

UNITED STATES DEPARTMENT OF AGRICULTURE

Soil Survey
of
**Montgomery County, North
Carolina**

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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 MONTGOMERY COUNTY, NORTH CAROLINA

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

COUNTY SURVEYED

Montgomery County is in the south-central part of North Carolina. (Fig. 1). The western boundary is about 50 miles from Charlotte, and the southern boundary is about 25 miles from the South Carolina State line. The county is irregular in shape, the boundaries being formed in part by streams and roads. It includes an area of 488 square miles, or 312,320 acres.

In general, the surface relief is that of a plateau which has been dissected by the valleys of numerous streams. The resultant land relief is varied and ranges from low mountains to comparatively broad smooth interstream country. However, the greater part is gently rolling or rolling, becoming strongly rolling and, in places, steep near the stream courses. On the tops of interstream divides, most of the land surface is smooth or gently rolling, but very few such areas are wide. The surface configuration of the first and second bottoms, which occur along some of the streams, is level or gently undulating, and the areas range in width from a few feet to about one half mile.

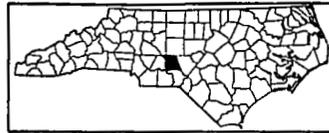


FIGURE 1.—Sketch map showing location of Montgomery County, N. C.

The mountains occur mainly in the western and northwestern parts. They rise several hundred feet above the general level of the surrounding land and consist chiefly of sharp-topped peaks, narrow ridge crests, and steep slopes. The smooth interstream country is in the eastern part and, to less extent, in the southwestern part. A comparatively broad ridge begins in the northeastern corner and extends southward through Biscoe to Candor where one arm turns eastward into Moore County and the other continues southward into Richmond County. Other comparatively smooth country occurs in the southwestern part in the vicinity of Mount Gilead. In many places along the rivers and creeks the slopes are steep, but in other places they are gentle.

The elevation above sea level at Star, in the northeastern part of the county, is 625 feet and at Troy, in the central part, 626 feet. The drainage system indicates that the general slope is southward.

Owing to the character of the surface relief, the uplands are well or excessively drained, and erosion on many of the steeper slopes is actively wearing away the land. On the uplands a few nearly flat areas have comparatively poor drainage, owing partly to soil conditions, and in the low places on the first bottoms drainage is not very well established.

Three rivers cross the county, Yadkin and Pee Dee¹ Rivers on the western boundary, Uharie River in the northwestern part, and Little River through the central part. Numerous creeks, branches, and intermittent drainage ways connect with the main streams, and every farm is drained by one or more of these smaller streams.

All the streams have cut comparatively deep, narrow valleys. They have not reached base level but are still deepening their channels. Yadkin and Pee Dee Rivers are used for the generation of hydroelectric power. A large power reservoir is on Yadkin River in the northwestern part of the county, and another is on Pee Dee River in the southwestern corner. The electricity generated at these places is transmitted to many points in the State. Several dams are in Little River, some of which are used to develop electricity. Thus far, Uharie River has not been utilized for the development of water power or hydroelectric power, although it is possible to develop power from this stream.

A large part of the county is covered with forest. Most of the forested territory is cut-over land or abandoned fields. The cut-over land supports a second growth of blackjack, white, red, and post oaks and shortleaf and longleaf pines. The old fields have grown up to second-growth pine. Formerly the southeastern part was covered with a virgin growth of longleaf pine, but the present tree growth consists of scattered longleaf and shortleaf pines; also scrub and blackjack oaks. In most places there is an undergrowth of wire grass. The original longleaf-pine forest extended from the southeastern part into the central part near the headwaters of Rock Creek, but it occurred in scattered areas on the ridges in association with shortleaf pine and was not predominant. At present, pine predominates in the extreme southern part; both pine and oak grow in the central part; and oaks predominate in the western, northwestern, and northern parts. The undergrowth includes small oaks and pines, dogwood, sweetgum, and holly. Laurel grows in some places on the slopes in the northern part.

Montgomery County was formed from Anson County in 1778. The early settlers were of Scotch, English, and Welsh descent, and the present population is comprised of their descendants and others who have entered from adjoining counties or other parts of the State. A fairly large colored population is in the southern and southeastern parts. According to the 1930 census, the total population is 16,218, all of which is classed as rural. Of the population, 9,802 are classed as rural farm and 6,416 as rural nonfarm. The population includes 3,730 negroes and 12 foreign-born white persons. The average number of people to the square mile is 32.6, but the population is not uniformly distributed, as large areas are sparsely populated. The more thickly populated sections are in the southwestern, southeastern, eastern, and northeastern parts.

Troy is the county seat and the largest town, with a population of 1,522. A cotton mill, rug mill, and several lumber plants are located here. Other towns are Mount Gilead, Biscoe, Star, Capelsie, and Candor. Cotton mills are located at Biscoe and Capelsie and lumber plants at Mount Gilead and Star. Candor is situated near the peach-

¹The same stream, but the name changes at the mouth of Uharie River.

growing section of the county All these towns serve as local trading centers for the rural communities.

Railroad facilities are adequate, as practically all parts of the county are within 12 miles of a railroad station Lines of the Norfolk Southern Railroad cross the eastern, central, and southwestern parts, and the Winston-Salem Southbound Railway crosses the extreme northwestern part

State highways, most of which are hard surfaced, extend from Troy to the county seats of adjoining counties, and Montgomery County maintains a good system of topsoil and gravel roads which extend to all the rural sections Passenger bus lines are operated from Raleigh to Charlotte through Troy and from Greensboro to Fayetteville through Biscoe

Churches and schoolhouses are located at convenient places. Many of the schools are of the consolidated type, and the buildings are of modern brick or frame construction. Rural free-delivery mail routes serve parts of the county, and telephone lines extend to some sections

The principal markets for peaches are New York, Philadelphia, and Boston, and some of the peach crop is sold at markets within the State. Tobacco is marketed at Winston-Salem and Carthage; cotton is sold locally or at buying centers in adjoining counties; watermelons are shipped to northern markets or to points in Virginia and in the State; and vetch seed is disposed of at points in the State, mainly within the peach-growing belt.

CLIMATE

The climate of Montgomery County is oceanic The difference between the summer and winter mean temperatures is 34.3°. In winter the ground is frozen to a comparatively slight depth and for only short periods. The climate is sufficiently mild for the production of winter cover crops and hardy vegetables and peaches are ready for market in the early part of the summer Outdoor work can be performed during most of the winter but short periods occur when the weather is too severe for such work. The average frost-free season is 195 days, from April 13 to October 25, inclusive, and this is sufficient time for maturing the crops commonly grown. Killing frost has been recorded as late as April 27 and as early as October 9

The rainfall is ample and well distributed, the heaviest rainfall occurring in the spring and summer and the lightest in the fall The average annual snowfall is 6.7 inches. The snows are, in general, light and remain on the ground only a short time.

Owing to the comparatively high elevation and rolling surface relief, the climate is healthful In most places a dependable supply of good drinking water can be obtained either from wells or springs.

Table 1, compiled from records of the Weather Bureau station at Albemarle, Stanly County, gives the normal monthly, seasonal, and annual temperature and precipitation at that station. Albemarle is 700 feet above sea level and is located about 12 miles west of the boundary of Montgomery County, but the data obtained from that station are considered representative of climatic conditions in Montgomery County.

TABLE 1.—Normal monthly, seasonal, and annual temperature and precipitation at Albemarle, Stanly County, N.C.

[Elevation, 700 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1925)	Total amount for the wettest year (1922)	Snow, average depth
	°F	°F	°F	Inches	Inches	Inches	Inches
December.....	43 3	76	2	3 88	2 50	3 85	1 2
January.....	42 1	76	-2	4 26	6 16	4 95	2 0
February.....	43 1	78	6	4 14	2 06	7 21	2 0
Winter.....	42.8	78	-2	12.28	10 72	16 01	5.2
March.....	51 1	88	12	4 87	2 95	8 14	1 0
April.....	59 3	95	23	4 27	2 56	5 21	5
May.....	67 7	101	33	3 65	2 65	3 91	0
Spring.....	69 4	101	12	12 29	8 16	17 26	1.5
June.....	75 4	101	45	4 86	3 21	4 29	0
July.....	78.3	104	48	5 24	59	5 94	.0
August.....	77 6	104	50	5 37	2.20	7 01	0
Summer.....	77 1	104	45	15 47	6 00	17 24	0
September.....	72 0	101	36	3 77	40	3 00	0
October.....	62 0	98	23	2 47	2 57	4 42	0
November.....	49 7	82	12	2.65	3 66	.86	(¹)
Fall.....	61 2	101	12	8.79	6 53	8 28	(¹)
Year.....	60 1	104	-2	48.83	31 41	58 79	6 7

¹ Trace.

AGRICULTURAL HISTORY AND STATISTICS

Agriculture had its beginning in the territory now included in Montgomery County several years prior to the Revolutionary War. The early agriculture consisted of the growing of corn, wheat, flax, vegetables, and fruits, and the raising of sheep, hogs, and cattle. Tobacco was grown mainly for home use, but some was rolled in hogsheads to Fayetteville for market. Cotton was introduced many years before the Civil War and the first cotton mill was erected between 1840 and 1850. The southeastern part of the county was formerly covered with longleaf pine and between 1890 and 1898 the turpentine industry was important. As soon as the turpentine was exhausted, the pine timber was cut for lumber. In 1903, following the cutting of the timber, the first successful commercial peach orchard was established near Candor, and from this start the peach-growing industry expanded and peaches became very important as a special crop.

Over the timbered areas in the rest of the county the lumber industry in hardwoods and shortleaf pine has continued important from about 1898 until the present, but in recent years it has been on a smaller scale than formerly. Between 1860 and 1890 many plantations in the southern part of the county were abandoned and these have been a source of second-growth pine timber for the last several years.

During the period of lumbering, agricultural progress was somewhat retarded, but since the decline of the lumber industry more attention is being given to the development of farming.

In table 2, compiled from United States census data, are given the acreage and yield of the important crops grown in Montgomery County in the decades from 1879 to 1929, inclusive.

TABLE 2.—Acreage and yield of the principal crops in Montgomery County, N C, in stated years

Crop	1879		1889		1899	
	<i>Acres</i>	<i>Bushels</i>	<i>Acres</i>	<i>Bushels</i>	<i>Acres</i>	<i>Bushels</i>
Corn.....	18,090	210,521	15,856	162,131	17,214	218,050
Wheat.....	9,197	39,702	10,203	51,435	9,294	44,910
Oats.....	7,852	60,248	7,562	51,273	3,407	28,270
Cotton.....	6,519	<i>Bales</i> 2,989	7,811	<i>Bales</i> 1,468	8,475	<i>Bales</i> 3,303
Hay and forage.....	1355	<i>Tons</i> 1296	1615	<i>Tons</i> 1752	1,397	<i>Tons</i> 1,624
Tobacco.....	54	<i>Pounds</i> 14,370	4	<i>Pounds</i> 1,635	30	<i>Pounds</i> 13,770
Peaches.....		<i>Trees</i> <i>Bushels</i>	22,379	<i>Bushels</i> 33,318	32,152	<i>Bushels</i> 256

Crop	1909		1919		1929	
	<i>Acres</i>	<i>Bushels</i>	<i>Acres</i>	<i>Bushels</i>	<i>Acres</i>	<i>Bushels</i>
Corn.....	14,872	197,502	14,821	239,399	110,677	1168,781
Wheat.....	6,357	37,096	8,902	62,018	5,059	42,057
Oats.....	3,434	36,067	1,541	18,049	1,029	18,916
Cotton.....	8,224	<i>Bales</i> 3,726	9,103	<i>Bales</i> 5,093	11,660	<i>Bales</i> 4,435
Hay and forage.....	2,227	<i>Tons</i> 1,895	3,607	<i>Tons</i> 2,883	1,425	<i>Tons</i> 1,469
Tobacco.....	3	<i>Pounds</i> 1,748	260	<i>Pounds</i> 132,909	586	<i>Pounds</i> 402,172
Peaches.....		<i>Trees</i> <i>Bushels</i>	41,625	<i>Bushels</i> 10,429	181,539	<i>Bushels</i> 187,643

¹ In addition to corn harvested for grain, that from 58 acres was cut for silage, from 335 acres was cut for fodder, and from 17 acres was hogged off

² Hay only

The 1929 corn acreage shows considerable decrease from that of 1879, but there was only a slight decrease in yield, and the decrease in the oat acreage is very decided. The acreage in wheat in 1929 was the smallest reported by the census, but the cotton acreage increased about 50 percent between 1879 and 1929. The tobacco acreage has very markedly increased.

