on this soil.

Georgeville gravelly silt loam.—Georgeville gravelly silt loam is similar to Georgeville silt loam in color of the surface soil and color and structure of the subsoil. It differs mainly from Georgeville silt loam in texture of the surface soil which in many places contains from 15 to about 30 percent of brown smooth somewhat rounded or broken platy pieces of slate and small angular quartz fragments. Many of these quartz fragments and pieces of slate are strewn over the surface and give the soil a distinctly gravelly appearance.

Georgeville gravelly silt loam occurs mainly in the northwestern and southwestern parts of the county, and a few small scattered areas are in the central part. The largest developments are north of Hackney Mill, near Piney Grove Church, near Zion Church, southeast of Brush Creek Church, south and southeast of Bonlee, south of Harpers Crossroads, and southwest of Goldston.

Approximately 40 percent of the land is used for crops. Corn occupies about 45 percent of the farmed land, wheat 20 percent, cotton 20 percent, and oats and legumes about 10 percent. Crop yields and fertilizer treatment for the various crops are about the same as for Georgeville silt loam.

Georgeville silty clay loam.—The surface soil of Georgeville silty clay loam is reddish-brown, brownish-red, or light-red silty clay loam ranging from 5 to 7 inches in thickness. The subsoil is red smooth brittle stiff silty clay extending to a depth ranging from 35 to 45 inches, where it passes into light-red silty clay material which contains particles of soft smooth yellow, purple, and almost white decayed slate rock. In some places there are small eroded or "galled" spots of red silty clay which are much heavier in texture than the surrounding soil, but these areas are too small to indicate as a separate type on the soil map. Because of the heavy character of the surface soil, it is inclined to form clods if plowed when too wet.

Georgeville silty clay loam is the most extensive member of the group of red-land soils. It occurs largely in the northwestern, western, and central parts of the county, and smaller areas are in the east-central part. In the northwestern part large areas are northeast and west of Silk Hope, in the western part south of Siler City and northeast of Bonlee, and in the central part east, north, and west of Pittsboro and north of Browns Chapel.

Approximately 35 percent of the land is devoted to crops. Corn occupies about 40 percent of the farmed acreage, wheat 30 percent, cotton 10 percent, and oats, rye, barley, and legumes about 15 percent.

Corn yields range from 25 to 40 bushels an acre. Many farmers fertilize the land for this crop with 200 pounds an acre of a 2–8–2 or 3–8–3 grade of fertilizer or the same quantity of a home mixture of 16-percent superphosphate, cottonseed meal, and nitrate of soda.

Some give a side application of about 50 pounds an acre of nitrate of soda at the last cultivation. When corn follows clover, many use 16-percent superphosphate alone as a fertilizer. In sections where dairying is practiced, stable manure and 16-percent superphosphate are used as soil amendments.

Cotton yields from one-half to 1 bale an acre. The land for cotton is fertilized with from 200 to 400 pounds an acre of 3–8–3 fertilizer or 16-percent superphosphate. Lower yields are obtained where superphosphate alone is used. Some farmers side-dress cotton with about 50 pounds an acre of nitrate of soda.

Wheat produces from 15 to 30 bushels an acre and is fertilized with from 150 to 300 pounds an acre of 3–8–3 fertilizer or 16-percent superphosphate. Some farmers top-dress wheat in the spring with from 50 to 75 pounds an acre of nitrate of soda or sulphate of ammonia. Oats yield from 25 to 50 bushels an acre and receive about the same fertilizer treatment as wheat. The acreage devoted to barley is increasing, and this promises to be a good crop for Georgeville silty clay loam. Barley is used as feed for cattle. The yields range from 25 to 35 bushels an acre, and the crop is given about the same fertilizer treatment as wheat.

The production of red clover also is increasing. This crop is grown for hay, for a soil builder, or for seed. It yields from 1 to 1½ tons of hay an acre. The first cutting is used for hay and the second either for seed or to be turned under to improve the land. Soybeans are an important hay crop, and the yields of soybean hay range from 1½ to 2½ tons an acre. This crop is fertilized with from 100 to 150 pounds an acre of a 2–8–2 or 3–8–3 grade of fertilizer or a home mixture of about the same analysis. Cowpeas produce from 1 to 1½ tons of hay an acre or from 25 to 30 bushels of seed. The crop is grown mostly for hay or seed for use on the farm. Rye is grown by some farmers as a green-manure crop or for grain. The grain crop yields from 20 to 25 bushels an acre. Lespedeza is produced on many farms. Some hay is saved, but this crop is grown mainly as a soil builder or for seed. It is also sown in many pastures. Hay yields range from 1 to 1½ tons an acre, and good yields of seed are obtained. Alfalfa is grown on a comparatively small acreage. The yields range from three-fourths to 1 ton of hay an acre at each cutting, and three or four cuttings are made each season.

Crop rotations are practiced by some farmers. A common 4-year rotation is as follows: First year, corn with cowpeas or soybeans; second year, wheat, clover in the stubble; third year, fallow; and fourth year, corn or cotton. A 3-year rotation used by some farmers is: First year, corn with cowpeas or soybeans; second year, wheat or other small grain; and third year, fallow.

Georgeville gravelly silty clay loam.—Georgeville gravelly silty clay loam is similar to Georgeville silty clay loam, except that scattered over the surface, and to some extent embedded in the surface soil, are numerous brown smooth somewhat rounded or broken fragments of slate. In many places the gravel are mainly white quartz. The gravel content ranges from 15 to 30 percent of the soil mass. This soil is similar to Georgeville silty clay loam in the color of the surface soil and in the color and structure of the subsoil.

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This soil occurs mainly in the central and east-central parts of the county in comparatively small areas, and a few bodies are in the western part. Fairly large areas are developed in the vicinities of Austins Bridge, Pleasant Hill Church, and Pittsboro, and a fair-sized area is in the western part of the county west of Siler City.

About 30 percent of the land is used for crops. Corn occupies about 40 percent of the farmed acreage; wheat, 30 percent; cotton, 15 percent; and oats and legumes, approximately 10 percent. The yields and fertilizer treatment for the various crops are about the same as for similar crops on Georgeville silty clay loam.

Davidson clay loam.—The 5- to 7-inch surface soil of Davidson clay loam consists of brownish-red or reddish-brown clay loam. The subsoil is deep-red, purplish-red, or maroon smooth heavy clay or silty clay to a depth ranging from 40 to 45 inches, where it becomes lighter red and is more friable. At a depth ranging from 60 to 75 inches the material passes into soft friable dark-red, yellowish-brown, and black decomposed rock.

Included with this soil as mapped are small areas, over which angular stone fragments are scattered. The largest of these bodies are indicated on the soil map by stone symbols. Also included are a few small areas having a heavy clay surface soil, and there are some spots of brown loam, locally known as push land.

Davidson clay loam is developed mainly in the west-central, central, and east-central parts of the county. The largest bodies are south of Siler City, between Siler City and Pittsboro, and northeast of Pittsboro.

Approximately 40 percent of the land is farmed. Corn occupies about 40 percent of the farmed land; wheat, 30 percent; cotton, 10 percent; and oats, rye, barley, and legumes, a total of about 15 percent.

Davidson clay loam was recognized by the early settlers as one of the best soils of this section of the country, and a large acreage was cleared and cultivated by them. This soil does not erode or gully readily, and it responds well to good methods of cultivation. It withstands drought well.

Davidson clay loam is considered excellent for the production of corn, wheat, cotton, clover, and alfalfa. Corn yields from 20 to 25 bushels an acre, with the addition of only small quantities of fertilizer, and it yields from 40 to 50 bushels an acre, with an acre application of 200 pounds of a 2–8–2 or 3–8–3 fertilizer or a home mixture of about the same quantity of 16-percent superphosphate and cottonseed meal and a side application of about 50 pounds of nitrate of soda. Acre yields ranging from 35 to 50 bushels are obtained when corn is planted on clover land and 16-percent superphosphate is the only amendment applied.

Wheat produces from 12 to 19 bushels an acre without the use of fertilizer, and increased yields are obtained when wheat follows clover. Acre yields ranging from 20 to 30 bushels are obtained when the land is given an acre application of 150 to 200 pounds of 3–8–3 or 4–10–0 fertilizer and a top dressing of nitrate of soda or sulphate of ammonia at the rate of 50 to 75 pounds an acre.

Cotton produces from one-half to 1 bale an acre. The lower yields are caused by damage by the boll weevil. The land for cotton is fertilized with from 200 to 300 pounds an acre of 3–8–3 fertilizer,

and even higher yields than those mentioned are obtained when from 400 to 500 pounds an acre are used. Yields of oats range from 35 to 60 bushels an acre when the land is fertilized. Barley produces from 25 to 35 bushels an acre when similar fertilizer treatment as that given for wheat is used. Rye yields from 20 to 35 bushels an acre. Clover yields from 1 to 1½ tons of hay. Some clover is plowed under for soil improvement. Soybeans yield 1½ to 2½ tons of hay an acre or about 20 bushels of seed. This crop is fertilized with from 100 to 150 pounds an acre of 2–8–2 or 3–8–3 fertilizer or home mixtures of about the same analyses. Alfalfa is grown on a small acreage. It yields about 1 ton of hay an acre at each cutting, from three or four cuttings a season. Davidson clay loam is the best soil in the Piedmont Plateau for the production of alfalfa, wheat, and red clover.

Cecil fine sandy loam.—The surface soil of Cecil fine sandy loam consists of a layer of grayish-yellow or slightly brownish yellow friable fine sandy loam 8 or 10 inches thick, underlain by yellowish-red or reddish-yellow friable fine sandy clay which extends to a depth of 12 or 14 inches. The subsoil is red stiff brittle clay which continues to a depth of about 34 inches, where it is underlain by lighter red and more friable clay. At a depth ranging from 40 to 45 inches, the material grades into soft friable decayed rock. The surface soil in places is thin and shows spots and streaks of yellowish-red material, which have been caused by erosion. Quartz fragments and stones occur on the surface. In some places the stones are numerous and are indicated on the soil map by symbols.

Cecil fine sandy loam is of small extent. It occurs in small areas in the extreme northwestern corner of the county, at the Randolph County line, and in the extreme southeastern corner along the Harnett County line.

About 60 percent of the land is farmed, mainly to corn, wheat, oats, clover, and cotton. Corn yields from 15 to 35 bushels an acre, wheat 10 to 15 bushels, cotton one-half to three-fourths of a bale, and oats 15 to 30 bushels. The land is given about the same fertilizer treatment as Georgeville silt loam.

Cecil sandy loam.—The 6- or 8-inch surface soil of Cecil sandy loam is grayish-yellow or brownish-yellow friable sandy loam. The subsoil is red heavy brittle clay to a depth of about 30 inches, where it passes into lighter red and more friable clay. At a depth ranging from 40 to 45 inches the subsoil is underlain by soft crumbly reddish-brown, gray, and yellow decomposed rock. Many granite and quartz rock fragments are scattered over the surface in places, and these are indicated on the soil map by symbols.

This soil is developed along the Orange County line north of Bynum, two small areas are east of Bynum, and several small bodies are in the extreme southeastern part of the county near the Harnett County line. About 65 percent of the total area is farmed. Corn, wheat, and cotton are the principal crops grown, and oats, rye, and clover are produced to a small extent. Corn yields from 20 to 35 bushels an acre, wheat 10 to 20 bushels, cotton one-half to three-fourths of a bale, and oats 25 to 35 bushels. The fertilizer treatment for these crops is about the same as for similar crops on Georgeville silt loam.

Cecil clay loam.—The surface soil of Cecil clay loam, locally known as red clay land, consists of brownish-red or red rather heavy clay loam 5 or 6 inches thick. The subsoil is red stiff but brittle clay to a depth of 30 or 35 inches, where it is underlain by lighter red and less heavy clay which, at a depth ranging from 40 to 45 inches, grades into soft decayed rock. Included with this soil in some of the smoother areas are small bodies having a coating, an inch or two thick, of brown sandy loam. Also included are small eroded areas, or "galled spots", of red clay and a few small areas having stones on the surface.

Cecil clay loam occurs mainly in the western part of the county, along the Randolph County line, and in the southeastern part near the Harnett County line, and a few small areas are in the northeastern part northwest and east of Bynum. This soil is of small extent.