Commercial fertilizer is used on nearly all farms. According to the 1930 census, 1,265 farms, of a total of 1,474, reported the use of fertilizer, including commercial fertilizer, manure, marl, lime, and ground limestone, at a cost of \$179,346. The same census reports that 5,506 tons of commercial fertilizer were bought by the farmers. About 95 percent of the fertilizer is ready mixed and ranges from low to high grades, the higher grades being in more general use. Most of the home-mixed fertilizer is of fairly high grade. Most of the ready-mixed fertilizer consists of mixtures analyzing 2:8:2,² 3:8:3,

² Percentages, respectively, of nitrogen, phosphoric acid, and potash

4:8:4, 4:9:5, 5:7:5, 6:12:6, 4:8:6, 5:9:5, 4:10:4, 4:15:4, and 5:15:5. In addition to the ready-mixed fertilizer, some farmers apply nitrate of soda as a side or top dressing. Superphosphate (16 percent acid phosphate) is used on some farms. Liming has recently been started, and ground limestone is now in use on about 100 farms. All available stable manure is applied to the land.

According to the 1930 census, 461 farms reported the use of hired labor in 1929, at a cost of \$97,684, or an average of \$211.90 a farm. Both white and colored laborers are employed, and the supply is plentiful at a reasonable price.

The area in farms is 45.8 percent of the total area of the county, and the average size of farms is 99 acres. The average size of farms in 1879 was 187 acres, and census data for the intervening time indicate a steady decrease in farm acreage. The number of farms increased from 1,290 in 1880 to 1,817 in 1925 but decreased to 1,474 in 1930. The size of farms ranges widely, but the great majority are between 10 and 260 acres. Only 5 farms include more than 1,000 acres.

According to the 1930 census, 58.7 percent of the farms are operated by the owners, 40.9 percent by tenants, and 0.4 percent by managers. The percentage of tenancy has remained about constant since 1880. Of the tenant farms, 48 are rented on a cash basis, and the remainder are rented under the share system. On the cash basis the land is rented for a lump sum ranging from \$50 to \$300 a farm, depending on its size and state of improvement. Under the share system the crop is divided equally between tenant and landlord, the tenant furnishing the labor and one half of the fertilizer and the landlord one half of the fertilizer, the tools, and the work animals.

Most of the farm dwellings are substantial, and many are of modern suburban type, but many of the tenant houses are small. The barns are amply large to shelter the livestock, and many are constructed to store farm products and machinery. Some farms have several outbuildings for storage purposes. The average farm equipment consists of a breaking plow, a smoothing harrow, 1-horse or 2-horse walking cultivators, a grain drill, a mowing machine, a hayrake, and a 1-horse corn planter. On a few farms 2-horse riding cultivators are used, and a few tractors are in use. The work animals are principally mules. Fences are comparatively few and, in general, are constructed of two or three strands of barbed wire, but on some farms the fences are of woven wire. Reapers are used on many farms, but where the land is steep or the fields are small the grain is cradled. A few threshing machines travel from place to place to thresh the grain.

On nearly all the farms from 1 to 3 milk cows are kept, and some farms have more. On a few farms the cows are registered Guernseys or Jerseys, but on most farms the cattle are grades. Recently 43 purebred sires have been brought in. Dairying is not an important industry, but there are five dairies, from which the products are sold locally. Three of the dairies keep herds of Guernseys and two have Jerseys.

The hogs are of fairly good quality and are a mixture of Duroc-Jersey, Berkshire, Poland China, or other breeds. Nearly every farmer has from 1 to 3 hogs, and a few keep more. Chickens are kept on practically all farms, and some farms have improved flocks.

Turkeys are raised on many of the farms. Some poultry is shipped each year to northern and eastern markets.

The 1930 census reports the value of dairy products, exclusive of those used at home, as \$27,863 and the value of poultry and eggs sold as \$65,752.

The pastures are composed mainly of native grasses. Within recent years improved permanent pastures have been started and at present (according to the county farm agent) such pastures are maintained on 41 farms. The upland improved pastures are composed of bluegrass, orchard grass, herd's grass, alsike clover, white (Dutch) clover, Dalhs grass, and Lespedeza, and the bottom-land pastures of Lespedeza and carpet grass.

SOILS AND CROPS

Montgomery County lies almost wholly in the piedmont-plateau region, the southeastern corner including an area of about 50 square miles of the sand-hill section of the Atlantic Coastal Plain. Thus, it may be seen, it is located in two widely different physiographic provinces of the State, and the underlying rock or sandy-clay formations are decidedly different. The weathering of these formations has produced a large number of soil types which differ in both chemical and physical composition. As climatic conditions are practically the same over the county, the soil differences cannot be the product of different climatic conditions but are the product of the character of the underlying soil material or rock formations and the local stage of development.

Many of the soils are developed in large continuous areas ranging in extent from 5 to 10 or more square miles, whereas others include a comparatively small acreage and are widely scattered over the county. The surface relief is a modifying factor as regards the development of the soil, particularly as it affects the depth and character of the surface soil. All the upland soils are naturally well drained, owing to the sloping, rolling, and hilly relief. The soils which have the more favorable surface relief and contain the largest amount of plant food or are the easiest to cultivate control the agriculture and also govern the distribution and concentration of the farms throughout the county.

Only 14.3 percent of the land is cleared and utilized for crops, open pastures, or orchards. In the northwestern part are extensive areas of cut-over land where the relief is hilly, and only a small acreage is used for cropping purposes. Large tracts of this land have been leased as game preserves. Throughout this region and also throughout other forested areas practically all the original merchantable timber has been cut, but the second-growth trees furnish a fairly good supply, and the rapid growth and good cover indicate a future supply. In the extreme southern part of the county, second-growth pine predominates, but in the western, central, and northern parts, white, red, and post oaks are the principal trees. The future value of a large part of the land will depend on the timber growth. In the sand-hill region, perhaps one half of the land has been cleared and is now cultivated. Most of the farming is concentrated in the southwestern, southeastern, and eastern parts.

The agriculture of Montgomery County is typical of that of the slate belt of the State. It is, and has been for a long time, a self-sufficing type. Most of the farms are small, being 1-, 2-, or 3-horse farms, and practically all the farming operations are accomplished with horses and mules. On a few farms, tractors and other heavy machinery are used. It has been the purpose of the farmers to produce sufficient food and feed to supply the home and in addition to grow a small quantity of cotton as a cash crop. Considerable revenue has been derived from time to time from the sale of lumber and crossties. Many small sawmills are operated in connection with farming.

As no large cities are near the county, no local markets for truck or garden products are available. Dairying has not been developed, because of the lack of nearby markets and because no cooperative arrangement has been made for the collection and sale of milk. Many of the farmers are not in a financial position to purchase a herd of dairy cattle and to expend much time and money in improving their soil to the point where it would produce good pasture grass. The soils are very low in organic matter and are leached of most of the soluble elements of plant food. Owing to these soil conditions and the hot summers, bluegrass and other good pasture grasses have not been grown extensively. The typical bluegrass region of Kentucky is about 15° cooler than Montgomery County.

At present the agriculture of the county consists of the production of corn, wheat, oats, and hay as general-farm crops, and cotton, peaches, and tobacco as special cash crops. Corn, small grains, and cotton are grown indiscriminately over the county, regardless of the kind of soil. However, there is a direct relationship between these crops and their yields on the different soil types. These relationships will be discussed in detail under the groups of soils and the individual types.

Corn is the principal general-farm crop, occupying 10,677 acres in 1929. It is grown on nearly every farm, but the greater part is produced on soils of the red-land group. This crop is produced mainly as feed for work animals, for fattening hogs, and for supplying meal for bread. In the same year, wheat occupied 5,059 acres. This crop is grown mainly on the first group of agricultural soils and to some extent on the second group. A small acreage of oats and hay is produced but, according to the county farm agent, the quantity of hay is not sufficient for local needs.

Cotton is the most important cash crop, and on this crop depends the economic welfare of a large number of farmers. It is grown in all parts of the county, but about two thirds is produced in the southwestern part, mainly on the red-land soils. In 1929, 11,660 acres were devoted to cotton. This is the only general cash crop that can be grown in the piedmont section of the county under present economic conditions. Many of the soils on which it is grown are not so well suited to the production of cotton as are some of the coastal-plain soils or even the Cecil or Appling soils in other parts of the piedmont section. A money crop has been and is still necessary, and cotton appears to meet the demand better than any other crop, as the farmers know how to grow it, it is a crop that finds a ready cash sale at all times, credit may be obtained on it, and it can be stored and will not deteriorate rapidly.

Peaches are produced in commercial orchards on the sand-hill soils. According to the North Carolina Forecaster for 1927, there were 354 car-lot shipments of peaches from the county in that year. The main varieties grown are the Mayflower, Elberta, and Belle (Belle of Georgia). Cantaloupes and watermelons are produced to some extent as special crops on the sand-hill soils. These crops appear to be the best paying crops for the light sand soils. A small acreage of tobacco is grown, but tobacco growing has not flourished because there is only a small area of soils in the county adapted to growing the kind of tobacco that meets the present-day demand.

Vetch seed is produced for market in the eastern part of the county between Biscoe and Steeds. In recent years, Lespedeza has become an important crop. On nearly every farm, potatoes, sweetpotatoes, garden vegetables, and sorgo are grown for home use and to meet the small local demand.

In order to bring out the relationship existing between the different soil types and the agriculture of the county, it is necessary to divide the soils into two broad groups, namely, agricultural soils and forest soils.

In the following pages of this report the soils of Montgomery County are described in detail, and their agricultural importance is discussed; their distribution is shown on the accompanying soil map; and their acreage and proportionate extent are given in table 3.

TABLE 3—Acreage and proportionate extent of soils mapped in Montgomery County, N C

Type of soil	Acres	Per- cent	Type of soil	Acres	Per- cent
Georgeville silty clay loam.....	37,248	11.9	Granville sandy loam.....	1,280	0.4
Georgeville gravelly silty clay loam.....	35,200	11.3	White Store very fine sandy loam..	3,392	1.1
Georgeville silt loam.....	9,664	3.1	Altavista silt loam.....	1,536	.5
Georgeville gravelly silt loam.....	6,656	2.1	Norfolk sandy loam.....	1,024	.3
Penn silt loam.....	10,752	3.4	Norfolk sandy loam, deep phase....	1,856	.6
Wadesboro sandy loam.....	5,248	1.7	Norfolk sand.....	18,176	5.8
Wadesboro gravelly sandy loam.....	3,392	1.1	Ruston gravelly sandy loam.....	1,600	.5
Davidson clay loam.....	896	.3	Bradley sandy loam.....	3,648	1.2
Congaree silt loam.....	4,544	1.4	Meadow (Congaree material).....	1,472	.5
Herndon silt loam.....	21,504	6.9	Georgeville stony silt loam.....	42,752	13.7
Herndon gravelly silt loam.....	26,752	8.6	Iredell stony loam.....	832	.3
Herndon very fine sandy loam.....	9,664	3.1	Herndon stony silt loam.....	20,240	8.4
Alamance silt loam.....	3,136	1.0	Hoffman sandy loam.....	7,936	2.5
Orange silt loam.....	9,664	3.1	Rough stony land.....	11,264	3.6
Orange gravelly silt loam.....	4,992	1.6			
			Total.....	312,320	100.0

AGRICULTURAL SOILS

The agricultural soils naturally fall, according to soil characteristics as well as agricultural adaption and use, into three main groups. The first, or red-land, group includes soils having light-colored or red surface soils with dominantly red clay subsoils; the second includes those soils having light-colored surface soils and yellow or reddish-yellow clay subsoils; and the third, or sand-hill, group includes those soils having light-gray sand surface soils underlain by sand or sandy clay subsoils.

RED-LAND SOILS

The first group of soils, generally called red clay land, includes Georgeville silt loam, Georgeville gravelly silt loam, Georgeville silty

clay loam, Georgeville gravelly silty clay loam, Penn silt loam, Wadesboro sandy loam, Wadesboro gravelly sandy loam, Davidson clay loam, and Congaree silt loam. The total extent of these soils is 177.5 square miles, or 36.4 percent of the area of the county. They occur mainly in broad continuous areas in the southwestern and northeastern parts.

All these soils, except Congaree silt loam, have undulating, gently rolling, or rolling relief. The natural surface drainage is excellent, and the internal drainage through the clay subsoils ranges from fair to good. On most of the land, sheet erosion is active, and on some of the steeper slopes gullying is very rapid. The surface soils of the red-land soils range from grayish yellow to red, are dominantly fine in texture, ranging from silt loams to silty clay loams or clay loams, and have a smooth, floury feel. A few areas, however, are sandy loam, and some areas have small platy angular gravel and broken slate on the surface. The subsoils of the different soils are prevalently red heavy stiff but brittle clays or silty clays. In all soils of this group the parent-rock material lies from 30 to 80 inches below the surface.

The fine texture of the soils causes them to run together when wet, and, if they are not plowed under proper moisture conditions, they will break up into large clods and some of the clods will remain throughout the cultivation period. These soils are low in organic matter, but, taken as a whole, perhaps contain more than the soils of any other group. They range from slightly acid to acid. When plowed deep or subsoiled, they absorb a large amount of the rainfall. These soils naturally warm up slowly in the spring, owing to their heavy texture and to the fact that they do not drain so readily as the more sandy soils. The effects of turning under a green-manure crop or of applying barnyard manure endure well, as the heavy subsoils hold the manure, preventing it from leaching rapidly.

The subsoils of these soils, although rather 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 soils are dominantly high in potash; that of the Davidson soil is not so high in potash but contains a higher percentage of lime.

The soils of this group dominate the agriculture of the county. On them is grown most of the corn, wheat, oats, legumes, and cotton produced. These crops are grown indiscriminately on the different soils, wherever the surface relief is favorable. However, Georgeville silty clay loam, Georgeville gravelly silty clay loam, and Davidson clay loam are the best soils in the county for the production of wheat, oats, clover, and alfalfa, and the greater part of these crops is produced on these soils. The Georgeville soils, because of their texture, moisture-holding capacity, and also because of the high content of potash in the subsoils, are the soils best suited for grains. Clovers, wheat, and alfalfa make the best yields on Davidson clay loam, and the largest yields of corn are obtained on Congaree silt loam.

Soils of this group support a self-sufficing type of agriculture, that is, practically all the home supplies are grown on them. They are not well suited to cotton, especially under boll-weevil conditions, because they warm up late in spring and the cotton does not grow so quickly or mature so early as on the more sandy soils of the State. Cotton is grown on these heavy soils because of the need of a money

crop. If the farmers in the red-land belt had areas of Norfolk sandy loam or Cecil sandy loam on their farms, it is probable that no cotton would be planted on the Georgeville or Davidson soils

Georgeville silty clay loam.—Georgeville silty clay loam, so-called "red land", ranks high as an agricultural soil, being one of the strongest and best soils in the county for wheat, clover, and corn, and a soil that can be built up to a high state of productivity. As in all the Georgeville soils, the subsoil is rich in potash, containing about five times as much potash as the subsoil of Norfolk sandy loam. It also contains large amounts of iron and alumina. Strong work animals and heavy machinery are required to properly prepare this soil for seeding

The surface soil is reddish-brown or pale-red silty clay loam from 5 to 7 inches thick. The subsoil is red smooth brittle stiff clay or silty clay which continues to a depth ranging from 30 to 40 inches, where it passes into soft decomposed slate rock. In places small eroded or galled spots of red heavy silty clay, which is much heavier than the surrounding soil, occur. Such areas are too small to indicate separately on the soil map. On account of the rather heavy texture of the surface soil, the land has a tendency to clod, especially if plowed when too wet.

Georgeville silty clay loam occurs in large areas in the northeastern and, to less extent, in the northwestern and southwestern parts of the county and along the western border. Approximately 35 percent of the land is under cultivation, and the leading crops are corn, cotton, and wheat. About 40 percent of the cultivated land is in corn, 25 percent in cotton, and 20 percent in wheat. Oats, clover, and Lespedeza are produced on a much smaller acreage. Corn yields from 20 to 30 bushels to the acre, cotton from one half to 1 bale, wheat from 10 to 25 bushels, and oats from 30 to 40 bushels. Clover and Lespedeza give excellent returns.

Corn land receives from 100 to 300 pounds to the acre of a 2:8:2, 3:8:3, or 4:8:4 fertilizer, and some farmers make a side application of about 75 pounds to the acre of nitrate of soda at the last cultivation. On some farms corn is planted on clover land. Cotton land receives from 300 to 600 pounds to the acre of a 2:8:2, 3:8:3, 4:9:4, 4:10:4, or 4:15:4 fertilizer or a mixture of cottonseed meal and superphosphate (acid phosphate). Nitrate of soda is applied by some farmers at a rate ranging from 75 to 200 pounds to the acre, and this is usually made in two applications. Wheat is given an acre application ranging from 200 to 300 pounds of a 2:8:2, 3:8:3, 4:8:0, or 4:10:0 mixture or of superphosphate. Some farmers fertilize wheat in the spring with a 2:8:2 fertilizer and an additional 75 or 100 pounds of nitrate of soda. Clover and Lespedeza receive an acre application of about 200 pounds of a 2:8:2 or a 3:8:3 grade or from 200 to 400 pounds of superphosphate. Oats are fertilized by some farmers with a top dressing of nitrate of soda. Wheat is sown on clover land on some of the farms, and increased yields are thereby obtained.

Georgeville gravelly silty clay loam.—Georgeville gravelly silty clay loam differs from Georgeville silty clay loam mainly in the texture of the surface soil which contains from 15 to about 25 percent of brown smooth somewhat rounded gravel or broken platy pieces of slate. The gravel and slate fragments occur on the surface and to

some extent are embedded in the soil. The soil is similar to Georgeville silty clay loam in the color of the surface soil and in the color and structure of the subsoil.

This soil occupies 55 square miles in Montgomery County. Large unbroken areas occur in the southwestern part around Mount Gilead and south of Wadeville. Smaller areas are developed in the northwestern part. Approximately 60 percent of the land is cultivated, and of this area about 50 percent is devoted to cotton, 30 percent to corn, and 15 percent to wheat. Oats, clover, and Lespedeza are grown on a small acreage. Crop yields and fertilizer treatment are practically the same as on Georgeville silty clay loam.

Georgeville silt loam.—Georgeville silt loam represents the normally well developed soil of the Georgeville series. The 6- to 8-inch surface layer is grayish-yellow or slightly reddish yellow smooth flourlike silt loam and in most places is underlain by a reddish-yellow friable silty clay loam subsurface layer 3 or 4 inches thick. The subsoil is red brittle friable silty clay extending to a depth ranging from 30 to 40 inches, at which depth it passes into soft decayed slate rock. On the surface, in places, small eroded areas of reddish-brown silty clay loam occur, but they are not of sufficient size to separate as a distinct type on the soil map. The surface soil, being lighter in texture, tills more easily than Georgeville silty clay loam and is less inclined to form clods.

This soil is not so extensive as the other Georgeville soils, the total mapped area being 15.1 square miles. It occurs mainly in the eastern part of the county, being well developed between Biscoe and Star. Scattered areas lie along the county boundary in the northwestern part.

About 60 percent of the land is cultivated, and the principal crops are corn and cotton. About 50 percent of the cultivated land is devoted to corn and 25 percent to cotton. Wheat, oats, tobacco, clover, vetch, and Lespedeza are grown on small acreages. The yields of corn, cotton, wheat, oats, and legumes are about the same as those obtained on Georgeville silty clay loam. Vetch gives excellent returns, and the crop is used for land improvement, for hay, and for seed for market. Corn planted on land where vetch has been turned under gives a marked increase in yields. This practice is followed by some farmers in the eastern part of the county. Tobacco is grown on this soil in the vicinities of Star and Ether. The yields range from 600 to 800 pounds an acre and the grades from light to heavy. The fertilizer treatment is from 600 to 700 pounds an acre of a 3:8:3, 4:9:4, or 5:9:5 mixture.

Georgeville gravelly silt loam.—Georgeville gravelly silt loam is similar to Georgeville silt loam except that the surface soil contains from 15 to 25 percent of platy or smooth somewhat rounded brown slate gravel which are most abundant on the surface but when plowed become well mixed with the soil.

This soil occurs in comparatively small and somewhat scattered areas in the southwestern part of the county. The total extent is 10.4 square miles, and about 55 percent of the land is cultivated. The crops, yields, and fertilizer treatment are practically the same as for Georgeville silty clay loam.

Penn silt loam.—The surface soil of Penn silt loam is light-brown or slightly reddish brown silt loam 6 or 8 inches thick. The subsoil

is purplish-red, Indian-red, or brownish-red friable silty clay which extends to a depth ranging from 28 to 40 inches, where it is underlain by soft decomposed bedrock. The subsoil is more friable than that of the Georgeville soils. Included with this soil are small bodies of fine sandy loam and loam too small to indicate on the soil map. On some of the more rolling and steep areas angular stone fragments occur and these are indicated on the map by stone symbols.

The soil has a comparatively large total area, covering 16.8 square miles, but not so great a proportion of it is used for agriculture as of the Georgeville soils, only about 10 percent of it being farmed. Rather large areas occur in the southern part of the county around Harrisville, Little River Church, and near the sand-hill country.

Much of the land supports a growth of pine trees and other parts represent abandoned fields covered with broom sedge and scattered scrub pine. Cotton and corn are the principal crops grown and oats and wheat are of minor importance. Cotton yields from one third to three fourths of a bale an acre, corn from 14 to 25 bushels, oats from 15 to 25 bushels, and wheat from 8 to 10 bushels. The fertilizer treatment is about the same as for the crops grown on Georgeville silty clay loam. The pine tree growth is a source of a fair timber supply.

Wadesboro sandy loam.—Wadesboro sandy loam occurs in close association with Penn silt loam but it represents a better-developed soil. The surface soil consists of a layer of grayish-yellow friable sandy loam 6 or 8 inches thick underlain by a yellowish-red heavy sandy loam layer 3 or 4 inches thick. The subsoil is dark-red or dull-red friable sandy clay extending downward to a depth ranging from 34 to 42 inches where it grades into soft sandstone rock.

This soil occupies 8.2 square miles in the county occurring in fair-sized areas in the southern and southeastern parts along the Montgomery-Richmond Counties line.

About 70 percent of the land is cultivated, mainly to cotton and corn, and a small acreage is in oats and clover. About 60 percent of the cultivated land is planted to cotton and about 30 percent to corn. Cotton produces from $\frac{1}{2}$ to 1 bale an acre and corn from 25 to 35 bushels. The other crops give good yields. Cotton land receives from 300 to 400 pounds an acre of 3:8:3 fertilizer and corn from 200 to 300 pounds of 2:8:2, or a home mixture analyzing about the same.

Wadesboro gravelly sandy loam.—Wadesboro gravelly sandy loam, locally called "goose-egg land," is a sandy loam soil containing a large quantity of oval or rounded quartz gravel in the surface soil. These gravel were probably left from a deposit of coastal-plain material that once covered the surface. In places the gravel are so numerous as to interfere with cultivation.