Approximately 50 percent of the land is farmed. The main crops are corn and wheat, and some cotton, oats, rye, and clover are grown on small acreages. Corn yields from 25 to 40 bushels an acre, wheat 10 to 20 bushels, cotton one-half to three-fourths of a bale, and oats 25 to 35 bushels. Fertilizer treatment of the land for these crops is about the same as for similar crops on Georgeville silt loam.

Goldston gravelly silt loam.—The surface soil of Goldston gravelly silt loam is grayish-yellow or grayish-brown silt loam to a depth ranging from 7 to 9 inches, where it is underlain by a 3- or 4-inch layer of yellowish-brown rather heavy silt loam or friable silty clay loam. On the surface and embedded in the soil are numerous small flat smooth slate particles and brown angular fragments. These particles and fragments compose from 15 to 35 percent of the soil mass, and they give the soil a dingy-brown appearance, especially where they are thick on the surface. The subsoil, which begins at a depth of about 12 inches, is reddish-brown, yellowish-brown, or brownish-red friable but slightly plastic silty clay continuing to a depth ranging from 24 to 30 inches, where it grades into an ocherous-yellow, mottled slightly with brownish yellow, reddish brown, and gray, friable silty clay that is more friable than the material in the upper part of the subsoil. At a depth of about 34 inches, the subsoil grades into brownish-yellow decayed rock containing mottles of red and gray and specks of black mineral matter. Areas in which the dull-brown rock fragments are numerous on the surface are indicated on the map by symbols.

Included with this soil as mapped are small eroded areas of silty clay loam texture. Also included are small bodies of Goldston silt loam, which do not have any round, angular, platy, or gravelly particles on the surface. Such bodies occur only in the southern part of the county, mainly southeast of Mount Zion Church and north of Gum Springs Church. With the exception of the lack of gravelly and platy particles, the surface soil and subsoil are similar to the surface soil and subsoil of Goldston gravelly silt loam. A slightly higher proportion of Goldston silt loam is farmed than of Goldston gravelly silt loam, but crop yields are approximately the same.

Goldston gravelly silt loam is developed mainly in the southern part of the county where it occupies fairly gradual or rather steep slopes leading to drainageways. This soil occurs in comparatively large bodies and has a total area of 59.5 square miles. The largest areas are

west and south of Goldston and within a triangle formed by Goldston, Pittsboro, and Ore Hill. Smaller areas are in the northern part of the county north and northeast of Pittsboro.

About 20 percent of this soil is farmed. Corn occupies about 40 percent of the cultivated area, wheat 25 percent, cotton 20 percent, and oats, rye, and legumes 10 percent. Corn yields range from 15 to 30 bushels an acre, wheat 8 to 12 bushels, cotton one-fourth to one-half of a bale, oats 15 to 25 bushels, and rye 10 to 15 bushels.

Cotton receives an acre application ranging from 200 to 400 pounds of 3–8–3 fertilizer and wheat from 150 to 300 pounds of 3–8–3 or the same quantity of 16-percent superphosphate. Corn is not so heavily fertilized as cotton. Usually all these crops are given a side or top dressing ranging from 50 to 100 pounds an acre of nitrate of soda.

Lespedeza does well in most places, and some fair pasture is obtained. The more steeply sloping or shallow soil areas should be used for forestry. Most of the merchantable timber has been cut, but the land supports a small growth of hardwoods and a second growth of loblolly pine.

Wadesboro fine sandy loam.—The surface soil of Wadesboro fine sandy loam consists of grayish-yellow or slightly brownish yellow smooth fine sandy loam to a depth ranging from 5 to 8 inches, where it is underlain by yellowish-red friable fine sandy clay to a depth of about 12 inches. Below this layer is the subsoil of slightly brownish red or red friable crumbly clay which, at a depth ranging from 28 to 32 inches, changes to brownish-red, faintly mottled with red and yellow, friable clay. The lower part of the subsoil is slightly lighter in texture than the upper part. At a depth ranging from 40 to 45 inches, the subsoil passes into purplish-red, streaked with yellow and gray, decomposed sandstone.

Throughout the Wadesboro fine sandy loam areas, surface wash is noticeable, particularly in areas of more sloping relief. In places all or part of the fine sandy loam surface soil has been removed, exposing the light-red fine sandy clay. Such spots are locally known as gall spots, but, because of their small extent, they are included with the fine sandy loam. Also included with this soil are small areas in which the texture of the surface soil is slightly coarser. A small area having a grayish-yellow or brownish-yellow sandy loam surface layer and a yellowish-red or brownish-red friable crumbly subsoil occurs at Brickhaven. The soil here apparently is derived from unconsolidated beds of sands and clays of the Coastal Plain and is in reality Ruston sandy loam.

The main occurrence of Wadesboro fine sandy loam is in the southern part of the county. The largest areas are northeast of Carbonton, southeast of Gulf, at and north of Haywood, and near Brickhaven.

This soil is used mainly for the production of corn and cotton, and some wheat, oats, and legumes are grown. Corn yields from 25 to 35 bushels an acre when an application ranging from 200 to 300 pounds of a 3–8–3 fertilizer is made; cotton one-half to 1 bale, when an application ranging from 300 to 400 pounds of 3–8–3 is made; wheat 10 to 15 bushels; and oats 20 to 30 bushels. The crops are given a top dressing of nitrate of soda at a rate ranging from 75 to 100 pounds an acre. This soil is easily tilled and responds readily to good treatment.

Wadesboro fine sandy loam, gravelly phase.—The surface soil of the gravelly phase of Wadesboro fine sandy loam consists of a 7- to 9-inch layer of grayish-yellow or brownish-yellow sandy loam. The subsoil is brownish-red or red friable sandy clay to a depth ranging from 28 to 34 inches, where it becomes slightly mottled with yellow and is more friable. On the surface and embedded in the soil are numerous rounded quartz gravel, ranging from one-half inch to about 2 inches in diameter, which compose from 15 to 35 percent of the surface soil but do not interfere seriously with cultivation, except where they occur in large quantities.

This soil occurs only in a few small areas in the southeastern part of the county, the largest of which is north of Haywood. The soil is more rolling than typical Wadesboro fine sandy loam. Most of the land is cultivated, and the principal crops are corn and cotton. Yields of these crops are about the same or slightly less than those on Wadesboro fine sandy loam. The fertilizer treatment is similar.

Penn silt loam.—The 6- or 8-inch surface soil of Penn silt loam is light-brown or slightly reddish brown mellow silt loam. The subsoil is purplish-red or Indian-red friable silty clay which extends to a depth ranging from 30 to 36 inches, where it is underlain by soft decomposed purple shale showing some mottling of brown and ocherous yellow.

This soil occurs in only a few small areas in the vicinity of Gulf and in one body north of Carbonton. Only a few small fields are farmed, and the principal crops are corn and cotton. The yields are lower than for the same crops on Wadesboro fine sandy loam. Nearly all the land is covered with second-growth shortleaf pine.

Wickham fine sandy loam.—The 12- to 15-inch surface soil of Wickham fine sandy loam consists of yellowish-brown or light-brown rather heavy fine sandy loam. The subsoil is reddish-brown or yellowish-red fairly stiff but slightly sticky clay which, at a depth ranging from 30 to 34 inches, passes into yellowish-brown, faintly mottled with reddish-brown, friable crumbly clay loam.

This soil is derived from alluvial material and occcupies second bottoms along Deep and Cape Fear Rivers in the southern part of the county. The largest areas are southeast of Gulf, near Coalglen, south of Haywood, and at Brickhaven. The soil is developed in strips ranging in width from a few feet to more than one-half mile. This is considered one of the best agricultural soils in the county, and practically all the small acreage is used for crops. Corn and cotton are the principal crops, and wheat and oats are grown to a small extent. Corn yields from 25 to 40 bushels an acre, cotton one-half to three-fourths of a bale, wheat 12 to 20 bushels, and oats 20 to 30 bushels. The land for crops receives about the same fertilizer treatment as Georgeville silt loam.

Congaree silt loam.—The surface soil of Congaree silt loam consists of brown or light-brown mellow silt loam to a depth ranging from 15 to 18 inches. Beneath this is yellowish-brown or light-brown friable silty clay loam which extends to a depth ranging from 30 to 34 inches, and below this depth the soil is brownish-yellow friable clay loam containing some black mineral specks in places. The texture of this layer is lighter than that of the overlying layer. This soil is variable. In some places it is brown silt loam without much

change in texture or structure to a depth of 30 or more inches, and in other places it becomes mottled with yellow and gray at a depth ranging from 28 to 32 inches. Small areas of fine sand and fine sandy loam are included with this soil as mapped, and in small flat areas the texture is silty clay loam.

Congaree silt loam is developed from alluvium deposited on the first bottoms. It is all subject to occasional overflow by high water, and new material is thus added to the soil. Natural surface drainage and underdrainage are not everywhere good, and ditches are necessary to drain the soil adequately.

This soil occurs along many of the streams, in strips ranging from a few feet to nearly one-half mile in width. The widest areas are along Deep River and some of its tributary creeks. Smaller areas are along Haw, Cape Fear, and Rocky Rivers and many creeks in the western and northern parts of the county.

This soil is fairly extensive. About 70 percent of it is used for crops. The rest is uncleared and used to some extent for summer pasture. Much of the uncleared land is more poorly drained than the cleared land.

Corn and hay are the principal crops, and wheat and oats are grown to some extent. Corn yields from 35 to 45 bushels an acre without the application of fertilizers and as high as 75 bushels an acre when the land is fertilized. This is the best soil in the county for the production of corn. Most of the hay is cut from native grasses which yield from 1 to 2 tons an acre. Wheat and oats make good yields when not damaged by overflow.

Congaree fine sandy loam.—The surface soil of Congaree fine sandy loam consists of brown or light-brown mellow fine sandy loam 10 to 12 inches thick. Beneath this layer the soil is light-brown friable but somewhat heavy clay loam which extends to a depth ranging from 28 to 34 inches, where it is underlain by brownish-yellow friable crumbly fine sandy clay. In this layer the material is lighter in color and more friable than in the layer immediately above. Included with this soil as mapped are narrow strips of light-brown fine sand, which are too small to indicate on the soil map. In many places small scales of mica are present in both the surface soil and subsoil.

Congaree fine sandy loam occurs in narrow areas along Haw and Cape Fear Rivers. It occupies positions near the streams and in general is slightly more elevated than Congaree silt loam. Owing to the fact that it is open, porous, and has a sandy texture, the soil almost everywhere is well drained, although it is subject to overflow by high water.

Most of the land is cultivated, mainly to corn, which yields from 25 to 35 bushels an acre without fertilizer. Higher yields are obtained with the use of fertilizer. A few small fields are planted to wheat or oats, and the yields are good. This is the best soil in the county for growing watermelons.

GRAY-LAND SOILS

The combined area of the soils of this group is 278.8 square miles, or 40.2 percent of the total area of the county. Large areas are in the northwestern and southwestern parts, but the largest develop-

ments are in the southern and southeastern parts. These soils are locally known as gray sandy land and white gravelly land. The relief ranges from nearly level to undulating and rolling. It is prevailingly smoother than that of the red-land soils. The Appling and Herndon soils have the more rolling relief, and the rest of the soils have smooth or gently rolling relief. Improved farm machinery can be used on most of the soils of this group.

The surface texture of most of these soils is coarser than that of the red-land soils, and for this reason they can be cultivated more easily and, in the porous sandy soils, sooner after rains. The light sandy soils warm earlier in the spring than the fine-textured soils of the red-land group.

With the exception of the White Store, Helena, and Iredell soils, all the subsoils are friable and crumbly, as they consist of sandy clays or silty clays; but the subsoils of the White Store, Helena, and Iredell soils are heavy plastic clays. On account of the heavy subsoils, internal drainage in the last-named soils is somewhat retarded.

The reddish-yellow or yellow color of the subsoils is probably due to the fact that the soils have not been so completely oxidized or that the rock from which they are formed does not contain so much iron as the rock under the red-land soils. These light-colored soils contain less plant nutrients and humus and are slightly more acid than those of the red-land group.