Wadesboro gravelly sandy loam is not an extensive soil. It occurs in the southern part of the county both east and west of Little River. Approximately 50 percent of the land is cultivated. The crops, yields, and fertilizer treatment are similar to those on Wadesboro sandy loam.

Davidson clay loam.—Davidson clay loam is locally known as "push land" or "red heavy clay land." It has a brownish-red or reddish-brown rather heavy clay loam surface soil from 5 to 7 inches

thick underlain by a dark-red or maroon stiff firm smooth brittle clay subsoil mainly free from any great amount of grit. The subsoil extends to a depth ranging from 35 to 45 inches where it passes into soft decayed rock material. In a few places rounded "niggerhead" stones occur on the surface but not in sufficient quantities to indicate on the soil map.

This is an inextensive soil occurring only in small areas in the northwestern and southwestern parts of the county. Perhaps 70 percent of the land is cultivated and the main crops are corn, wheat, and cotton. The yields and fertilizer treatment are about the same as those on Georgeville silty clay loam.

In agricultural usage Davidson clay loam is closely related to Georgeville silty clay loam but it differs from the Georgeville soil in that both the surface soil and subsoil of the Davidson soil contain more lime and less potash. Davidson clay loam, being neutral or only slightly acid, is naturally the best clover and alfalfa soil in the Carolinas, and it is also a good soil for orchard grass. Some of the largest yields of wheat and oats ever produced in North Carolina were grown on Davidson clay loam. This soil requires heavy machinery and strong work animals in order to prepare it for seeding, but when properly prepared it maintains fair tilth and holds a good supply of moisture.

Congaree silt loam.—Congaree silt loam is a first-bottom soil occurring in narrow or rather wide strips along many of the larger streams. It is subject to occasional overflow and, on account of its nearly level surface, drainage in low places is not adequate. The surface soil is brown silt loam ranging from 6 to 10 inches in thickness. Below this the soil material in most places is lighter brown and becomes slightly heavier in texture with depth. At a depth ranging from 24 to 34 inches brownish-yellow and gray mottlings appear, or in many places the soil grades into bluish-gray silty clay. Along streams, near areas of Penn silt loam, the surface soil has a purplish-red cast caused by sediments from that soil. Small areas of fine sandy loam texture are included in mapping because they are too small to show separately.

The largest areas are along Little River and Cheek Creek in the southern part of the county. A large part of the land is used for crops and a small acreage is devoted to pasture. Corn and hay are the principal crops, corn yielding from 30 to 45 bushels an acre and hay from 1 to 1½ tons. The land is naturally fertile and contains a good store of all the plant-food elements. Crops are grown without the use of fertilizer or, in some places, with very light applications.

Congaree silt loam is naturally one of the most fertile and productive soils in the county. It consists of fine materials which have been washed from the upland soils and deposited in the first bottoms along the streams. It contains more organic matter than any other soil, and moisture conditions are excellent. It contains a large quantity of the essential plant-food constituents necessary for the production of corn. The wetter and more poorly drained areas produce a good quality of native grass suitable for hay.

LIGHT-COLORED SOILS WITH YELLOW OR REDDISH-YELLOW CLAY SUBSOILS

This group of soils includes Herndon silt loam, Herndon gravelly silt loam, Herndon very fine sandy loam, Alamance silt loam, Orange

silt loam, Orange gravelly silt loam, Granville sandy loam, White Store very fine sandy loam, and Altavista silt loam. These soils cover a combined area of 128 square miles. Their main occurrence is in the central part of the county, the largest continuous areas lying in the vicinity, south, and west of Troy.

The surface relief ranges from nearly level or undulating to rolling, steeply sloping, and hilly. Alamance silt loam, Orange silt loam, Granville sandy loam, and White Store very fine sandy loam have an undulating or gently rolling relief, and areas of Altavista silt loam are nearly level or gently undulating. Natural surface drainage of the soils of this group, in general, is good. The internal drainage of the Orange and White Store soils is impeded to some extent by the heavy character of the subsoils, and in some places the surface of these soils and of the Altavista soil is so flat that water drains off slowly.

With the exception of Granville sandy loam, all the surface soils of soils of this group are silt loams and very fine sandy loams, and they are dominantly gray or grayish yellow. The subsoils are yellow or reddish yellow and are prevailingly friable clays or silty clays. A rather heavy somewhat plastic clay is present in the subsoils of the White Store and Orange soils. The soils of this group are lighter in texture and slightly more friable than soils of the red-land group. The light color, particularly in the subsoil, is probably because the material has not undergone such complete oxidation or because the rocks from which the soil is derived do not contain so much iron as those in the red-land group. These soils contain less plant food and humus than the soils of the red-land group and are slightly more acid.

The soils of this group, although they occupy only approximately one fourth of the land of the county, have a much greater percentage of land under cultivation than soils of the red-land group.

Cotton and corn are the main crops and small quantities of wheat, oats, clover, Lespedeza, vetch, and tobacco are grown. The yields of these crops, especially of wheat, corn, clover, and oats, are not so high as yields on the red-land soils under the same general-farming methods. Tobacco is grown to a very small extent, mainly on Herndon very fine sandy loam and Herndon silt loam. The smoother areas offer promise of the extension of tobacco culture, provided economic conditions are favorable. One reason that tobacco has not been grown to greater extent is the fact that the soils in Montgomery County are not quite so well adapted to the production of this crop as are the more sandy soils of the Cecil and Durham series. The farmers on the soils of this group depend mainly on cotton as their cash crop. With heavy applications of fertilizer on the Herndon, Alamance, and Granville soils, good yields of cotton can be obtained, provided there is no considerable damage from the boll weevil. The very fine sandy loams of this group warm up a little more quickly than the silt loams and silty clay loams of the red-land group and for this reason have a slight advantage over the heavier soils. A large part of the soils of this group lies favorably for cultivation with improved machinery.

Herndon silt loam.—The surface soil of Herndon silt loam is grayish-yellow or yellowish-gray mellow silt loam from 7 to 9 inches thick. The subsoil begins as yellowish-brown, yellowish-red, or brownish-red friable silty clay and at a depth ranging from 24 to 30 inches grades

into mottled or streaked brownish-yellow and bright-red friable crumbly silty clay. Between depths of 38 and 45 inches the subsoil is underlain by soft decomposed bedrock. The surface soil when air-dried is very light gray, or almost white in places, powdery silt loam. In plowed fields it shows streaks and spots of yellow and yellowish-red in some places.

Herndon silt loam occurs in large areas in the northeastern part of the county around Flint Hill School and north of Allreds, and in the central part southwest and southeast of Troy. The total area is 33.6 square miles, and approximately 20 percent of the land is used for agriculture. About 45 percent of the cultivated land is used for corn, 35 percent for cotton, and 10 percent for wheat. Oats, clover, Lespedeza, tobacco, and vetch occupy small acreages. Corn yields from 15 to 30 bushels to the acre and is fertilized with an acre application ranging from 100 to 300 pounds of a 4:8:4 or 2:10:4 mixture. On land where vetch has been turned under, increased yields are obtained. Cotton produces from one half to three fourths of a bale to the acre, and the fertilizer treatment ranges from 300 to 400 pounds of a 2:8:2, 3:8:3, or similar home mixture. Wheat yields range from 7 to 20 bushels, and the crop is given an acre application ranging from 200 to 300 pounds of a 2:8:2 or an 0:10:4 fertilizer. Some farmers apply a top dressing of 75 or 100 pounds to the acre of nitrate of soda in the spring. Tobacco produces from 600 to 800 pounds to the acre of bright leaf. It is fertilized with from 600 to 800 pounds of a 3:8:3 or 4:9:4 mixture. Oats, vetch, and Lespedeza return good yields.

Herndon gravelly silt loam.—Herndon gravelly silt loam is similar to Herndon silt loam, except that the surface soil contains from 15 to 35 percent of angular brown or white quartz gravel ranging in diameter from one-fourth inch to 4 inches. This soil is more extensive than the silt loam and covers an area of 41.8 square miles. It occurs in large areas in the central part of the county around Roberdo and south and southeast of Troy, and other areas are in the northwestern corner west of Blaine.

This soil, although extensive, is not important agriculturally, and only about 10 percent of it is farmed. The remainder represents cut-over land.

The principal crops are corn and cotton, and some wheat, oats, and clover are grown on small acreages. The crop yields and fertilizer treatment are practically the same as on Herndon silt loam. A large part of this soil is probably better suited to forestry, although much of it, especially the smoother areas, could be cleared and used for general farming and for pasture.

Herndon very fine sandy loam.—Herndon very fine sandy loam differs from Herndon silt loam mainly in the texture of the surface soil. The mineral matter which governs the texture is slightly coarser, that is, it contains a much larger quantity of very fine sand than does the silt loam. This soil is less extensive than Herndon silt loam. The largest areas are developed in the central part of the county around and west of Troy, and many smaller areas are southwest of Troy.

Approximately 25 per cent of the land is cleared and used for agriculture. The crops, yields, and fertilizer treatment are similar to those on Herndon silt loam. This soil is mellow and easily tilled.

Alamance silt loam.—Alamance silt loam to a depth ranging from 7 to 10 inches is light-gray or yellowish-gray smooth floury silt loam. In wooded areas a thin covering of leaf mold or gray soil material an inch or two thick, is on the surface. The subsoil begins as pale-yellow silty clay loam and below a few inches grades into yellow friable crumbly silty clay which extends to a depth ranging from 28 to 34 inches. Below this is the mottled light-gray and yellow soft decayed slate rock.

Alamance silt loam is not an extensive soil in Montgomery County. It occurs in small scattered areas in the northeastern and southwestern parts. Probably 35 percent of the land is cultivated. All of it has smooth level or gently sloping relief and could easily be farmed. The crops, yields, and fertilizer treatment are practically the same for this soil as for Herndon silt loam. The soil needs lime and organic matter, not only to furnish the needed nitrogen but to prevent puddling or running together.

Orange silt loam.—Orange silt loam resembles Alamance silt loam, with which it is closely associated, in the color and texture of the surface soil, but it differs in the lower part of the subsoil. At a depth of about 18 inches the yellow friable silty clay subsoil grades into brownish-yellow, with spots of dark brown and gray, heavy plastic clay which cracks when dry and exposed to air. The clay layer is very much like that in the subsoil of Iredell stony loam.

The total area of this soil is 15.1 square miles. It occurs in fairly large areas in the east-central part of the county around Biscoe, and smaller areas are scattered over the central and northeastern parts. About 10 percent of the land is used for farming and the remainder is covered by second-growth oaks. The heaviness of the lower part of the subsoil retards downward drainage, and for this reason the soil is not so well drained as Herndon silt loam. Crops and fertilizer treatment are similar to those on Herndon silt loam, but the yields are not so high.

Orange gravelly silt loam.—Orange gravelly silt loam is different from Orange silt loam because of the gravel content in the surface soil. From 15 to 35 percent of the mass of the surface soil consists of brown somewhat rounded and angular gravel which give the soil a distinctly gravelly appearance. This is a comparatively inextensive soil. It occurs in the southern, southwestern, and central parts of the county. Only about 5 percent of the land is cultivated, and the principal crops are cotton and corn. The yields under normal conditions are low.

Granville sandy loam.—The surface soil of Granville sandy loam is grayish-yellow or yellowish-gray sandy loam ranging from 7 to 10 inches in thickness. It is underlain by a yellow friable crumbly sandy clay subsoil which extends to a depth ranging from 30 to 34 inches. This layer grades into mottled yellow and gray, with spots of bright red or purplish red, friable decomposed sandstone. The soil is of very small extent, and it occurs in scattered areas in the southern part of the county near and along the Richmond County line.