Practically all of the tobacco, most of the sweetpotatoes grown for sale, and much of the cotton are produced on these light-colored soils. Some corn, wheat, oats, rye, and legumes are grown, but yields are not so high as on the red-land soils. The Alamance soils are particularly well suited to the production of lespedeza.

Appling sandy loam.—The 7- to 9-inch surface soil of Appling sandy loam in cultivated fields consists of grayish-yellow or slightly brownish yellow sandy loam underlain to a depth ranging from 12 to 15 inches by slightly brownish yellow friable sandy clay. The subsoil begins as brownish-yellow or reddish-yellow friable stiff clay which passes, at a depth ranging from 24 to 30 inches, into stiff mottled or streaked yellow, dull-red, and yellowish-brown clay. At a depth ranging from 36 to 45 inches, the subsoil is underlain by mottled red, yellow, and gray soft decomposed rock, mainly granitic rock.

Included with this soil in mapping are small areas of fine sandy loam and coarse sandy loam texture. In some fields small areas of reddish-yellow soil are exposed through erosion of the surface layer. In some places the subsoil is mottled light red and yellow just below the surface soil, and in other places bedrock lies near the surface or outcrops. In places a few angular granite fragments or small partly rounded boulders are on the surface.

Appling sandy loam occurs almost exclusively in the northeastern part of the county, north of Bynum and east of Haw River, and a few small areas are in the southeastern corner.

About 60 percent of the land is farmed. Corn occupies about 45 percent of the farmed land, wheat 25 percent, cotton 15 percent, and oats, rye, soybeans, cowpeas, and clover about 10 percent. A small acreage is used for tobacco and sweetpotatoes. Corn yields from 15 to 30 bushels an acre, wheat 12 to 15 bushels, cotton one-

half to three-fourths of a bale, oats 20 to 30 bushels, rye 20 to 25 bushels, tobacco 400 to 800 pounds of bright leaf, and sweetpotatoes 150 to 200 bushels. Cowpeas and soybeans yield from 1 to 1½ tons of hay or about 20 bushels of seed an acre, and clover from 1 to 1½ tons of hay. Vetch does well.

Land for corn receives an acre application of 200 pounds of 2–8–2 or 3–8–3 fertilizer or about the same quantity of a home mixture of 16-percent superphosphate, cottonseed meal, and nitrate of soda. Some farmers side dress the crop with about 50 pounds an acre of nitrate of soda. Clover is grown by some farmers to improve the land, and when corn follows clover only superphosphate and potash are used as fertilizer. Wheatland is fertilized with 16-percent superphosphate alone, although a few farmers apply from 150 to 300 pounds an acre of 3–8–3 fertilizer. Some top-dress the wheatland in the spring with from 50 to 75 pounds an acre of nitrate of soda or sulphate of ammonia, and some give oats about the same fertilizer treatment as wheat. Land for cotton is fertilized with from 200 to 300 pounds an acre of 3–8–3 fertilizer. That for tobacco is given an acre application ranging from 500 to 800 pounds of 3–8–3, 3–8–5, or 4–8–6 fertilizer. From 500 to 1,000 pounds an acre of a 3–8–3 grade of fertilizer are commonly used for sweetpotatoes, although some farmers use 4–8–6 or 3–8–10 grades. Soybeans receive from 100 to 150 pounds an acre of 2–8–2 or 3–8–3 fertilizer.

Appling stony sandy loam.—Appling stony sandy loam differs from Appling sandy loam mainly in the presence of a large number of rock fragments on the surface and to some extent in the soil. The stones are numerous in places and consist mainly of broken pieces of granite, although some white quartz fragments occur in a few areas. In some places there are rounded boulders from 1 to nearly 2 feet in diameter, in addition to the other rock fragments. The subsoil in places is not so deep to the soft granite as that of Appling sandy loam.

This soil is rather extensively developed in the northeastern part of the county in the section north of Bynum and east of Haw River, and small areas are in the extreme southeastern part. The total area is 22 square miles.

Approximately 20 percent of the land is farmed, and corn occupies about 45 percent of the cultivated area; wheat, 25 percent; cotton, 15 percent; and oats, rye, and legumes, 10 percent. Crop yields are slightly lower than on Appling sandy loam, but the fertilizer treatment is practically the same. On some of the steeper slopes many of the rocks picked from the fields have been used to construct low walls to prevent soil erosion.

Durham sandy loam.—The surface soil of Durham sandy loam consists of a grayish-yellow or very light gray layer of friable sandy loam from 5 to 8 inches thick, passing into pale-yellow sandy loam which extends to a depth ranging from 12 to 15 inches. The subsoil is yellow or pale-yellow clay or heavy sandy clay which is rather stiff but brittle and crumbly. It continues to a depth ranging from 28 to 34 inches. The material below this is brownish-yellow, with faint spots and streaks of gray and bright red, crumbly decayed granitic material. Included with mapped areas of this soil are small bodies of fine sandy loam and coarse sandy loam. Granitic rock

fragments occur on the surface in some places and, where numerous, have been shown on the soil map by symbols.

This soil is developed mainly in the northern part of the county, and a few small areas lie near the Harnett County line in the southeastern part. The largest bodies are northwest of Browns Chapel near the Alamance County line and between Bynum and the Orange County line.

About 50 percent of the land is used for crops, mainly corn, wheat, cotton, oats, rye, soybeans, cowpeas, and clover. The soil is well suited to the production of sweetpotatoes and bright-leaf tobacco, and a small acreage is devoted to these crops. The yields of the various crops and the fertilizer treatment are about the same as for the same crops on Appling sandy loam. This soil produces the best quality of bright-leaf tobacco grown on any soil in the Piedmont Plateau.

Alamance silt loam.—The surface soil of Alamance silt loam, locally called "white land" or "post oak land", is light-gray or grayish-yellow smooth floury silt loam 8 or 10 inches thick. The subsoil is yellow friable crumbly silty clay to a depth ranging from 24 to 28 inches, where it is mottled yellowish-brown, gray, and light-gray, with occasional spots of bright red, friable crumbly silty clay loam. At a depth of about 34 inches it is underlain by gray and rust-brown soft decomposed slate rock. The subsoil is not everywhere mottled in the lower part, but in many places the yellow layer directly overlies the soft decayed slate. In wooded areas a thin layer of dark-gray leafmold covers the surface.

Alamance silt loam is an extensive soil occupying a total area of 54 square miles. It is developed in large areas in the northern, northwestern, and western parts of the county, where it occurs mainly as interstream flats and a few gentle slopes. It is confined to the section west of Haw River and north of a line drawn from Pittsboro to the southwestern corner of the county. The largest areas are north and northwest of Siler City and north of Bennett.

Because of the flat relief, this soil is not so well drained as the more rolling soils. It is cold and does not warm so readily as the more sandy soils of this group. Owing to the fine silty texture, the soil puddles when wet and forms clods when not in the proper moisture condition.

About 15 percent of the land is farmed. Corn occupies about 45 percent of the farmed area, wheat 25 percent, cotton 15 percent, and oats, rye, and legumes 10 percent. Corn yields from 15 to 30 bushels an acre, and the cornland is fertilized with about 200 pounds of 2–8–2 or 3–8–3 fertilizer. Wheat yields from 10 to 15 bushels an acre and is given about the same fertilizer treatment as corn. Cotton yields from one-third to one-half bale an acre, and the land is given an acre application of about 200 pounds of 3–8–3 fertilizer. A small acreage is planted to tobacco, yields of which range from 400 to 600 pounds of bright-leaf grades. Land for tobacco is fertilized with about 600 pounds an acre of 3–8–3 fertilizer. Oats yield from 15 to 20 bushels an acre, rye about 20 bushels, and clover gives fair yields. Lespedeza is grown on many farms, and the yields are higher than those of clover. Alamance silt loam is considered one of the best soils for growing lespedeza.

Alamance gravelly silt loam.—The surface soil of Alamance gravelly silt loam, locally called "white gravelly land", consists of light-gray or grayish-yellow smooth silt loam 8 or 10 inches thick. Scattered over the surface and mixed with the soil is a large quantity, ranging from 15 to about 35 percent of the soil mass, of flat smooth slate gravel and angular quartz gravel. The subsoil is yellow friable silty clay which, in some places, is mottled with yellowish brown, gray, and red in the lower part. Soft decayed slate rock underlies the soil at a depth ranging from 30 to 34 inches. Rock fragments occur on the surface in places, and where these are numerous they are indicated on the soil map by stone symbols. In some places bedrock lies near the surface, and in other places it outcrops.

This is the most extensive soil in the county. Its total area is 79.3 square miles. It is developed mainly in the southern and western parts. A wide area begins about 2 miles south of Pittsboro and extends in an almost unbroken belt southwestward to the Randolph County line south of Bennett, and several fair-sized areas are southwest of Siler City.

Approximately 20 percent of the land is cleared and farmed. Corn is grown on about 35 percent of the farmed area, wheat on 30 percent, cotton on 20 percent, and oats, rye, and legumes on 10 percent. Barley and tobacco are grown on small acreages. Corn yields from 15 to 30 bushels an acre, and the land is fertilized with about 200 pounds of 2–8–2 or 3–8–3 fertilizer. Wheat yields from 8 to 15 bushels an acre, and wheatland is given an acre application of 200 pounds of 2–8–2 fertilizer, although some farmers apply about 50 pounds of sulphate of ammonia and give no other fertilization. Cotton yields from one-fourth to three-fourths of a bale an acre, and the land is fertilized with from 200 to 300 pounds of 2–8–2, 3–8–3, or a home mixture of 16-percent superphosphate, cottonseed meal, kainit, and nitrate of soda. Yields of barley are satisfactory. Soybeans are well suited to the land and are grown by some farmers for hay and soil improvement. Bright-leaf tobacco yields range from 600 to 800 pounds an acre. Most farmers fertilize the land for tobacco with a 3–8–3 fertilizer, but some use a 3–8–5 grade, applied at the rate of about 600 pounds an acre. Lespedeza is grown on many farms, and higher yields are obtained on this soil than on any other soil in the county.

Alamance very fine sandy loam.—The 8- to 10-inch surface soil of Alamance very fine sandy loam is grayish-yellow friable very fine sandy loam. The subsoil is yellow friable silty clay which becomes mottled, at a depth ranging from 26 to 30 inches, with yellowish brown, gray, and bright red. The lower part of the subsoil is slightly more friable than the upper part. The subsoil is underlain by soft decayed rock at a depth ranging from 30 to 35 inches. This soil differs from Alamance silt loam mainly in the slightly coarser texture of the surface soil and in the slightly more rolling relief. Because of the very fine sand content, this soil does not clod so readily as Alamance silt loam.

Alamance very fine sandy loam occurs in the western part of the county. The largest areas are north of Siler City, east of Bonlee, and at Wells, and there are several smaller areas. Approximately 70 percent of the land is cultivated, mainly to corn, wheat, cotton, and oats.

Fertilizer treatments are practically the same as for similar crops on Alamance silt loam, but yields are slightly higher. A small acreage of bright-leaf tobacco is grown, yields of which are good.

Herndon silt loam.—The surface soil of Herndon silt loam consists of a layer of grayish-yellow or yellowish-gray smooth silt loam from 7 to 9 inches thick, underlain by a brownish-yellow friable silty clay loam layer 4 or 5 inches thick. The subsoil begins as reddish-brown or yellowish-red friable silty clay which in some places in the lower part becomes more friable mottled brownish-yellow and red silty clay. At a depth ranging from 30 to 34 inches the subsoil is underlain by mottled or streaked brown, gray, and bright-red friable decomposed rock. Included with mapped areas of this soil are small bodies having a very fine sandy loam texture.

Herndon silt loam occurs mainly in the northwestern part of the county west of Haw River. The largest areas are west of Plain Field Church, near Emmaeus Church, and northeast of Silk Hope, and smaller areas are in the central part southwest of Pittsboro.

About 30 percent of the land is farmed. Corn, the leading crop, occupies about 40 percent of the farmed area. Wheat is grown on about 30 percent, cotton on 10 percent, oats, rye, clover, and lespedeza on about 10 percent, and tobacco on a very small acreage. Corn yields from 15 to 30 bushels an acre, wheat 8 to 15 bushels, cotton one-fourth to three-fourths of a bale, and oats, rye, clover, and lespedeza give good yields. Land for crops is fertilized with the same grades and about the same quantities of fertilizer as are used for similar crops on Alamance silt loam. This is a good soil for growing lespedeza.