About 65 percent of the land is cultivated, mainly to cotton and corn. The yields and fertilizer treatment are about the same as the general average of the county. This soil, because of its sandy texture

and good drainage, warms up early in the spring. It is used in the northern part of the State for the production of bright tobacco. Peanuts and garden vegetables do well.

White Store very fine sandy loam.—The surface soil of White Store very fine sandy loam consists of grayish-yellow or yellowish-gray very fine sandy loam ranging in thickness from 7 to 10 inches. The subsoil begins as yellow friable fine sandy clay, but at a depth of about 20 inches it becomes mottled yellow, gray, and red heavy plastic clay which, at a depth ranging from 30 to 35 inches, grades into mottled decomposed shale and fine-grained sandstone. On account of the heavy texture of the lower part of the subsoil, internal drainage is not well established.

This soil covers a total area of 5.3 square miles and occurs in close association with Granville sandy loam, in the southwestern corner of the county. About 35 percent of the land is used for crops, mainly cotton and corn. Some oats and clover are grown. The crop yields and fertilization are similar to those on Herndon silt loam.

Altavista silt loam.—Altavista silt loam resembles Alamance silt loam in many respects. It is an alluvial soil developed in wide strips on second bottoms, mainly along Little River near the southern county line. It lies above normal overflow and is fairly well drained. The 6- to 8-inch surface soil is mellow smooth yellowish-gray or grayish-yellow silt loam. The subsoil consists of yellow firm friable silty clay and extends to a depth ranging from 28 to 34 inches, where it grades into mottled or streaked yellow and gray heavy plastic clay.

The total area of this soil is small. About 50 percent of the land is devoted to crops, and a small acreage is used for pasture. Drainage is not well established on the flatter areas, and such places are left in forest. The soil is used mainly for the production of corn, and some oats and hay are produced. Corn yields from 20 to 30 bushels an acre with a light application of complete fertilizer, and oats from 20 to 45 bushels with a top dressing of nitrate of soda.

SAND-HILL SOILS

The sand-hill soils include all the soils of the Norfolk, Ruston, and Bradley series mapped in Montgomery County, in addition to meadow (Congaree material). The combined acreage of these soils is 43.4 square miles. They occur in the southeastern part of the county, locally known as the "sand-hill section." The soils are easily distinguished from those of the two groups of agricultural soils previously described, in that they all have light-gray or grayish-yellow sand or loamy sand surface soils and dominantly yellow friable sandy clay or sand subsoils. They occur on broad flat ridges or interstream areas and on areas which are steeply sloping or hilly. They are all exceptionally well drained, both in the surface soil and subsoil. These soils hold moisture very well, and the best crops are obtained in normal seasons. Contrary to general belief, crops on these sand soils will not stand so much rain as those on the heavier soils, owing to the fact that more of the rainfall is absorbed by the surface soils and subsoils than is taken up by the heavier soils which do not allow free passage of moisture.

These soils contain only a small quantity of plant food, because the parent material is low in the mineral elements essential to plant growth and because most of the soluble plant food and organic mat-

ter has been leached out. Organic matter is readily dissipated, and the effect of turning under green-manure crops is of short duration, hence, under similar treatment, it is more difficult to maintain the productivity of the sandy soils than of the heavy soils. Although these soils are low in humus, nitrogen, phosphorus, and potash, their physical properties are so favorable that they respond readily to fertilization and produce some of the most profitable crops in the county. Because of their texture, their porosity, and the friability of their subsoils, these soils warm up early in the spring and are the first soils in the county on which farming operations begin. They are very easy to cultivate, and light farming implements and modern machinery can be operated advantageously.

In this group, Norfolk sand covers the largest acreage and is the most important agricultural soil. Only a few small areas of Norfolk sandy loam and its deep phase and of the Ruston and Bradley soils occur in this county.

The crops and agricultural practices on the soils of the sand-hill group are markedly different from those on the rest of the soils of the county. These sandy soils are too light in texture for grasses and grain crops, and cash crops are grown almost exclusively. Peaches are by far the most important crop and are produced in several commercial orchards, several hundred car-lot shipments being made each year. Cotton and corn are less important crops, and watermelons, cantaloupes, vetch, tobacco, and grapes are produced to a small extent. In sections of the State southeast of this county, dewberries are grown successfully on Norfolk sand.

Norfolk sandy loam.—Norfolk sandy loam occupies a very small total area in the southeastern part of the county in the vicinity of Candor. This is considered one of the best soils in the coastal-plain region for the production of bright tobacco, cotton, and peanuts, and it is well suited to growing peaches, sweetpotatoes, and a large variety of truck crops and garden vegetables. Because of the sandy clay subsoil, the soil can be built up to a fair state of productivity which is much more easily maintained than in Norfolk sandy loam, deep phase, or Norfolk sand.

The surface soil, to a depth ranging from 5 to 8 inches, is light-gray loamy sand underlain by pale-yellow or grayish-yellow loamy sand. The subsoil, beginning at a depth between 15 and 20 inches, is yellow friable and crumbly sandy clay which continues to a depth ranging from 30 to 35 inches, where it grades into mottled reddish-brown, light-gray, and yellow slightly compact but friable sandy clay material.

Practically all the land is under cultivation, about 50 percent being used for cotton, about 40 percent for corn, and a small part for peach orchards. Cotton yields from one half to one bale to the acre and corn from 20 to 40 bushels. The higher yields of cotton and corn are obtained with heavy applications of fertilizers and in good seasons. Cotton receives from 300 to 600 pounds to the acre of a 4:8:4 or 6:12:6 fertilizer, and some farmers make an additional application of 75 or 100 pounds of nitrate of soda. Corn receives an acre application ranging from 200 to 400 pounds of a 4:8:4 fertilizer, and a side application of about 75 pounds of nitrate of soda is sometimes added. Peach trees each receive a few pounds of a 4:9:5 fertilizer.

Norfolk sandy loam, deep phase.—The deep phase of Norfolk sandy loam differs from typical Norfolk sandy loam in that the sandy clay subsoil lies at a much greater depth below the surface, ranging from about 24 to 30 inches. Small areas occur in the southeastern part of the county near Candor. The fertilizer treatment and crops are similar to those on Norfolk sandy loam, but the yields are slightly less. A small acreage is planted to tobacco, and the yields range from 600 to 800 pounds of light types. Tobacco receives a fertilizer application ranging from 600 to 800 pounds an acre of a 4:8:6 mixture.

Norfolk sand.—To a depth of 4 or 6 inches Norfolk sand is light-gray sand. This layer is underlain by pale-yellow loose medium sand to a depth of 40 or more inches. In some places at a depth ranging from 32 to 38 inches the soil material is reddish-yellow very friable slightly loamy sand. In most places below a depth of 40 inches is pale-yellow sand extending to a depth of 60 or 70 inches, where it grades into almost white sand. In places, the surface is covered with rounded quartz gravel, but such bodies are not extensive enough to indicate separately on the soil map. Along the State highway south from Candor, near Center Church, is an area including about 12 acres, in which the surface soil is dark gray or black and the subsoil is mottled gray and yellow. This land is ditched and cultivated and would have been mapped as Portsmouth sandy loam had it been sufficiently extensive.

Large unbroken areas of Norfolk sand occur in the vicinity of Candor and extend southeastward to the county line. This soil is rather extensive and includes a total area of 28.4 square miles. Approximately 60 or 70 per cent of the land is used for agriculture. The leading crops are peaches, cotton, and corn, and the minor crops are vetch, watermelons, cantaloupes, and tobacco. Grapes are grown, mainly for home use. Peaches are produced as a cash crop, and a large area of the soil is devoted to their production. The yields over a period ranging from 3 to 5 years are good.

Peach trees are fertilized with a 4:9:5 or 4:10:5 mixture at the rate of 1 pound for each year of age of the tree to a maximum of about 6 pounds. In some orchards the rate of fertilization depends on the success or failure of the previous crop. Vetch is grown as a cover crop between the rows in some orchards.

Cotton yields from one half to three fourths of a bale an acre and corn from 10 to 25 bushels. The fertilizer treatment for these crops is similar to that on Norfolk sandy loam, but the applications are heavier. Tobacco is produced to a small extent and yields from 600 to 800 pounds of a bright type. The fertilizer treatment for tobacco ranges from 600 to 1,000 pounds an acre of a 4:8:4 mixture. Cantaloupes and watermelons are grown on a small acreage for market, and the melons are of fine flavor and good shipping quality. Stone Mountain is the chief variety of watermelon. Watermelons receive from 800 to 1,000 pounds an acre of 5:7.5 fertilizer and an additional application of nitrate of soda, and cantaloupes are given an application of high-grade fertilizer. On this soil, one fairly large commercial apple orchard has been established, and the yields and quality of the fruit are considered very satisfactory.

Ruston gravelly sandy loam.—The surface soil of Ruston gravelly sandy loam is grayish-yellow or slightly brownish yellow friable sandy

loam or loamy sand containing from 15 to 25 percent of gravel. The gravel, consisting of small rounded quartz from one fourth inch to 2 inches in diameter, occur on the surface, but they become well mixed with the soil on plowing. Included with this soil are a few small areas which are gravel free. The subsoil, beginning at a depth ranging from 12 to 18 inches, is yellowish-red or brownish-red friable sandy clay which extends to a depth ranging from 38 to 45 inches, where it grades into mottled or streaked reddish-brown, yellow, pink, and light-gray friable sandy clay material. The red color of the subsoil represents a more advanced stage of oxidation than occurs in Norfolk sandy loam. This soil occurs in the southeastern part of the county west of Candor. Approximately 90 percent of the land is cultivated. The crops, yields, and fertilizer treatment are similar to those on Norfolk sandy loam.

Bradley sandy loam.—Bradley sandy loam represents a soil condition rather than a definite soil type. It occurs on the border of the coastal plain and Piedmont Plateau and partakes of the characteristics of the soils in these two regions, the surface soil resembling that of Norfolk sandy loam and the subsoil that of the Georgeville or Wadesboro soils. The surface soil is grayish-yellow loamy sand from 15 to 20 inches thick. The subsoil is red or dull-red friable silty clay or sandy clay, which grades into soft decayed rock material at a depth ranging from 34 to 38 inches. In some places the surface soil is eroded, and red spots of the subsoil are exposed. Areas in which rounded quartz gravel lies on the surface occur in places, but these were not sufficiently important to show on the soil map. In a few small areas the subsoil is yellow or reddish yellow.

This soil occurs in the southeastern part of the county south of Biscoe and along Drowning Creek. About 30 percent of the land is used for agriculture. The crops and fertilization are similar to those on Norfolk sandy loam, but the yields are slightly lower.

Meadow (Congaree material).—Meadow (Congaree material) represents alluvial soil which is variable in color, texture, and structure and for this reason cannot be classed as a definite soil type. It is composed mainly of material washed from the piedmont soils, which has not yet developed into a definite soil on account of unfavorable drainage and the frequent additions of new material by overflow waters. The surface soil ranges in color from yellowish brown to brown and reddish brown and consists of silt loam, silty clay loam, fine sandy loam, or fine sand. The subsoil is brown, mottled with yellowish brown and gray, friable material or silty clay. This soil occurs in narrow strips along many of the smaller streams and is not so well drained as Congaree silt loam. It is not used for crops, but a small acreage is in pasture.

Included with meadow are narrow strips of swamp along a few of the streams in the sand-hill section. The swamp areas are saturated part of the year and are subject to frequent overflows. In them the surface material is variable, ranging in color from light gray to almost black, and it contains more or less organic matter. The texture of the surface material ranges from sand to silt. The subsoil in most places is heavier than the surface material and consists of mottled yellow, gray, and brown sand, sandy clay, or silty clay material. This swampy land is not used for agriculture.