Herndon silt loam, gravelly phase.—Herndon silt loam, gravelly phase, is similar to typical Herndon silt loam, except that it contains a large quantity of brown smooth slate and angular quartz fragments on the surface and to some extent embedded in the soil. The quantity of gravel ranges from about 15 to 30 percent of the soil mass.

This soil occurs largely north of Silk Hope and northwest of Siler City, and a few small areas are in the southeastern part of the county east of Gum Springs Church. About 60 percent of the land is farmed, and the crops and yields are similar to those on typical Herndon silt loam.

Granville fine sandy loam.—The 8- to 10-inch surface soil of Granville fine sandy loam consists of grayish-yellow or brownish-yellow mellow fine sandy loam, and the subsoil is yellow friable fine sandy clay to a depth ranging from 30 to 34 inches. Below the subsoil the material is friable but somewhat plastic and mottled brownish yellow, gray, bright red, and, in places, purple.

Included with Granville fine sandy loam on the soil map are a few small areas of Granville sandy loam. The surface soil of the spots of Granville sandy loam is grayish-yellow or slightly brownish yellow light sandy loam or loamy sand to a depth of 10 or 12 inches. The subsoil is yellow friable sandy clay to a depth ranging from 28 to 34 inches, where the material grades into mottled brownish-yellow, gray, and bright-red slightly plastic soil material. These areas occur mainly in the northeastern part of the county south of Farrington and along the Durham County line. The crops grown, yields, and

fertilizer treatment on this soil are similar to those on Granville fine sandy loam.

Granville fine sandy loam occurs mostly in small scattered areas, mainly in the southern and southeastern parts of the county. The largest bodies are northwest and northeast of Carbonton, south of Gulf, north of Coalglen, north and east of Moncure, and northeast and east of Brickhaven.

About 85 percent of the land is farmed. About 35 percent of the farmed area is used for corn, 25 percent for cotton, 15 percent for wheat, 5 percent for tobacco, and 10 percent for oats, rye, and legumes. A small acreage is planted to sweetpotatoes. Corn yields from 10 to 30 bushels an acre, cotton one-fourth to three-fourths of a bale, wheat 8 to 12 bushels, tobacco 400 to 700 pounds of bright leaf, and oats 15 to 20 bushels. Rye and legumes give fair yields, and sweetpotatoes yield from 150 to 175 bushels an acre. The various crops are given about the same fertilizer treatment as similar crops on Appling sandy loam.

Granville fine sandy loam, gravelly phase.—Granville fine sandy loam, gravelly phase, is similar to typical Granville fine sandy loam, except that it has a large number of small rounded quartz gravel scattered over the surface and to some extent mixed with the soil. This soil, which is of very small extent, occurs in a few scattered areas in association with typical Granville fine sandy loam in the southern part of the county. Most of the land is farmed, and the crops grown are the same as those grown on typical Granville fine sandy loam.

Granville silt loam.—The surface soil of Granville silt loam is grayish-yellow, light-gray, or brownish-yellow silt loam ranging from 7 to 10 inches in thickness. The subsoil is yellow friable silty clay to a depth ranging from 30 to 34 inches. A layer of mottled yellow, gray, and red friable but somewhat plastic material underlies the subsoil. In some places the subsoil passes into purple or Indian-red soft shale or sandstone material. Included with this soil on the map are small bodies having a very fine sandy loam texture and also a few small areas having rounded quartz gravel on the surface.

This soil, which is of small extent, is developed in the southern and southeastern parts of the county, mainly west of Carbonton and east and northeast of Moncure. Only about 20 percent of the land is farmed. Corn, cotton, wheat, and oats are grown, and yields are slightly lower than those obtained on Granville fine sandy loam.

Norfolk loamy sand.—The surface soil of Norfolk loamy sand consists of an 8- to 10-inch layer of light-gray or grayish-yellow loamy sand. The subsoil is pale-yellow friable loamy sand which is underlain, at a depth ranging from 30 to 34 inches, by yellow friable crumbly sandy clay. In a few places, where the yellow sandy clay is within 20 inches of the surface, the soil is a sandy loam type, but the areas are too small to indicate separately on the map.

Norfolk loamy sand is developed in a few small areas in the southern part of the county, south of Gulf and northeast of Moncure. The soil apparently is derived from remnants of Coastal Plain material, which have resisted the forces of erosion.

About 60 percent of the land is cultivated, mainly to corn and cotton. Yields of corn range from 8 to 25 bushels an acre and of

cotton from one-fourth to three-fourths bale. Garden vegetables, watermelons, and cantaloups do well. All crop yields depend on the quantity of commercial fertilizer used.

Altavista fine sandy loam.—The surface soil of Altavista fine sandy loam consists of light-gray, grayish-yellow, or dull-yellow mellow fine sandy loam to a depth ranging from 12 to 18 inches. The subsoil is yellow friable fine sandy clay which extends to a depth ranging from 28 to 32 inches, where it passes into mottled yellow, brownish-red, and gray crumbly fine sandy clay material. In some places the mottled material in the lower part of the subsoil is rather heavy and plastic. Included with this soil as mapped are small areas which have a sandy loam or very fine sandy loam surface soil, areas of flat poorly drained soil with a mottled subsoil, and small bodies of soil having a reddish-yellow subsoil.

Altavista fine sandy loam occurs in fair-sized areas in the eastern and southern parts of the county. It is developed on second bottoms, or terraces, from alluvium deposited along many of the streams. The relief is nearly level or gently undulating, with a gradual slope toward the stream. Both surface and internal drainage range from fair to good. The bodies of this soil range from a few feet to about 1 mile in width, and the largest developments are along Deep, Haw, Cape Fear, and New Hope Rivers and Northeast, Morgan, and White-oak Creeks.

About 60 percent of the land is used for crops. Corn occupies about 40 percent of the farmed land, cotton 20 percent, wheat 15 percent, oats 10 percent, and tobacco 5 percent. A small acreage is devoted to hay crops. Corn yields from 15 to 30 bushels an acre, cotton one-fourth to two-thirds of a bale, wheat 8 to 15 bushels, oats 15 to 20 bushels, and bright-leaf tobacco 400 to 600 pounds. The fertilizer treatment is practically the same as for similar crops on Appling sandy loam.

White Store sandy loam.—The surface soil of White Store sandy loam consists of a layer of grayish-yellow or slightly brownish yellow friable sandy loam 8 or 10 inches thick, underlain by a layer of yellow friable heavy sandy loam or light sandy clay 6 or 8 inches thick. The subsoil is mottled brownish-yellow, yellow, bright-red, and gray heavy tough clay which is very plastic when wet and contains very little sand. At a depth ranging from 34 to 40 inches, the subsoil is underlain by mottled brownish-yellow, purple, bright-red, and gray somewhat friable soil material derived mainly from shale and sandstone. On drying, the material in the subsoil shrinks and cracks into hard cubical blocks. Internal drainage in the subsoil is slow, owing to the high percentage and denseness of the clay present.

This soil occurs only in the eastern part of the county, most of it east of New Hope River. The largest areas are north and southeast of Farrington. The total area is 21.8 square miles.

This is an important agricultural soil which is used extensively for the production of bright-leaf tobacco and sweetpotatoes. Approximately 80 percent of the land is farmed. As it occupies broad smooth interstream ridges, most of it lies favorably for agriculture. About 30 percent of the farmed area is used for corn, 30 percent for tobacco, 10 percent for wheat, 10 percent for oats and legumes, 5

percent for sweetpotatoes, and a small acreage for cotton. Corn yields from 10 to 30 bushels an acre, tobacco 600 to 800 pounds, wheat 8 to 15 bushels, oats 15 to 20 bushels, and sweetpotatoes 150 to 250 bushels. Clover, soybeans, and vetch yield well. About the same fertilizer treatment is given as for similar crops on Appling sandy loam.

White Store fine sandy loam.—The 6- or 8-inch surface layer of White Store fine sandy loam consists of grayish-yellow, pale-yellow, or brownish-yellow friable fine sandy loam. This is underlain by a subsurface layer of yellow friable fine sandy clay from 3 to 5 inches thick. The subsoil is mottled brownish-yellow, yellow, bright-red, and light-gray heavy plastic clay to a depth ranging from 28 to 34 inches, where it is underlain by more friable mottled brownish-yellow, purple, purplish-red, and gray soil material. When exposed to the air, the subsoil clay cracks into vertical columns or cubical blocks. The heavy plastic subsoil hinders the movement of soil moisture.

The total area of this soil is 41.8 square miles. It is developed in the southern, southeastern, and northeastern parts of the county. Large areas are north and northeast of Carbonton, at and northeast of Gulf, northwest of Moncure, and in a broken belt extending from Corinth in the southeastern part through Seaforth to the northeastern corner.

Because of its finer texture, this soil is not so open and porous in the surface layer as is White Store sandy loam, and not so large a proportion of it is farmed. Only about 35 percent of the land is cleared and used for crops. Corn occupies about 35 percent of the farmed acreage, cotton 20 percent, tobacco 15 percent, wheat 10 percent, and oats and legumes about 10 percent. A small acreage is planted to sweetpotatoes. Corn yields from 20 to 30 bushels an acre, cotton one-fourth to one-half bale, bright-leaf tobacco 400 to 600 pounds, wheat 10 to 12 bushels, oats 15 to 20 bushels, and sweetpotatoes 150 to 200 bushels. The fertilizer treatment is practically the same as for these crops on Appling sandy loam.

White Store fine sandy loam, gravelly phase.—White Store fine sandy loam, gravelly phase, is similar to typical White Store fine sandy loam, except that on the surface and to some extent mixed with the surface soil are large quantities of rounded quartz gravel, ranging from fine to coarse, which constitute from 20 to 35 percent of the soil material. In some places where the gravel are small, they are angular rather than rounded.

This is a soil of small extent, most of which is in the southeastern part of the county in the vicinity of Corinth. About 65 percent of the land is farmed, and corn, cotton, wheat, and oats are the main crops. The yields are practically the same as for the same crops on typical White Store fine sandy loam.

White Store very fine sandy loam.—The surface soil of White Store very fine sandy loam consists of a 6- or 8-inch layer of grayish-yellow or brownish-yellow very fine sandy loam underlain by a layer of yellow friable very fine sandy clay loam which continues to a depth of 10 or 12 inches. The subsoil is mottled brownish-yellow, red, gray, and light-gray heavy tough plastic clay which extends to a depth ranging from 28 to 34 inches, where it grades into purplish-red decayed shale and mudstone.

This soil is developed in the southeastern part of the county, practically all of it in the vicinity of Merry Oaks. It is inextensive. Approximately 20 percent of the land is farmed, and the rest supports a forest cover of second-growth shortleaf pine. The principal crops are corn, wheat, and oats, and yields are slightly lower than for these crops on White Store fine sandy loam. This soil does not drain so readily or warm so quickly as White Store fine sandy loam.

Helena sandy loam.—The surface layer of Helena sandy loam is grayish-yellow or dull-yellow friable sandy loam 8 or 10 inches thick. Below this is the subsurface layer of yellow friable sandy clay which continues to a depth ranging from 15 to 18 inches. The material in this layer is similar to the sandy clay layer of Durham sandy loam. The subsoil is light-gray, mottled or streaked with rust brown and in some places bright red, heavy tough somewhat plastic clay which, at a depth ranging from 28 to 32 inches, passes into streaked light-gray and rust-brown friable crumbly decomposed rock. The heavy character of the lower part of the subsoil does not allow free circulation of soil moisture.

This soil, which is not extensive, occurs only in the northern part of the county in the vicinity of Cedar Grove Church. About 40 percent of the land is farmed, and the principal crops are corn, wheat, and oats. A small acreage is planted to tobacco. Crop yields are slightly lower than those obtained on Appling sandy loam, but the fertilizer treatment of the two soils is practically the same.

Iredell loam.—The 6- or 8-inch surface soil of Iredell loam consists of brown or grayish-brown loam. The subsoil is brown or yellowish-brown heavy tough plastic clay which, on drying, shrinks and cracks into large angular lumps. The subsoil extends to a depth ranging from 24 to 30 inches, where it is underlain by mingled light-green, gray, and rust-brown soft decomposed diorite bedrock. Internal drainage is very poor. There are many rounded brown ironstone gravel or concretions on the surface and mixed with the soil in many places. In some places rounded or broken dark-colored rocks are strewn over the surface, and areas in which these are numerous are indicated on the soil map by stone symbols.

In the northern part of the county near Mount Gilead Church and near Cedar Grove Church are small areas of Mecklenburg loam which, on account of their small extent, are included with Iredell loam in mapping. Here, the surface soil is brown or reddish-brown loam 6 or 8 inches thick. The subsoil is reddish-brown or yellowish-red heavy stiff somewhat plastic clay which, at a depth ranging from 24 to 30 inches, passes into ocherous-yellow or reddish-yellow clay that is more friable than the material in the upper part of the subsoil. This material, in turn, grades into ocherous-yellow or greenish-yellow soft decayed diorite rock. A few small brown concretions of ironstone gravel occur on the surface, and in some places there are angular scattered fragments of the dark-colored basic rock. The more stony areas are indicated on the map by stone symbols. Yields of corn and wheat—the principal crops on this included soil—are higher than those obtained on typical Iredell loam. The fertilizer treatment is the same as for similar crops on Davidson clay loam, except that more potash is required for most crops.

Iredell loam is of small extent. It occurs in small scattered areas in practically all parts of the county. The largest developments are north of Brush Creek Church in the western part, near Gulf and Carbonton in the southern part, and northeast and north of Bynum in the northern part.

About 20 percent of the land is cultivated, mainly to corn, wheat, oats, and cotton. Corn yields from 10 to 20 bushels an acre, wheat 8 to 10 bushels, oats 15 to 20 bushels, and cotton one-fourth to one-half bale. The crops are given about the same fertilizer treatment as similar crops on Appling sandy loam. A small acreage of the land is used for pasture. The forest growth on the uncleared areas includes post oak, blackjack oak, and a few white oak, red oak, water oak, pine, and cedar trees.

MISCELLANEOUS SOILS AND LAND TYPES

The group of miscellaneous soils and land types includes a large number of soils of small extent, which do not belong in the other groups as they are little used for the production of crops; the steep phases of some of the typical soils; alluvial soils, undifferentiated; and rough stony land. Over the greater part of the hilly, stony, and steep areas the surface soil is shallow or has been removed by erosion, and the subsoil was never deep. In many places the subsoil is very thin, and the disintegrated rock lies near the surface and in some places outcrops. Areas of these miscellaneous land types occur on the breaks and steep slopes leading to drainageways and to some extent on the low mountains. The largest areas are near Rocky, Deep, Haw, and Cape Fear Rivers and on steep hills and low mountains in the northern part of the county. The relief is strongly rolling or steeply sloping, and surface drainage is everywhere good because run-off from the steep slopes is rapid. Areas of these soils which once were cleared and cultivated are badly washed and gullied. Much of this land was formerly covered with pine and hardwoods including white, red, and black oaks. Most of the original timber has been cut, and the land now supports a cover of second-growth pine and oak, the pine predominating in the southern and eastern parts of the county.

All the steep and hilly land should be devoted to forestry. These soils do not produce better trees, in fact, they do not produce such good trees as do the other soils of the county, but, because of their stony character and prevailingly steep and hilly relief, they are unsuited for general farming purposes under present economic conditions. If cleared, the steep slopes would soon wash and gully, unless the land were seeded to grass or large sums were expended for terracing. A few small areas, which have the smoothest relief and are the least stony, are farmed. Some of the smoother areas could be used for orchards or for grazing land.

Wehadkee silt loam, Roanoke silt loam, and alluvial soils, undifferentiated, occur in the first and second bottoms and are naturally poorly drained. These soils, if properly managed and seeded, in places would produce excellent pasture grasses for summer grazing. Otherwise, their best use is for forestry.

Orange silt loam, Orange silt loam, gravelly phase, and White Store fine sandy loam, eroded phase, are soils of low productivity, and only

a small proportion of them is farmed. They provide scant pasturage. The greater part of these soils should be used for forestry.

Georgeville stony silt loam.—Georgeville stony silt loam is similar to Georgeville silt loam, except that the surface soil is not so uniform in color and thickness and the subsoil in many places is very thin over the underlying soft slate rock. Included with this soil are small areas having a silty clay loam surface soil.

Over the surface of Georgeville stony silt loam are large numbers of angular white quartz rocks and fragments of other rocks. Some rock fragments are embedded in the soil, and in places solid rock outcrops. In most places the stones are so numerous that plowing and cultivation are difficult.

The principal occurrence of this soil is on the steeper slopes leading to drainageways. A small proportion of it occupies some of the smoother ridges. Most of it is developed in the central and east-central parts of the county. The largest areas are along Rocky River east of Siler City, and along Haw River northwest and southeast of Bynum. Some fair-sized areas are in the western and southwestern parts near Brush Creek Church and northwest of Carbonton.

Not more than 5 percent of the land is cultivated. It is used, in small fields, for the production of corn and cotton, and a small part is in pasture. Because of its stony character and unfavorable relief, this soil is better suited to forestry than to cultivated crops.

Davidson clay loam, hilly phase.—Davidson clay loam, hilly phase, is similar to typical Davidson clay loam in the color and texture of the surface soil and the color and structure of the subsoil, but the subsoil is much thinner over the soft rock. This hilly soil occurs on steep slopes near drainageways, and most of it lies unfavorably for cultivation. Many dark-colored rock fragments and small boulders are on the surface in places. The largest areas of this kind are shown on the soil map by symbols.

This soil occurs only in comparatively small areas in the east-central part of the county, southeast of Bynum and between Bynum and Farrington. Most of the land is cut-over oak timberland, and practically all of it is now covered with a second-growth oak forest. A few small fields of the smoothest areas are used for corn and wheat. On account of its steep relief, this soil is best suited to forestry.

Cecil clay loam, steep phase.—The 5- or 6-inch surface soil of Cecil clay loam, steep phase, is reddish-brown or red clay loam. The subsoil is red heavy clay to a depth ranging from 24 to 30 inches and is underlain by lighter red and more friable clay. Soft decayed rock material occurs at a depth of about 34 or 36 inches, and in many places it is nearer the surface. In many places the surface soil is red rather heavy clay, owing to erosion. This soil differs from typical Cecil clay loam mainly in the slighter thickness of the subsoil and in its mode of occurrence. The soil is developed on steep slopes leading to drainageways, and the relief is considerably broken. White quartz rocks are on the surface in many places.

This soil occurs only in the extreme southeastern part of the county near the Harnett County line on slopes leading to Cape Fear River. It is of very small extent, and practically all of it is covered with second-growth pine and oak. On account of the steep relief, the land is best suited to forestry.

Herndon silt loam, stony phase.—The surface soil of Herndon silt loam, stony phase consists of a layer of grayish-yellow or yellowish-gray silt loam from 7 to 9 inches thick. The subsoil is yellowish-red or reddish-yellow friable silty clay loam continuing to a depth ranging from 26 to 32 inches, where it passes into soft decayed bedrock. Scattered over the surface, and in some places embedded in the soil, are many slate and other fine-grained rock fragments. The depth of the subsoil is variable. In places the underlying rock is near the surface, and in other places it outcrops.

Most of this soil occurs in the northern part of the county west of Haw River and north of a line between Pittsboro and Siler City. A few areas are southwest of Pittsboro, southwest of Siler City, east of Haw River, and in the southern part southeast of Christian Church.

This soil occupies high hills and steep slopes to streams. A few of the smoothest areas are used for crops, mainly corn and cotton, but practically all of the land supports a second growth of oak and pine trees. Because of its stoniness and rather steep relief, the soil probably is best suited to forestry.

Appling stony sandy loam, steep phase.—Appling stony sandy loam, steep phase, includes the steep and broken areas of Appling stony sandy loam. It occurs on low mountains and steep breaks leading to drainageways. The surface soil is grayish-yellow sandy loam 6 or 8 inches thick, and the subsoil is reddish-yellow or yellowish-red friable clay which, in some places, is mottled red and yellow in the lower part. The depth to the underlying rock is almost everywhere less than in Appling sandy loam, and in many places the rock lies near the surface or outcrops. There are large granite boulders on the surface in many places, in addition to many smaller granite fragments, and in some places white quartz stones are scattered over the surface. Included with mapped areas of this soil are some areas of coarse sandy loam and fine gravel, also a few bodies having a yellow friable subsoil.

This steep phase of Appling stony sandy loam occurs in the northeastern and southeastern parts of the county. It is not an extensive soil. The largest areas are on Edwards Mountain, on Oaky Mountain, north of Baldwins Bridge, north of Bynum, and in the southeastern part of the county near Corinth.

Practically all of the land is covered with second-growth pine and oak, as nearly all the original timber has been cut. A few attempts have been made to farm some of the smoothest areas, but these have been abandoned. This soil, on account of its stoniness and steep relief, probably is best adapted to forestry.

White Store fine sandy loam, eroded phase.—The eroded phase of White Store fine sandy loam consists of small areas of White Store fine sandy loam, Penn silt loam, and Granville fine sandy loam, which are so intricately associated that it is not feasible to show them as separate soil types or phases on the map. The surface soil consists of a layer of grayish-yellow, brownish-yellow, brownish-red, or dull-red sandy loam or fine sandy loam ranging in thickness from 2 to 6 inches. In many places all the fine sandy loam surface soil has been washed off. The subsoil is brownish-red, dull-red, or purplish-red heavy tough plastic clay which in the lower part is mottled light gray, yellow, dull red, and purple. At a depth rang-

ing from 18 to 34 inches this mottled material is underlain by soft purplish-red or Indian-red shale or sandstone material. Internal drainage of the subsoil is poor, owing to the heavy plastic clay.

This soil occurs in the eastern and southern parts of the county, in close association with typical White Store fine sandy loam. In the southern part the areas lie mainly west and north of Gulf, and in the eastern part they occupy a broad belt extending entirely across the county. In a few places the relief is comparatively smooth, that is, undulating or gently rolling, but the greater part of this soil occupies positions on the steeper slopes and near the small streams.

Only about 5 percent of the land is cleared and used for the production of crops, and the rest is covered with second-growth trees, dominantly loblolly pine. On the few farmed areas corn is the principal crop, and some cotton, wheat, and oats are grown. Yields are slightly less than those obtained on typical White Store fine sandy loam.

Much of this eroded soil formerly was cultivated, allowed to wash and gully, finally abandoned, and later reseeded to loblolly pine. Some of the smoothest areas, if properly handled, can be farmed, but the greater part of the land should be used for forestry.

Wehadkee silt loam.—The 6- to 8-inch surface soil of Wehadkee silt loam is gray or grayish-brown mellow silt loam. The subsoil is mottled gray, brownish-yellow, and brown friable silty clay to a depth of 30 or 32 inches, where the brown color becomes more pronounced and the soil slightly more friable. Included with this soil as mapped are a few small bodies of very fine sandy loam and also small areas of heavier silty clay loam.

This is a fairly extensive soil which occurs mainly in the northeastern and eastern parts of the county. It occupies the first bottoms along streams and is derived from alluvium. The areas range from a few feet to about 1 mile in width, the widest occurring along New Hope River and Morgan, Northeast, Whiteoak, and Beaver Creeks. Narrower areas are along the small streams in the southeastern, southern, and western parts of the county. Owing to its low, flat position along streams and to the meandering and somewhat choked stream channels, this soil is subject to frequent overflow from high water. Both surface and internal drainage are poor.

A small acreage is farmed, and the principal crops grown are corn, hay, and oats, which give fair yields. More of the land formerly was used for crops, but, as the ditches and creek channels became clogged with logs and sediments, the land was abandoned because of poor drainage. The uncleared land supports a growth of black gum, birch, beech, ironwood, and slash pine. A large part of the land is used as summer pasture for cattle. If properly drained and limed, this soil would produce good yields of corn and hay. Good drainage, however, would probably require the deepening and widening of the creek channels throughout their extent.