FOREST SOILS

The forest soils of Montgomery County include Georgeville stony silt loam, Herndon stony silt loam, Iredell stony loam, Hoffman sandy loam, and rough stony land. Over large areas, especially of rough stony land, the surface soil is shallow or has been removed through erosion. The subsoil layer is, in many places, very thin, and rocks lie near the surface and in some places outcrop. These soils occupy a total area of 139.1 square miles, or 28.5 percent of the area of the county. They occur in large unbroken areas in the northwestern, northern, central, and southeastern parts. Their surface relief is rolling, steeply sloping, hilly, or semimountainous. Surface drainage is everywhere excellent, as the water rapidly runs off the hillsides.

These areas consist of cut-over lands, that is the original hardwood timber has been cut, and white, red, and post oaks and shortleaf pine constitute the greater part of the second growth. Some of the trees have attained sufficient size to be cut for saw timber. Pine predominates in the southern part of the county, and the hardwoods are more numerous in the western and northern parts.

These soils have been classed as forest soils not because they produce better trees than other soils—in fact they do not—but because the surface relief and stony character of the soils render them unsuitable for general-farming operations under present economic conditions. If the steep hillsides were cleared and farmed, erosion and gullyng would soon be very pronounced, unless the land were seeded to grass or large sums of money were expended for the maintenance of terraces.

A few small areas of the smoothest and most nearly stone free land are farmed, and a few commercial apple orchards are on Herndon stony silt loam. The smoother-surfaced and less stony land may gradually be brought under cultivation for orchards or for grazing sheep and cattle. Grapes and other crops may be successfully grown. Under present conditions, the best use for these soils is for forestry, that is, for the growing of merchantable timber and the production of crossties and charcoal.

Georgeville stony silt loam.—Georgeville stony silt loam is similar to Georgeville silt loam of the group of red-land soils, except that the surface soil is not so uniform in color and depth and the subsoil, in many places, is very thin or lacking over the slate bedrock. One of the distinguishing features is the large quantity of white angular quartz occurring as fragments scattered over the surface or as solid outcrops. The stones range in diameter from 3 to 12 or more inches and in most places are so numerous that plowing and cultivation are difficult.

This soil occurs on the lower slopes and at the bases of some of the low mountains and also on steep slopes leading to drainage ways and heads of streams. It occupies 66.8 square miles and is the most extensive soil in the county. Large areas occur in the northwestern, western, northeastern, and southern parts.

On account of the stone content and unfavorable surface features, only a few small areas are used for crops, and a small part of the land is in pasture. The crops grown are mainly corn and cotton, and the

yields are lower than on Georgeville silty clay loam. Nearly all this land is covered with second-growth timber, mainly hardwoods. The timber yields a small supply of lumber each year. Because of the stony character and the unfavorable surface relief, the soil if cleared would not equal the other Georgeville soils in crop production, and for this reason it is probably best suited to forestry. Some of the smoother and less stony areas could be used for pasture or orchards.

Iredell stony loam.—Iredell stony loam, locally known as “black-jack oak” land, has a brown or grayish-brown loam surface soil 8 or 10 inches thick, which in places carries a noticeable quantity of small brown rounded iron concretions. The subsoil consists of brownish-yellow or yellowish-brown heavy soft plastic clay which grades into soft decomposed rock at a depth ranging from 20 to 30 inches. When exposed to the air the subsoil turns brown, and when dry it shrinks and cracks. Broken rock fragments and boulders ranging from small to large, known as “niggerhead rocks,” are scattered over the surface in sufficient quantities to interfere with cultivation.

This is one of the less extensive soils in the county. It occupies small areas along the western side. It is unimportant agriculturally, but small patches are used for cotton, corn, or pasture. Practically all the land is forested, and, on account of its stoniness, forestry is probably the best use to be made of it. Some areas if cleared would make fair pasture.

Herndon stony silt loam.—Herndon stony silt loam differs from Herndon silt loam in its surface relief and stony character. Scattered over the surface and to some extent embedded in the soil are numerous angular stone fragments in such quantities as to interfere with cultivation. The rock fragments are mainly pieces of the underlying rock, but in some places they represent remnants of white quartz veins. The surface relief is more uneven than that of Herndon silt loam and ranges from rolling to steep and rough. This soil occurs on some of the low mountains and to a large extent on steep slopes to streams and around their sources. Some areas are on the tops of interstream ridges.

This soil occupies a total area of 41 square miles. Large unbroken areas occur in the north-central part and in the northeastern corner, and many smaller areas are scattered over the county.

Like Georgeville stony silt loam, only a small acreage is used for agriculture. On the few areas farmed, cotton and corn are the principal crops, and the yields are lower than on Herndon silt loam. A large commercial peach and apple orchard is located on this soil on the summit of Shelter Mountain. The yields and quality of fruit are good. Most of the land supports a cover of second-growth forest consisting of hardwoods, together with some pine, and a small amount of lumber is produced each year. The soil, because of its stony character and unfavorable surface relief, is probably best adapted to forestry. However, some parts of it would be suitable for orchards and pasture.

Hoffman sandy loam.—The surface soil of Hoffman sandy loam consists of grayish-yellow or pale-yellow loamy sand to a depth ranging from 10 to 20 inches. The subsoil begins as dull-yellow or brownish-yellow sandy clay which grades within a few inches into mottled

yellow, red, pink, and gray friable sticky sandy clay representing the partly decomposed material from which the soil is derived. Locally, rounded quartz gravel occur on the surface and in the soil. Such areas are indicated on the soil map by gravel symbols.

This soil covers a total area of 12.4 square miles. Only a few smooth-surfaced areas are cleared and cultivated, in connection with fields of Norfolk sand. This soil occurs on the steeper slopes and hillsides leading to streams in the southeastern part of the county. On account of the surface relief, the sandy character of the soil, and the ease with which it erodes, the land is probably best suited to forestry.

Rough stony land.—Rough stony land comprises areas of rough, broken, or steep land on which many outcrops of solid rock and a large quantity of stones occur. The stones range in size from a few inches to large boulders several feet in diameter. The intervening soil is mainly Georgeville silt loam and Herndon silt loam, but it is in a much less well developed stage, both in the surface soil and subsoil, than in typical areas where the surface relief is favorable. This rough land occurs mainly on low mountains in the western and northwestern parts of the county, and some areas are in the southern part along Little River. The surface relief is characterized by sharp ridges, low peaks, steep broken mountain slopes, and steep slopes and breaks near streams. The total area of land of this kind is 17.6 square miles. All of it is cut-over timberland. Forestry is the best use to be made of it.

SOIL MANAGEMENT AND AGRICULTURAL METHODS³

The soils throughout Montgomery County, except those in some of the bottoms, are deficient in organic matter. In their natural state they have a thin layer of leaf mold or partly decomposed vegetable matter on the surface, but when the land is cleared of forest, the organic matter is soon lost through cultivation, and it is necessary to supply this to the soil in order to build up and maintain fertility. Some of the better farmers supply organic matter by growing and plowing under legumes and other green-manure crops.

Shallow breaking of the land is almost universally practiced. The land is usually plowed to a depth of 4 or 5 inches, and some farmers practice deeper plowing. A few farmers plow in the fall, but most of the land is plowed in the spring as early as weather conditions allow. Where the land is broken to only a slight depth it is benefited by gradually increasing the depth of plowing to 7 or 8 inches, provided this is done in the winter or early spring. By this method considerable soil moisture is stored and some plant food is saved from loss through leaching. It is necessary that the depth of plowing be increased gradually, because, if a large amount of the raw subsoil is brought up at one plowing it will probably do more harm than good.

It is probable that if deeper plowing were practiced on most of the land, terracing would be less essential than it is at present. On

³ This section is based mainly on information supplied by C. B. Williams, by the county farm agent and from publications of the North Carolina Agricultural Experiment Station.

many of the more rolling areas of the piedmont sections, erosion is causing serious land waste in places. Many of the farmers realize this condition and in order to prevent it have constructed, or are constructing, terraces. Improved terraces have been constructed for demonstration purposes on about 130 farms, and these are in good condition. Some terraces have been constructed on about 400 farms, but many of them are not kept in good condition.

Definite systems of crop rotation are not practiced. On many farms cotton, corn, or wheat are grown consecutively for 2 or 3 years, and the land is then allowed to lie idle or rest for 2 or 3 years and grow up with weeds and sprouts, and on some farms corn and wheat alternate year after year. On some farms in the northern part of the county corn, wheat, and clover are grown in rotation. During 1930, a few farmers started a definite 3-year demonstration rotation as follows: First year, cotton or corn; second year, wheat, oats, or barley seeded to Lespedeza, the Lespedeza being grown for seed; third year, Lespedeza for hay followed by corn or cotton.

Crop rotation is an important factor in building up and maintaining soil fertility. Many of the farmers recognize the value of crop rotation to their land, and it is probable that the practice will be extended. The farmers are now growing the crops best suited to the soils, and the land is well adapted to a wide variety of legumes, but under the present system of clean-cultivated crops very little organic matter is being added and much fertility is being lost. The North Carolina Agricultural Experiment Station recommends the following rotations as suitable for the needs of the different farms: Three-year rotation—first year, corn; second year, wheat, red clover; third year, red clover. Four-year rotation—first year, corn, crimson clover sown in the fall; second year, crimson clover followed by cowpeas or soybeans; third year, wheat, red clover; fourth year, red clover. Another 4-year rotation is, first year, corn; second year, wheat, red clover; third year, red clover; fourth year, cotton, rye.

Lespedeza is well adapted to many of the soils, particularly the Georgeville soils, and the following rotations are given to include this crop: First year, corn, crimson clover or vetch sown in the fall; second year, crimson clover or vetch followed by cowpeas or soybeans, wheat; third year, wheat, with Lespedeza sown on the wheat in the spring; fourth year, red clover. Another rotation including Lespedeza is first year, corn or wheat; second year, wheat, Lespedeza sown on the wheat in the early spring; third year, Lespedeza; fourth year, cotton, with hairy vetch sown in the cotton after the first picking.

Lime is used on about 100 farms. In the piedmont section it is applied to land planted to legumes or small grain and in the sand-hill section to cover crops in peach orchards. Where lime is used, better crop yields are obtained. Lime is applied in the form of ground limestone at the rate of about 1 ton to the acre. In the piedmont section of the county where lime has not been used and crop rotations, including legumes, are practiced it is well to use 1 ton of ground limestone to the acre or its equivalent in some other form of lime every 3 or 4 years. The best practice is to apply the lime immediately before the legume is seeded. Where red clover is the legume, a good

time to apply the lime is during the fall when the clover is seeded or during the fall under the small-grain crop, where the clover is to be seeded in the early spring on the small grain.

Carefully conducted field experiments have been made by the North Carolina Agricultural Experiment Station on many types of soil in the State to determine the best fertilizer treatment for different crops. Many of the soils on which the experiments were conducted are similar to those in Montgomery County. Table 4 gives recommendations in respect to soils, crops, and amounts and kinds of fertilizer. These recommendations are the results of field experiments, and they are given here to apply to the different soils in the county that are listed.

TABLE 4—Fertilizer recommendations for the leading crops on the soils of Montgomery County, N C.