Alluvial soils, undifferentiated.—The undifferentiated alluvial soils include intricately mixed materials which differ greatly in color, texture, and structure, and they cannot be separated into definite soil types. The soil materials are deposits of alluvium, together with some colluvial wash from the adjoining uplands. In places the surface soil is brown, reddish-brown, or light-brown silt loam which, at a

depth of a few inches, is mottled with yellow or gray. In some places layers of sand or gravel are in the subsoil, and in other places there are layers of dark bluish-gray clay. In the eastern part of the county, the surface soil in places is yellowish-gray sandy loam or fine sandy loam, and the subsoil is mottled yellow, brown, and gray sandy clay. In some of the areas which have a brown silt loam surface layer, there are sand bars.

These soils occur in comparatively narrow strips in the first bottoms along many of the small streams. The land lies only a few feet above the normal level of the streams and is subject to frequent overflow. At times of overflow new soil material is added. Most of the land is poorly drained, and some of it remains saturated during a part of the year.

Only a small proportion of the soil is used for crops, but a rather large acreage is devoted to summer pasture. Corn and hay are produced on small areas, and the yields are fair. Much of the land supports a growth of willow, birch, and ironwood, together with an undergrowth of alder bushes and bulrushes. If properly drained and limed, some areas of these soils would produce good yields of corn.

Orange silt loam.—The surface soil of Orange silt loam consists of a layer of pale-yellow or grayish-yellow smooth silt loam 8 or 10 inches thick, underlain by a yellow friable silty clay layer ranging from 6 to 10 inches in thickness. The material in this layer is similar to the subsoil of Alamance silt loam. The subsoil is composed of yellowish-brown or brown heavy plastic clay which in places shows faint spots of gray, rust brown, or bright red. The subsoil material, on exposure to air, becomes hard, and numerous cracks are formed in it. This layer is similar in many respects to the subsoil of Iredell loam. At a depth ranging from 24 to 28 inches the subsoil is underlain by mottled or streaked rust-brown, yellow, and light-gray soft decomposed rock. Internal drainage of this soil is poor.

Orange silt loam occurs in comparatively small scattered areas in the northern and central parts of the county. It occupies positions, mainly on interstream flats, in association with Alamance silt loam, but over some of it the relief is more sloping. The largest areas are west of Browns Chapel; north, west, and south of Silk Hope; northwest of Albrights Mill; and southwest of Pittsboro.

Owing to its nearly level relief and heavy almost impervious subsoil, this soil has poor drainage throughout. It is saturated with water during the greater part of the winter, and during dry seasons it becomes hard and dry. This is not an important agricultural soil, as only about 8 percent of the land is farmed. The rest is forested with post oak, blackjack oak, a few water oak, cedar, and pine trees. The main crops are corn, wheat, and oats, and cotton is grown on a small acreage. Corn yields from 8 to 15 bushels an acre, wheat 5 to 10 bushels, oats 15 to 20 bushels, and cotton one-fourth to one-half bale. The fertilizer treatment is about the same as for similar crops on Alamance silt loam. The greater part of this soil should be used for forestry.

Orange silt loam, gravelly phase.—Orange silt loam, gravelly phase, differs from typical Orange silt loam mainly in the texture of the surface soil and in the slightly more rolling relief. The surface

soil contains from 15 to 35 percent of brown smooth somewhat rounded slate fragments and a few quartz fragments, and in many places there are brown ironstone concretions. The gravel occur on the surface and to some extent are mixed with the soil. This soil is similar to Orange silt loam in color of the surface soil and in color and structure of the subsoil.

Orange silt loam, gravelly phase, is developed in comparatively small scattered areas in the northern and central parts of the county. The largest areas are northeast of Silk Hope and between Bonlee and Pittsboro.

About 10 percent of this gravelly land is used for crops, and the rest supports a growth of post oak and blackjack oak, together with a few water oak, cedar, and pine. The principal crops are corn, wheat, oats, and cotton. Yields are lower than for the same crops on Alamance gravelly silt loam, but the fertilizer treatment is practically the same. The best use for the greater part of this soil is for pasture and forestry.

Roanoke silt loam.—The 6- or 8-inch surface soil of Roanoke silt loam is light-gray silt loam containing faint mottlings of brown. The subsoil is mottled yellow, gray, and rust-brown tough somewhat plastic silty clay to a depth of 32 or more inches. Included with this soil as mapped are a few small areas having a very fine sandy loam texture and other small areas which have a heavy silty clay loam texture.

Roanoke silt loam occupies flat poorly drained areas on second bottoms, or terraces, and the soil material from which it is developed is alluvial in origin. This soil is developed in the eastern part of the county in small scattered bodies, mainly along New Hope River, and in small areas along Morgan and Whiteoak Creeks and Cape Fear River. The largest areas are in the vicinity of Seaforth and near Avents Bridge.

Owing to the rather poor drainage conditions, this soil is not farmed, but a few small areas are used for the production of hay. Some of the land is used for summer pasture. Most of it, however, is uncleared, and the timber growth on it includes water oak, black gum, and a few white oak, pine, and cedar trees. Its best use is for pasture and forestry.

Rough stony land.—Rough stony land represents areas of steep, broken, or blufflike land, mainly near streams. The surface of most of this land is covered, to greater or less extent, by many small rocks and, in places, large boulders or ledges of outcropping rock. The surface soil of the fine earth material is grayish-yellow or pale-yellow silt loam from 5 to 7 inches thick. It is underlain by a light-red or yellowish-red friable shallow silty clay subsoil, mainly of Herndon material. It many places the subsoil is poorly developed, and in some places it is lacking. In the latter areas bedrock lies immediately below the surface soil.

Rough stony land occurs only in the southern and eastern parts of the county. The largest areas are along Deep River and Rocky River near their confluence, and along Haw River south of Griffins Bridge. The land is not farmed. It is forested with second-growth oak and pine, and its best use is for forestry.

AGRICULTURAL METHODS AND MANAGEMENT

The capabilities of many soils in Chatham County have never been fully realized or appreciated by some of the landowners. The inherent qualities of many of the soils render them susceptible to a rather high state of improvement, and their productivity can be easily maintained through proper management, including in the rotation a leguminous crop. Thousands of acres of soil, which has steep relief or is shallow, should never have been cleared of the tree growth and allowed to wash and gully, thereby becoming unsuited or practically ruined for agricultural purposes. In some places the farmers have cultivated these rather steep hillsides and by proper use have prevented much erosion. They have been careful in plowing and cultivating along the contours, have seeded the land to grasses, and have practiced a rotation of crops that has kept the surface covered a large part of the time.

The so-called "red lands", comprising most of the soils of the Georgeville, Davidson, and Cecil series, are naturally strong soils well suited to the production of corn, oats, wheat, red clover, timothy, orchard grass, barley, soybeans, and alfalfa. The Davidson soils, particularly, are adapted to alfalfa. These soils are not so well suited to cotton under boll-weevil conditions, but are better adapted to grasses, clovers, and small grains and are, therefore, ideal for a dairy type of farming.

The light-colored sandy soils of the Durham, Appling, and Granville series are the best soils for the production of bright-leaf tobacco. These soils, when properly fertilized, also are suited to the growing of cotton. Alamance silt loam, Alamance gravelly silt loam, and Georgeville silt loam are the best soils for the production of lespedeza. Durham sandy loam and Granville sandy loam are well suited to the production of watermelons and sweetpotatoes. For growing dewberries and peaches on a commercial scale, Appling sandy loam, Appling stony sandy loam, Durham sandy loam, and Granville fine sandy loam are among the best soils in the Piedmont Plateau.

Dairying and cattle raising, although not extensively practiced in this county, are increasing and are carried on largely on the soils of the red-land group, mainly in the central and northern parts of the county in Center, Hickory Mountain, Albright, Hadley, and Baldwin Townships. There are more than 40 dairy farms in this section, from which whole milk and cream are sold on the markets of Durham, Greensboro, and Raleigh. Truck routes extend through these townships to collect the dairy products. The production of cream was started about 1917, and the first market was at Burlington. The sale of whole milk began about 1926 and has increased steadily. The prospects are of further expansion. Most of the dairy cattle are grade Jerseys, with some purebred animals, and others are grade Guernseys and grade Holstein-Friesians, together with a few purebred animals of these breeds. Only a few beef cattle are raised, mainly Aberdeen Angus and Shorthorn. Pastures in the dairy section are composed mostly of native grasses seeded with lespedeza. A few improved pastures are sown to bluegrass, ryegrass, and lespedeza. Much red clover, lespedeza, vetch, or alfalfa hay is produced for cattle feed,

and corn for silage is grown by many dairy farmers. In the dairy section the average farm has a herd of about six cows.

Except in the section where dairy cows are kept, only a small quantity of barnyard manure is available to be applied to the soils. Practically all of the soils are deficient in organic matter. Many farmers realize that this condition exists and are applying the little available barnyard manure and, in addition, are turning under leguminous crops, such as soybeans, cowpeas, and lespedeza. The addition of organic matter would reduce greatly the quantity of nitrogen needed, which must be supplied at present from a commercial source. The added organic matter, together with deeper plowing, would prevent to some extent sheet erosion and gullying of the soils, as it would enable them to take up and hold more of the rain water and produce more grass cover.

Terracing has been practiced by some farmers for a long time on practically all the more rolling cultivated land. This is very essential on the sandy soils, in order to prevent washing away of the sandy surface layers. On the clay loam soils it is necessary, not only to prevent damage to growing crops during heavy summer rains, but to prevent the complete washing away of the surface soils and the formation of gullies. The ridge type of terrace is used to a large extent on the more sloping areas, and on the less rolling fields the broad-based type is common. The gradual cutting back of gullies into cultivated fields is a serious menace to some of the sloping land now under cultivation. Gullying may be checked by piling brush, stones, stalks, or other trash in the channels, thereby creating small dams wherein the materials from the surface wash may accumulate.

Both shallow and deep plowing are practiced, depending on the character of the soil. The heavier surface soils require deeper plowing than the light-textured sandy soils. The red lands are, as a rule, broken as deeply as possible in the fall, then are allowed to freeze and thaw through the winter. The crops are planted in the spring. In places where small grain is to be sown, the land is broken in late summer or early fall, and the wheat is sown sometime between October and December. Most of the land for cotton and tobacco is broken in the spring, and a few farmers break it in the fall. The sandy soils are usually broken to a much slighter depth than the heavy red-land soils.

Leaching and erosion are the principal factors causing the loss of plant nutrients from the soils. Leaching is probably more destructive of plant nutrients in the light-colored sandy soils, although it occurs to some extent in the heavier red lands. The incorporation of organic matter in the soil by growing and turning under green-manure crops is important in checking soil leaching, and many farmers add organic matter by growing winter cover crops and by using crop rotations in which leguminous crops are turned back into the soil. In the control of erosion a large number of farmers are terracing their land, and others check erosion by deep plowing and by growing winter cover crops. The annual loss of plant nutrients from the soils in the Piedmont section, through leaching and erosion, is great.

Among the legumes used for soil improvement, lespedeza is probably better suited to the largest number of soils. Crimson clover, hairy vetch, cowpeas, soybeans, and red clover also are used as soil-

improvement crops. Experiments conducted with lespedeza by the North Carolina Agricultural Experiment Station in Stanly and Alamance Counties show a great increase in the yields of corn and of oat hay by turning under a crop of lespedeza. In Stanly County before turning under lespedeza on Alamance silt loam, corn yielded 26 bushels an acre, but when lespedeza was turned under, the yield was increased to 45.2 bushels. In Alamance County on Durham sandy loam, corn yielded 6.1 bushels an acre, but when lespedeza was plowed under, the crop yield was increased to 25 bushels. In Alamance County, oat hay on Durham sandy loam yielded 960 pounds an acre, but after turning under a crop of lespedeza, the yield was 3,520 pounds of oat hay.

Rotation of crops is practiced by some farmers, mostly in the grain belt, or red-land section, a 4-year rotation being the most common. Although not practiced to a great extent in this county, crop rotations are beneficial in maintaining the fertility of the soil. The North Carolina Agricultural Experiment Station conducted a field experiment in crop rotation for 9 years on Cecil clay loam which is an extensive red-land soil in the Piedmont section. This rotation is well suited to the heavy red soils in this county and is as follows: First year, corn, with cowpeas grown and plowed under for soil improvement; second year, wheat, red clover; third year, red clover, the second crop of which is plowed under for soil improvement. With this rotation and fertilization the increase in corn yields was 29.4 bushels and in wheat yields was 7 bushels.

For general farms the following 4-year rotation is suggested: First year, corn with soybeans for seed and turning under; second year, soybeans for hay, wheat or other small grain in the fall for grain or hay; third year, wheat or other small grain for grain or hay, red clover, sweetclover, or lespedeza drilled on the grain in March; fourth year, red clover, sweetclover, or lespedeza for hay, grazing, or turning under. A 3-year rotation for farms on which cotton is the predominant crop is as follows: First year, corn for grain, with soybeans for grazing, seed, and turning under; second year, cotton; third year, cotton. On farms where tobacco is the principal crop, the following 3-year rotation is suggested: First year, tobacco, with crimson clover or vetch in the fall for turning under, second year, corn for grain, wheat, oats, or Abruzzi rye in the fall; third year, wheat, oats, or Abruzzi rye for grain, Abruzzi rye in the fall for turning under. A 2-year rotation for such farms is as follows: First year, tobacco, Abruzzi rye in the fall for turning under; second year, Abruzzi rye for grain.

A winter hay crop, known as the Union County mixture, is recommended. The seeding consists of 2 bushels of oats, 1 bushel of barley, 1 peck of wheat, and 15 pounds of vetch or 20 pounds of Austrian Winter peas an acre.

The following grass mixture for permanent pasture on fertile sandy loam and clay loam soils with good drainage is recommended: Kentucky bluegrass, 3 pounds; redtop, 3 pounds; white clover, 2 pounds; orchard grass, 8 pounds; tall oatgrass, 4 pounds; alsike clover, 2 pounds; lespedeza, 8 pounds; a total of 30 pounds of seed an acre. For fertile sandy loam and clay loam soils which have only fair drainage the following pasture mixture is considered good:

Kentucky bluegrass, 3 pounds; redtop, 3 pounds; white clover, 2 pounds; orchard grass, 8 pounds; Dallis grass, 4 pounds; and lespedeza, 10 pounds; total, 30 pounds of seed an acre.

Crop varieties recommended for this county are as follows: Corn—Southern Beauty, Cocke Prolific, Weekly Improved, Biggs, Jarvis Golden Prolific, and Indian Chief; cotton—Mexican Big Boll and Cleveland Big Boll; soybeans (for seed and pasture)—Mammoth Yellow, Herman, and Tokyo; soybeans for hay—Laredo and Virginia; cowpeas—Brabham, Iron, Groit, Whippoorwill, and Black; velvetbeans—Early Speckled and Osceola; wheat—Fulcaster, Gleason, Purple Straw, and Leap Prolific; oats—Fulghum, Appler, and Lee; barley—Tennessee No. 6 and North Carolina; rye—Abruzzi; red clover—medium (middle-western grown) and sapling; sweetclover—biennial white and biennial yellow; lespedeza—Common, Kobe, Tennessee 76, and Korean; and alfalfa—Common (Kansas or Utah grown).

The soils of Chatham County range from slightly acid to strongly acid, and many farmers are using lime to correct this condition. The use of lime in moderate quantities for some crops is necessary for profitable results, as most legumes and tobacco require an application of lime when they are grown on soils which have not received an application of lime in some form for a few years. When used for tobacco, dolomitic limestone is recommended, provided the fertilizers used do not carry sufficient magnesia to meet the needs of the crop.

Field results in the Piedmont section have shown that the dominant types of soil, with the exception of Iredell loam, in general, are deficient in nitrogen and phosphoric acid. The soils of the Piedmont Plateau section generally contain fairly large quantities of potash, and in most areas this element is not needed in as large quantities in fertilizer mixtures as the other two ingredients.

The North Carolina Agricultural Experiment Station recommends the fertilizer mixtures given in table 4 for crops on the different soils in Chatham County. The recommendations are based on carefully conducted field experiments.

TABLE 4.—*Recommendations for the use of fertilizers for the principal crops on soils in Chatham County, N. C.*

Soil	Fertilizers [1] recommended for—						
	Corn	Cotton	Small grains	Tobacco	Legumes	Sweetpotatoes	Soybeans
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Georgeville	300 of 4-10-4	600 of 4-10-4	300 of 4-10-4				
Cecil	do	do	do				
Wadesboro	do	do	do				
Wickham	300 of 4-8-4	600 of 4-8-4	300 of 4-8-4				300 of 2-8-4.
Altavista	do	do	do				Do.
Roanoke	do	do	do				Do.
Congaree	300 to 400 of 4-10-4	600 of 4-10-4	300 of 4-10-4				
Wehadkee	do		do				300 of 2-10-4.
Appling	300 of 4-10-4 and side dressing of 75 to 100 of nitrate of soda.	600 of 4-10-4 and side dressing of 75 to 100 of nitrate of soda.	300 of 4-10-4 and side dressing of 75 to 100 of nitrate of soda.	1,000 of 3-8-6	300 of 2-10-4		
Durham	do	do	do	do	do	750 of 3-8-8	
Alamance	do	do	do	do	do	do	
Granville	do	do	do	do	do	do	
White Store	do	do	do	do	do	do	
Iredell	do	do	do		do		
Herndon				1,000 of 3-8-6	do		
Davidson				do	do		

[1] Quantities given are acre applications.

MORPHOLOGY AND GENESIS OF SOILS

Chatham County lies entirely within the Piedmont Plateau, a physiographic region which extends from New Jersey to Alabama. The land ranges from about 185 to about 587 feet above sea level. The relief is prevailingly rolling, and, because of this feature, the porosity of the soil, and the friable consistence of the lower soil strata, both surface and internal drainage are well established.

This county lies in the Red and Yellow soils region of the United States. The soils are dominantly light in color, ranging from light gray and grayish yellow to reddish brown and red. Some of them show evidence of laterization. The soils have developed under forest cover, heavy rainfall, and warm temperature. Therefore conditions have not been favorable for the accumulation of large quantities of organic matter, as in the grass-covered sections of the country. In forested areas, a thin layer of leafmold covers the surface and a small quantity of organic matter is mixed with the topmost inch or two of the surface soil, but after the land is cleared of trees, this thin layer of organic matter is soon lost through cultivation.

In this area of rather heavy rainfall and warm temperature, active leaching of the soil continues throughout the greater part of the year, as the ground is not frozen to so great a depth or for so long a period as it is in latitudes farther north. Because of the leaching out of soluble plant nutrients from the surface soils, they do not contain so large a quantity of these elements as the subsoils. Much of the land is bare during the winter and is used largely for clean-cultivated crops during the summer. Thus, leaching is accelerated. Another general characteristic of the soils is the absence of free carbonates. On account of the process of leaching, free carbonate of lime has not accumulated in the soils, although calcium is present in the mineral components of many of the underlying rocks. The soils throughout the county range from slightly acid to strongly acid. Table 5 gives the results of pH determinations on several soils from this county.

TABLE 5.—*pH determinations of several soil profiles from Chatham County, N. C.*[1]

Soil type and sample no.	Depth	pH	Soil type and sample no	Depth	pH
Georgeville silt loam:	*Inches*		Goldston gravelly silt loam:	*Inches*	
238401	0 - ½	5.0	238423	0 - 1	5.8
238402	½- 7	5.4	238424	1 - 8	5.7
238403	7 -12	5.0	238425	8 -12	5.7
238404	12 -30	5.3	238426	12 -27	6.5
238405	30 -45	5.3	238427	27 -34	7.6
238406	45+	5.3	238428	34+	7.7
Davidson clay loam:			Wadesboro fine sandy loam:		
238412	0 - ½	6.5	238429	0 - ½	5.5
238413	½- 7	5.7	238430	½- 7	5.1
238414	7 -45	5.4	238431	7 -11	5.0
238415	45 -60	5.1	238432	11 -30	5.1
238416	60 -75	5.3	238433	30 -45	5.2
238417	75+	5.3	238434	45+	5.5
Alamance silt loam:			White Store sandy loam:		
238452	0 - ½	4.5	238471	0 - 1	6.2
238453	½- 8	4.5	238472	1 -10	6.2
238454	8 -26	4.6	238473	10 -18	6.3
238455	26 -35	4.8	238474	18 -40	5.9
238456	35+	5.3	238475	40+	5.4
Granville fine sandy loam:			Orange silt loam:		
238462	0 - 1	4.6	238476	0 - ½	4.8
238463	1 -10	5.0	238477	½-10	4.8
238464	10 -32	5.1	238478	10 -18	5.1
238465	32+	5.3	238479	18 -26	4.6
			238480	26+	5.0

[1] Determinations made by the hydrogen-electrode method in the laboratories of the Bureau of Chemistry and Soils, by E. H. Bailey.

On account of the influence of relief and the action of rainfall, changes are evident in many of the soils. Through erosion and gullying, not only have the surface features been changed but also the texture of the surface soil. In places the sandy surface mantle has been reduced in thickness and the silty surface soil has been almost entirely removed, leaving the red heavy subsoil exposed. The effects of erosion, as a result of unwise use of the land by man, are especially noticeable in areas of the Georgeville, Appling, Goldston, White Store, and Wadesboro soils.

The rock formations underlying the soils consist of slate and other fine-grained rocks, probably of volcanic origin, granite, diorite, sandstone, shale, and mudstone. Bedrock lies at a depth ranging from a few feet to more than 20 feet below the surface, but the disintegrated rock material in most places ranges from 4 to 10 feet below the surface. This soft decomposed rock material underlies the heavy subsoil layer, or B horizon, and has no uniformity in color, texture, or structure. The texture of the A horizons ranges from light sandy loam and fine sandy loam to silt loam, silty clay loam, and clay loam. The light sandy loams and fine sandy loams have their greatest development in the southeastern and eastern parts of the county. Rock fragments and boulders are on the surface in places, particularly in the northeastern part, and large areas of gravelly soil occur in the southern and southwestern parts.

The most noticeable feature of the texture profile of the well-developed, or normal, soils is the presence in most of them of a comparatively coarse textured eluviated surface layer, or A horizon, which is underlain by a finer textured, uniformly colored, and well-oxidized illuviated layer, or B horizon. This is underlain by a still lower layer, or C horizon, which may vary somewhat in texture but is prevailingly coarser than the second layer, or B horizon. In some places it is finer than the surface layer, or A horizon. The textures of these three layers differ greatly in the different soils. The A horizon ranges from sandy loam and gravelly sandy loam to silty clay loam and clay loam, the B horizon is composed of friable or heavy clays, and the C horizon consists of partly decomposed or disintegrated rock material which has no definite structure and is variable in color and texture. The thickness of the different layers is variable, the A horizon ranging from about 5 inches to about 15 inches, the B horizon from about 2 feet to more than 6 feet, and the C horizon from a few inches to several feet.

In this county a direct relationship exists between the various soil profiles and the weathered rock material. With the exception of the soils developed from alluvium, all the soils have been formed, through the soil-forming processes, directly from the weathered products of the underlying rock formations. Through the disintegration and decay of the rocks and through subsequent action of leaching, concentration, and various degrees of oxidation, the material has, in the course of time, been altered into soils differing in texture, color, and structure. The thickness of the B horizons, or zone of concentration of alumina and iron, ranges from 2 to more than 6 feet in the normal soils; and the color and structure are uniform, indicating that the normally developed soils are very old.

On the bases of common origin, color, structure, relief, and drainage conditions, the soils are grouped into series. The soil types are

differentiated on the basis of texture, or the percentages of sand, silt, and clay in the surface soil.

The Carolina slate belt, which is composed of slate and other fine- and coarse-grained rocks, occurs throughout the central, northern, and western parts of the county. From the weathered products of this formation soils of the Georgeville, Alamance, Herndon, Goldston, and Orange series have developed. These soils are dominantly silty in the A horizon. In the northeastern part of the county is a comparatively large area of granite and in the extreme southeastern corner a smaller area composed mainly of granite. Soils of the Appling, Durham, Cecil, and Helena series have been formed in a similar manner from this rock. In the southeastern and eastern parts are large areas of Triassic sandstone, shale, and mudstone, from which soils of the Wadesboro, Granville, White Store, and Penn series have developed. Dark-colored basic igneous rocks, mainly diorite and gabbro, occur as intrusions, mainly in the central part of the county in the slate belt. The weathered products of these rocks have, through the soil-building processes, given rise to soils of the Davidson and Iredell series.