Soils	Fertilizer ¹ recommended for—					
	Corn	Small grains	Cotton	Tobacco	Legumes	Pasture
Georgeville.....	Pounds 400 of a 5-10-3 mixture	Pounds 400 of a 5-10-3 mixture	Pounds 500 to 600 of a 5-10-3 mixture	Pounds 1,000 of a 3-8-5 mixture	Pounds 400 of a 2-10-4 mixture	Pounds 400 of a 4-10-4 mixture
Penn.....	do.....	do.....	do.....	do.....	do.....	Do.
Wadesboro.....	do.....	do.....	do.....	do.....	do.....	Do
Davidson.....	do.....	do.....	do.....	do.....	do.....	Do
Herndon.....	400 of a 4-10-4 mixture and 15 of ammonia, ²	400 of a 4-10-4 mixture and 15 of ammonia ²	600 to 800 of a 4-10-4 mixture and 15 of ammonia ⁴	1,000 of a 4-8-6 or a 3-8-5 mixture	do.....	Do.
Alamance.....	do.....	do.....	do.....	do.....	do.....	Do.
Granville.....	do.....	do.....	do.....	do.....	do.....	Do
White Store.....	do.....	do.....	do.....	do.....	do.....	Do
Orange.....	do.....	do.....	do.....	do.....	do.....	Do
Iredell.....	do.....	do.....	do.....	do.....	do.....	Do
Altavista.....	400 of a 4-8-4 mixture and 10 of ammonia ³	400 of a 4-8-4 mixture	do.....	do.....	do.....	do.....
Norfolk ⁵	400 to 600 of a 4-8-4 mixture and 13 of ammonia ³	400 of a 4-8-4 mixture and 13 of ammonia ³	600 to 800 of a 4-8-4 mixture and 13 of ammonia ⁴	1,000 of a 4-8-6 mixture	300 to 400 of a 2-8-4 mixture	do.....
Ruston.....	do.....	do.....	do.....	do.....	do.....	do.....
Bradley.....	do.....	do.....	do.....	do.....	do.....	do.....
Hoffman.....	do.....	do.....	do.....	do.....	do.....	do.....
Norfolk sand.....	400 of a 4-8-4 mixture and 20 of ammonia ³	do.....	600 to 800 of a 4-8-4 mixture and 20 of ammonia ⁴	do.....	400 of a 2-8-4 mixture	do.....

¹ The quantities given are acre applications

² The second application of ammonia (nitrogen) is made as a top dressing when the corn is knee-high

³ The second application of ammonia (nitrogen) is made as a top dressing to small grains when the stalks begin to send up stems for the formation of seed heads

⁴ The second application of ammonia (nitrogen) is made as a top dressing to cotton before the first cultivation after chopping

⁵ Except Norfolk sand

Table 5 lists the highest-yielding varieties and strains of the leading crops in the piedmont and coastal-plain sections of the State, and the list applies to these same sections of Montgomery County. The varieties and strains were determined by long-continued and carefully conducted field tests by the department of agronomy of the North Carolina Agricultural Experiment Station.

TABLE 5—Recommended crop varieties for the piedmont and coastal-plain sections of Montgomery County, N. C.

Crop	Piedmont section	Coastal-plain section	Crop	Piedmont section	Coastal-plain section
Corn.....	Weekly Improved (Piedmont branch station strain) Southern Beauty Latham's Double Jarvis Golden Prolific (yellow)	Latham's Double. Indian Chief (yellow) Biggs (W W Eagles strain)	Cotton.....	Mexican Big Boll Cleveland Big Boll. Coker-Cleveland (1½-inch staple)	Mexican Big Boll Cleveland Big Boll Coker-Cleveland (1½-inch staple)
Wheat.....	Alabama Blue-stem Fulcaster (Pennsylvania station strain) Purple straw Gleason Leap Prolific		Grasses.....	Orchard Redtop Timothy Fall oatgrass Kentucky blue-grass Meadow fescue	Redtop Bermuda grass Ryegrass Carpet grass Dallis grass Kentucky blue-grass
Rye.....	Abruzzi	Abruzzi	Soybeans (for soil improvement)	Herman Virginia Mammoth yellow Tokyo Laredo	Herman Mammoth yellow brown Otootan. Tokyo.
Oats.....	Lee Fulghum Appler	Fulghum (for fall and spring sowing) Appler (for fall sowing) Burt (for spring sowing).	Clover.....	Red White Crimson Japan Sweet.	Crimson. White Sweet Japan
Barley.....	Tennessee No 6 (hooded)	Tennessee No 6 (hooded).	Vetch.....	Hairy	Hairy
Tobacco (bright)	Cash White-stem Orinoco Jamaica (wrapper). Bonanza	Cash White-stem Orinoco Jamaica (wrapper)			

The following list of publications is appended for reference for persons who wish more detailed information that may apply to the agriculture of Montgomery County. The reference list is furnished by the North Carolina State College, Raleigh, N C.

North Carolina Agricultural College Extension Circulars 24, How to Use Lime on the Farm; 57, Soybeans—a Future Economic Factor in North Carolina; 96, Vetch for North Carolina; 98, Crimson Clover for North Carolina; and 127, Soybean Growing in North Carolina

North Carolina Agricultural Experiment Station Circular 35, Velvet Beans, How to Grow and Use

North Carolina Agricultural Experiment Station Agronomy Information Circulars 40, Fertilizer Recommendations for Important Crops of Agricultural Region No. 7 of North Carolina, with a List of Soil Types Arranged in Accordance with Their Extent; 42, Summary of Results of Cotton Variety Experiments Conducted During 1927, '28, and '29 and Production and Consumption of Different Staple Lengths; 47, Improved Practices for Producing Tobacco of Better Quality; and 49, Factors in Soybean Production, Variety Recommendations, and Characteristics

North Carolina Agricultural Experiment Station Bulletins 250, Fertilizer Experiments with Cotton, 255, Influence of Crop Rotation and Soil Treatments upon the Yield of Crops on Norfolk Sandy Loam Soil, 262, Value of Lime on Norfolk Sandy Loam Soil, as Shown by the Relative Yields and Profits of Crops Grown in Rotation under Different Soil Treatments; 263, Approved Practices for Sweet Potato Growers; and 266, Effects of Synthetic Nitrogen and Concentrated Fertilizers on Cotton and Sweet Potatoes

North Carolina Department of Agriculture Bulletins, Report on the Piedmont Soils (February 1915), and Fertilizer Experiments with Flue-cured Tobacco (June 1927)

SOILS AND THEIR INTERPRETATION

Montgomery County lies mainly in the Piedmont-Plateau region of the State, but about one tenth, or the southeastern corner, is in the sand-hill section of the Atlantic Coastal Plain. The county is therefore located on the borders of the gray- and the red-soils belts.

The surface soils are prevailingly light in color, ranging from light gray to reddish brown. The soils have developed under a forest cover of oaks and pines, and conditions have not been favorable for the accumulation of a large quantity of organic matter. The composition of the soils is not favorable to the absorption and retention of large quantities of organic matter as in many of the prairie soils in the Western States. In forested areas there is usually a thin layer of leaf mold on the surface and a comparatively small quantity of organic matter mixed with the topmost few inches of soil. When the land is cleared of forest the small accumulation of vegetable matter is soon disseminated through cultivation.

Leaching or washing out of the soluble matter in the soils has been active and is still in operation, being particularly evident in the sandy loam and sand soils. The surface soil, or A horizon, is highly eluviated and does not contain so much soluble plant food as the subsoil, or B horizon. In this region of rather heavy rainfall and warm temperature, leaching continues throughout the year. The soil is not frozen to a great depth like the soils in the Northern States, and the ground remains frozen for only short periods, not sufficiently long to arrest the processes of leaching. Much of the land is bare during the winter and is used to a large extent for clean-cultivated crops in the summer, and this condition may account for some of the loss of plant food from the surface soil. On account of leaching, free carbonate of lime has not accumulated in the soil, and owing to the deficiency of lime the soils range from slightly acid to acid. Table 6 gives the results of pH determinations of samples of several soils from Montgomery County and shows their relative acidity.

TABLE 6 — Results of pH determinations on four soils of Montgomery County, N C

Sample no	Soil type	Depth	pH
		<i>Inches</i>	
238307	Georgeville silt loam.....	1 to 7	5.07
238308	.....do.....	7 to 11	4.85
238309	.....do.....	11 to 28	4.96
238338	Orange silt loam.....	2 to 6	5.67
238339	.....do.....	6 to 18	5.22
238340	.....do.....	18 to 28	5.53
238343	Granville sandy loam.....	½ to 7	4.96
238344	.....do.....	7 to 30	4.96
238348	White Store very fine sandy loam.....	1 to 8	5.22
238349	.....do.....	8 to 20	4.87

The effects of erosion are evident in many parts of the county, particularly on cleared areas of the Georgeville, Penn, Wadesboro, and Herndon soils. Erosion is not so noticeably active in the forested areas but in abandoned fields supporting a second growth of pine it did serious damage until the second growth of trees checked its

ravages Erosion has not only changed the surface features by washing and gullyng but it has also caused changes in soil texture. In places the sandy or silty surface mantle has been partly or entirely removed leaving the red or yellowish-red clay B horizon exposed. In the southeastern part of the county a much larger area was formerly covered by sandy deposits of the coastal plain but through the action of erosion much of the soil material has been carried away. The sandy covering is well preserved on the smoother ridges but on the steeper slopes it has been removed. In some places disconnected areas of the original sandy coastal-plain covering occur on surrounding piedmont country.

The soil-forming material, composed of decayed rock and beds of sandy clay and sand, lies from 2 to more than 6 feet below the surface. It has no uniformity in color, structure, or texture, as it is derived from four distinct sources or rock formations, as follows:

(1) Slates of the Carolina slate belt, in which the rocks are laminated slates and dense rocks of very fine texture, ranging in color from light gray to dark bluish gray or greenish gray, and the weathered parts show shades of purple, deep red, yellow, and gray. The rocks are prevailingly very fine in texture and on exposure to the weather become soft and shatter into small angular and platy chips which finally weather into smooth flourlike silt. The Georgeville, Alamance, and Orange soils are derived from the weathered products of these rocks.

(2) Highly metamorphosed volcanic sediments ranging from impure quartzite to rocks of schistose structure containing a predominant amount of quartz and mica and a small amount of feldspar and epidote. The rocks range from massive to granular and have in places the superficial appearance of fine-textured granite. Some of the rocks on the weathered surface soil have the appearance of small shell rock or coquina. These rocks occur in large areas in association with the slates, and in places the soils are influenced by the slates. The Herndon soils are derived from these rocks.

(3) Triassic shale, sandstone, and mudstone. The color of these rocks ranges from Indian red and purplish red to brown. The rock formations occur in the southern part of the county near the Richmond County line, and they compose the material from which the Penn, Wadesboro, Granville, and White Store soils are derived. Within the rock formations in the foregoing groups are small intrusions of dike rock, mainly diorite and gabbro. These rocks furnish the material for small areas of Davidson and Iredell soils.

(4) Beds of unconsolidated water-deposited material, mainly sandy clays and sands. These deposits underlie the coastal-plain section in the southeastern part of the county. They are variable in texture, friable, and mottled with red, yellow, gray, and pink. The soils derived from them are the Norfolk, Ruston, and Hoffman. Along the border of the coastal-plain and piedmont regions the formations overlap, and from a combination of material from both regions the Bradley soils are formed. Altavista and Congaree soils are developed from recent alluvial deposits along the creeks and rivers.

Uneven land features have been formed as a result of the greater or less degree of resistance to forces of weathering by the underlying rock formation. The resultant surface relief is mainly that of fairly smooth topped ridges and rather deep and narrow valleys, but in the

northwestern part of the county, owing to the more resistant character of the rocks, numerous small low mountains, which stand out conspicuously above the general level of the country, have been formed.

Through the weathering of the different rock formations, the several soils differing in texture, structure, and color have been formed and their profiles distinctly marked. The most striking feature of the texture profile of all the normally developed soils is the presence of a comparatively light textured surface layer, a second layer of heavier texture (in many places much heavier), and a third layer which may vary considerably in texture, but which is prevaingly lighter than the second layer, or B horizon, but in most places is heavier than the first layer, or A horizon. The texture of the A horizons ranges from sand, loamy sand, and sandy loam to silt loam, silty clay loam, and clay loam. In many places an admixture of gravel is in the surface layer, and in other places angular rock fragments occur on the surface. The texture of the B horizon, or subsoil, ranges from heavy plastic clay, clay, and silty clay to sandy clay and sand. The third layer, or C horizon, is composed of partly decomposed rock or sandy clay and sand material which is variable in texture. The thickness of the different horizons ranges widely—the surface horizon from 5 to 7 inches in the clay loams and silty clay loams, from 7 to 10 inches in the silt loams, and from 8 to 20 inches in the sandy loams. The second layer, or subsoil horizon, ranges in thickness from about 8 inches to approximately 48 inches, and the C horizon may extend to a great depth, although in some places it is only a few inches thick.