The Georgeville soils have a grayish-yellow eluviated A horizon, a red heavy stiff but brittle silty clay illuviated B horizon, and a soft somewhat mottled or streaked decomposed rock material C horizon. As these soils are derived from slate, they contain a high percentage of silt throughout the profile and have a slick smooth feel. Davidson clay loam has a more deeply weathered solum than any other soil in the county, and it is also the most completely oxidized. The development of the A horizon in the Cecil soils is similar to that in the Georgeville soils, but the solum of the Cecil soils is thicker, deeper red, and characterized by the presence of angular quartz sand and small mica scales. The Wadesboro soils are characterized by a red or brownish-red friable B horizon containing some quartz sand. The B horizon of the Penn soils is purplish red or Indian red, resembling the color of the shale or mudstone from which the soil material is derived. The color in the A horizon is darker than in the same horizon of Georgeville silt loam, but, as in the Georgeville soil, it contains a large quantity of silt. The Wickham soils, developed from deposits of alluvium and occurring on the second bottoms, have red or brownish-red fairly well oxidized B horizons.

The soils having a light color profile are members of the Appling, Durham, Granville, Alamance, Herndon, and Altavista series. These soils differ from the red soils, in that they have reddish-yellow or yellow B horizons. The A horizons are light textured and are light gray or grayish yellow. The C horizons are mottled or streaked yellow, gray, and red friable soil material. The B horizons of the Appling and Herndon soils are reddish yellow or mottled red and yellow and of the Durham, Alamance, Granville, and Altavista soils are yellow. The Altavista soils are developed on second bottoms, or terraces, from deposits of alluvium.

A group of soils which, on the basis of normal profile development, may be considered young soils have a large combined area. To this group belong the soils of the White Store, Orange, Goldston, Iredell, and Helena series. The White Store soils are derived from Triassic sandstone and shale. The A horizon is grayish yellow and friable, similar to that of the Granville soils, but the B horizon is

heavy and plastic mottled clay. The Orange soils are derived from slates and dark-colored fine-grained rocks occurring with the slates. The A horizon of soils of this series resembles the A horizon of the Alamance soils, but the B horizon is heavy plastic tough clay resembling in many respects the B horizon of the Iredell soils. Soils of the Goldston series are derived from slate and coarser grained and darker colored rock in the slate belt, and they represent an intermediate development between the Orange soils and the Georgeville soils. The B horizon is brownish-red or reddish-brown somewhat friable clay. The Iredell soils have a gray or brownish-gray A horizon, a brownish-yellow extremely heavy plastic clay B horizon, and a C horizon composed of soft greenish-yellow decayed diorite rock. The Helena soils are similar to the Appling or Durham soils in the A horizon, but the B horizon is decidedly heavier and mottled.

Another group of soils includes those soils which have been restricted in the normal development of a profile by unfavorable relief or other factors. Included in this group are Georgeville stony silt loam; Herndon silt loam, stony phase; Appling stony sandy loam, steep phase; White Store fine sandy loam, eroded phase; Cecil clay loam, steep phase; Davidson clay loam, hilly phase; and rough stony land. In these soils, because of steep relief, the B horizon is shallow or poorly developed, and in many places, through erosion, the A horizon has been considerably altered or practically removed.

The Roanoke, Congaree, and Wehadkee soils, and alluvial soils, undifferentiated, have been formed from deposits of alluvium—the Congaree, Wehadkee, and alluvial soils, undifferentiated, on first bottoms, and the Roanoke soils on second bottoms. The soil material has been washed from the uplands and deposited in times of overflow. That of the first bottoms is recent, so far as age is concerned, and new material is being added to most of these soils from time to time. The soils are poorly drained, and because of the recent age of the material and inadequate drainage, definite profiles have not developed.

Descriptions of profiles of several soil types will illustrate the color and structural differences in some of the normally developed soils. Following is a description of a profile of Georgeville silt loam, as observed 1 mile south of Griffins Crossroads:

A_1. 0 to ½ inch, gray silt loam containing a small quantity of organic matter and having a thin veneer of leafmold.

A_2. ½ inch to 7 inches, dull-yellow or grayish-yellow smooth silt loam of single-grained structure.

A_3. 7 to 12 inches, reddish-yellow friable silty clay loam. This is an intergrade layer between the A and B horizons.

B_1. 12 to 30 inches, red rather heavy stiff but brittle smooth silty clay which breaks into large angular lumps that crumble fairly easily into small angular particles. The color of a cut surface is lighter than that of a broken surface. Fine roots of plants extend into this layer.

B_2. 30 to 45 inches, light-red friable silty clay which crumbles easily into a mealy mass. The material is lighter in color and structure than in the B_1 horizon. A few fine plant roots extend into this layer.

C. 45 inches +, mingled brown, yellow, and light-gray soft smooth decayed fine-grained Carolina slate.

Following is a description of a profile of Davidson clay loam, as observed three-fourths of a mile east of Silk Hope:

A_1. 0 to ½ inch, brown loam containing a small quantity of organic matter and small roots, overlain by a thin layer of dark-gray or brown leafmold.

A_2. ½ inch to 7 inches, dark-brown or reddish-brown rather heavy loam or clay loam containing some well-decomposed organic matter.

B_1. 7 to 45 inches, dark-red or maroon heavy stiff but brittle smooth clay containing a few small black manganese concretions which effervesce with a weak solution of hydrogen peroxide. A cut surface is lighter in color than a broken surface. The soil breaks into large angular pieces which readily break into small angular particles. Vertical cracks form in exposures in road cuts. On the exposed cuts rounded particles are formed, and this fine material rolls down the banks. Small roots of plants extend into this layer.

B_2. 45 to 60 inches, red friable clay containing a few black mineral particles. The material in this layer is lighter in color and structure than that in the B_1 horizon.

C_1. 60 to 75 inches, red friable clay containing mottlings or streaks of ocherous yellow and some spots of white material. This is the first stage of soil development above the decomposed rock material.

C_2. 75 inches +, mingled dark-red, yellowish-brown, and ocherous-yellow soft friable decayed basic rock material.

A profile of Appling sandy loam, as observed 1 mile east of Manns Chapel, shows the following horizons:

A_1. 0 to 1 inch, gray sandy loam or loamy sand containing a small quantity of organic matter from decayed leaves.

A_2. 1 inch to 8 inches, grayish-yellow mellow and friable light sandy loam.

A_3. 8 to 15 inches, slightly brownish yellow friable sandy clay which is intergrade material between the A and B horizons.

B_1. 15 to 26 inches, brownish-yellow rather stiff but brittle clay. This material breaks into large angular lumps which crumble readily into small angular soil particles.

B_2. 26 to 45 inches, mottled yellow, red, and yellowish-brown friable clay which is more friable than the material of the B_1 horizon.

C. 45 inches +, mottled red, yellow, and gray soft decomposed granitic material.

Following is a description of a profile of Granville fine sandy loam, as observed 1½ miles northeast of Brickhaven:

A_1. 0 to 1 inch, light-gray fine sandy loam containing a small quantity of organic matter derived from decayed leaves.

A_2. 1 inch to 10 inches, slightly grayish yellow friable mellow fine sandy loam or loamy fine sand.

B. 10 to 32 inches, yellow friable fine sandy clay which is easily crushed into a soft mealy mass having no definite structure.

C. 32 inches +, mottled brownish-yellow, gray, and bright-red or Indian-red friable but slightly plastic soil material overlying and grading rather quickly into the light-colored or purple sandstone.

Following is a description of a profile of Goldston gravelly silt loam, as observed 3 miles south of Pittsboro:

A_1. 0 to 1 inch, brown silt loam containing a small quantity of organic matter.

A_2. 1 to 8 inches, brownish-gray mellow smooth silt loam containing some flat smooth and angular brown fragments of the parent rock.

A_3. 8 to 12 inches, yellowish-brown friable silty clay loam.

B_1. 12 to 27 inches, yellowish-brown or reddish-brown, faintly mottled with rust brown, gray, and red, friable slightly plastic silty clay. This material breaks into rather large angular blocks having a brown coating along cleavage planes. The blocks when broken show the faint mottlings. A cut surface is lighter in color than the broken surface. Small plant roots extend into this layer.

B_2. 27 to 34 inches, yellow, mottled with brownish-yellow, red, and gray, friable silty clay which is lighter in color and structure than the B_1 horizon.

C. 34 inches +, brownish-yellow or grayish-brown friable soft decomposed slate or rock of volcanic origin, containing spots of red and gray and specks of black mineral matter.

○

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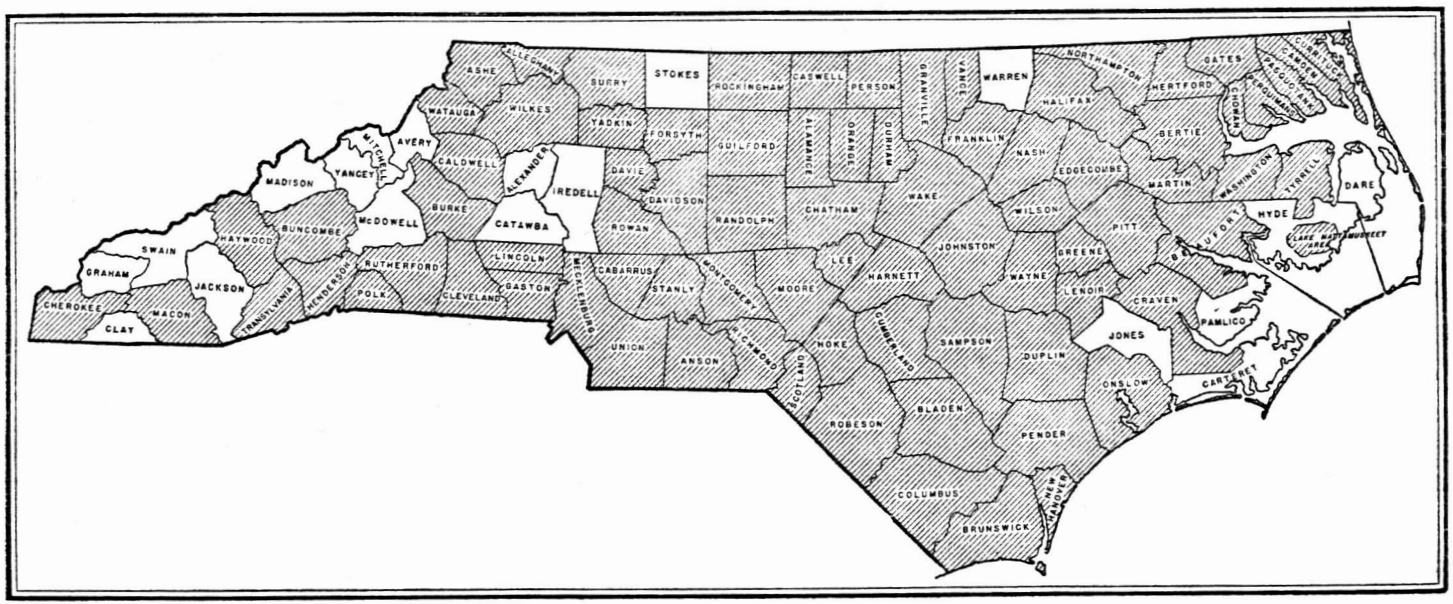
There shall be printed, as soon as the manuscript can be prepared with the necessary maps and illustrations to accompany it, a report on each soil area surveyed by the Bureau of Chemistry and Soils, Department of Agriculture, in the form of advance sheets bound in paper covers, of which not more than two hundred and fifty copies shall be for the use of each Senator from the State and not more than one thousand copies for the use of each Representative for the congressional district or districts in which a survey is made, the actual number to be determined on inquiry by the Secretary of Agriculture made to the aforesaid Senators and Representatives, and as many copies for the use of the Department of Agriculture as in the judgment of the Secretary of Agriculture are deemed necessary.



Areas surveyed in North Carolina, shown by shading. Detailed surveys shown by northeast-southwest hatching.

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