In the piedmont section of the county Georgeville silt loam may be considered the soil having a normally developed profile. Following is a profile description of this soil observed $1\frac{1}{4}$ miles south of Parsons Grove Church:

- Horizon A₁ 0 to 1 inch, light-gray silt loam having a thin layer of leaf mold on the surface and containing a small amount of organic matter in the soil
- Horizon A₂ 1 to 7 inches, grayish-yellow silt loam containing very little organic matter. Roots of plants occur in this layer
- Horizon A₃ 7 to 11 inches, reddish-yellow friable silty clay loam. This is the gradational zone between the light eluviated horizon and the heavy illuviated horizon. Roots, root holes, and worm casts are in this layer.
- Horizon B₁ 11 to 28 inches, red heavy smooth friable crumbly silty clay which breaks into angular lumps, and these break easily into smaller angular soil particles. A cut surface is yellowish red
- Horizon B₂ 28 to 37 inches, light-red friable crumbly silty clay which is lighter in color and texture than the B₁ horizon
- Horizon C 37+ inches, mixed yellow, red, pink, and gray, with a thin coating of black along cleavage lines, soft smooth decomposed slate

In addition to Georgeville silt loam, the silty clay loam, gravelly silty clay loam, gravelly silt loam, and stony silt loam members of the Georgeville series are developed in Montgomery County. These soils differ mainly from the normally developed Georgeville silt loam in the texture of the A horizon. Georgeville silty clay loam in some places has been formed from Georgeville silt loam by erosion, the light silt loam having been removed, leaving the heavier-textured soil. The other Georgeville soils are characterized by the noticeable content of platy and angular gravel or by broken fragments of rock on the surface. Georgeville stony silt loam is more rolling and steeper, and because of this the depth to the B horizon in many

places is not so great as in Georgeville silt loam. Table 7 gives the results of mechanical analyses of samples of several layers of Georgeville silt loam.

TABLE 7 — *Mechanical analyses of Georgeville silt loam*

No	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Percent	Percent	Percent	Percent	Percent	Percent	Percent
238306	Surface soil, 0 to 1 inch.....	1 7	4 3	2 2	3 3	4 4	66 6	17 4
238307	Subsurface soil, 1 to 7 inches....	2 8	5 1	2 1	2 0	3 7	62 6	21 1
238308	Subsoil, 7 to 11 inches.....	1 2	1 7	7	9	1 9	51 0	42 6
238309	Subsoil, 11 to 28 inches.....	5	1 3	1 0	1 7	2 8	38 0	54 6
238310	Subsoil, 28 to 37 inches.....	4	2 2	1 4	2 2	4 5	47 9	41 4
238311	Subsoil, 37+ inches.....	1 6	6 0	3 6	5 5	8 8	55 5	19 0

Alamance silt loam is closely associated with the Georgeville soils and is derived from the same sort of rock. In contrast to the Georgeville soils it is developed on smooth areas and in flats, and the soil is imperfectly drained as indicated by the mottled gray and bluish-gray coloration in the lower part of the profile. The soil is light gray or pale yellow in the A horizon and is pale-yellow friable silty clay in the B horizon.

The Orange soils are similar to the Alamance soils in the A horizon and upper layer of the B horizon. The lower part of the B horizon is brownish-yellow, with spots of dark brown and gray, heavy plastic clay. On account of this heavy layer, these soils are poorly drained. They are derived in part from the same kind of rock as the Alamance soils. Orange silt loam and Orange gravelly silt loam occur in the county. Table 8 gives the results of mechanical analyses of samples of several layers of Orange silt loam.

TABLE 8 — *Mechanical analyses of Orange silt loam*

No	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Percent	Percent	Percent	Percent	Percent	Percent	Percent
238337	Surface soil, 0 to 2 inches.....	4 7	4 8	2 1	3 6	6 2	71 0	7 7
238338	Subsurface soil, 2 to 6 inches....	2 5	2 5	1 3	2 3	4 8	75 1	11 5
238339	Subsoil, 6 to 18 inches.....	1 9	1 7	9	1 3	3 2	56 4	34 6
238340	Subsoil, 18 to 28 inches.....	4	6	4	7	2 5	43 3	52 1
238341	Subsoil, 28 + inches.....	2 6	12 6	11 1	15 5	11 3	32 1	14 8

The Davidson and Iredell soils are developed in small scattered areas in the piedmont section of the county. These soils are derived from the same kind of rock and are formed under the same climatic conditions. Their differences are probably owing to stage of development and degree of oxidation of the soil material. In the Davidson soil oxidation is complete, and this soil has the reddest B horizon of any of the piedmont soils. The A horizon is reddish brown, and the B horizon is dark-red or maroon smooth heavy brittle clay which is free from grit and crumbles easily. The C horizon is ochreous-yellow and dark-red clay containing some white soft decomposed rock. Davidson clay loam is mapped.

The Iredell soils occupy smooth areas, and both surface and internal drainage are poor. The A horizon is gray or brownish-gray, and the B horizon consists of heavy tough plastic waxy yellowish-brown clay which shrinks and cracks on drying. Iredell stony loam is mapped.

The Herndon soils are developed in close association with the Georgeville soils in the central and northern parts of the county. They differ from the Georgeville soils mainly in the color of the B horizon which is yellowish-brown or reddish-yellow silty clay in the upper layer and mottled brownish yellow and bright red in the lower layer. A profile description of Herndon silt loam as observed 4½ miles northwest of Troy is as follows:

- Horizon A₁ 0 to 2 inches, gray smooth floury silt loam containing a small quantity of organic matter.
- Horizon A₂ 2 to 9 inches, grayish-yellow mellow silt loam containing very little organic matter. A large number of plant roots are in this layer.
- Horizon B₁ 9 to 28 inches, yellowish-brown friable crumbly silty clay which breaks into large angular lumps and shows a glistening brown film along breakage lines. The lumps easily break into smaller angular soil particles.
- Horizon B₂ 28 to 44 inches, mottled brownish-yellow and bright-red friable silty clay
- Horizon C₁ 44 to 55 inches, mottled yellow, very light gray, and bright-red decomposed rock material showing white decayed material resembling feldspar.
- Horizon C₂ 55+ inches, red, yellow, brown, or almost white disintegrated rock

In addition to Herndon silt loam the gravelly silt loam, very fine sandy loam, and stony silt loam members of the Herndon series are developed. Herndon stony silt loam and some areas of Herndon gravelly silt loam are more rolling and rougher than the other Herndon soils. The gravel, which are composed to a large extent of quartz, are angular, and the stones on the surface are angular fragments of the parent rock.

In the southern part of the county, Penn, Wadesboro, Granville, and White Store soils are developed from rock formations of Triassic age. A profile of Penn silt loam as observed 2 miles south of Harrisville shows the following characteristics:

- Horizon A₁ 0 to 1 inch, grayish-brown mellow silt loam containing a small quantity of organic matter
- Horizon A₂ 1 to 6 inches, light-brown or slightly reddish brown silt loam, having a very small content of vegetable matter.
- Horizon B 6 to 38 inches, purplish-red friable silty clay which breaks into large angular lumps, and these in turn, break with slight pressure into smaller angular particles. In dried-out exposures the soil cracks into fine angular particles. The cut surface is lighter in color than the material along natural breakage lines
- Horizon C 38+ inches, purple, with some brown and ochreous yellow, partly decomposed soft smooth shale

The Wadesboro soils have dark-red or dull-red friable sandy clay B horizons. The A horizons are grayish-yellow friable sandy loam with yellowish-red heavy sandy loam subsurface layers. The C horizons consist of dark-red, streaked or mottled with brownish yellow, friable decomposed sandstone. Wadesboro sandy loam and Wadesboro gravelly sandy loam are developed.

The Norfolk, Ruston, Bradley, and Hoffman soils are developed in the coastal-plain section in the southeastern part of the county. Norfolk sandy loam is the normally developed soil in this section, and

its profile shows a light-textured and light-colored highly eluviated A horizon, a much heavier B horizon showing considerable illuviation, and a C horizon not so heavy as the B horizon but heavier than the A horizon and consisting of material variable in color, structure, and texture.

A typical profile of Norfolk sandy loam, one fourth mile west of Candor, shows the following horizons and their characteristics:

- Horizon A₁ 0 to 4 inches, gray loamy sand containing a small quantity of organic matter.
- Horizon A₂ 4 to 18 inches, grayish-yellow friable loamy sand of single-grain structure, containing very little organic matter.
- Horizon B 18 to 34 inches, yellow friable crumbly sandy clay which breaks down into a soft crumbly mass.
- Horizon C. 34+ inches, yellow, mottled or spotted with dark red, friable sandy clay material which is lighter in texture and more friable than the clay in the B horizon.

On account of the surface relief the Ruston soils are better drained than the Norfolk soils, and for this reason they are more thoroughly aerated and oxidized. The main difference between these soils is the color of the B horizon. In the Ruston soils this horizon is yellowish-red or brownish-red friable sandy clay, in contrast to the yellow material of the Norfolk subsoils. Ruston gravelly sandy loam is the only member of the Ruston series mapped.

Rough stony land is a classification of material occurring in rough, steep, and broken areas. Numerous angular stones and boulders are on the surface.

SUMMARY

Montgomery County is in the south-central part of North Carolina. The western boundary is about 50 miles from Charlotte. The surface features are varied, ranging from low mountains to comparatively broad, smooth, interstream country. Much of the land ranges from gently rolling to strongly rolling and steep. Owing to favorable surface relief, drainage is good over practically all the county.

Three rivers are in the county. Considerable hydroelectric power is developed on two of them and it is possible to develop power on the other.

A large part of the county is covered with second-growth timber, a large quantity of which is cut from the forests annually. Only 45.8 percent of the total area of the county is in farms, only a small proportion of which is devoted to cultivated crops.

Montgomery County was formed in 1778, and the early settlers were of Scotch, English, and Welsh descent. The population numbers 16,218, and the average number of people to the square mile is 32.6. The population is not evenly distributed, as some large areas have few inhabitants. Troy is the county seat.

Railroad facilities are adequate, and State highways traverse nearly all the agricultural districts. The principal markets for peaches are New York, Philadelphia, and Boston.

The climate is oceanic, and the difference between the mean temperatures of winter and summer is 34.3° F. The climate is sufficiently mild for the production of winter cover crops and hardy vegetables, and peaches are ready for market in early summer. The average frost-free season is 195 days, and the rainfall is sufficient to mature the crops commonly grown.

Agriculture in the county began prior to the Revolutionary War. The turpentine and lumber industries were important for many years, and during the period of lumbering agricultural progress was retarded.

The great majority of farms range from 10 acres to about 260 acres in size. Owners operate 58.7 percent of the farms and tenants 40.9 percent. Most of the farm land is rented on the share-crop basis. The livestock industry is of little importance, but each farmer keeps a few cows and hogs for home supplies.

The county lies almost entirely in the piedmont-plateau region, but a small part is in the sand-hill region of the coastal plain. The soils differ widely in physical and chemical composition, and the controlling factor in their development is the character of the underlying soil material. The better-developed soils with favorable surface relief control the agriculture.

The agriculture consists of the production of corn, wheat, oats, and hay as general farm crops, and cotton and peaches as special cash crops. Some tobacco, watermelons, and cantaloupes are grown for sale. Corn is the principal subsistence crop, and cotton is the main cash crop.

Considered agriculturally the soils are divided into three groups—that including light-colored or red surface soils and red clay subsoils, that including light-colored surface soils and yellow or reddish-yellow clay subsoils, and that including light-textured sandy soils having sandy clay or sand subsoils.

Soils of the first group, or those having light-colored or red surface soils and red clay subsoils, are the Georgeville, Penn, Wadesboro, Davidson, Iredell, and Congaree soils. These soils cover 36.4 percent of the total area of the county. They dominate the agriculture. On them is grown most of the cotton, corn, wheat, oats, and legumes produced.

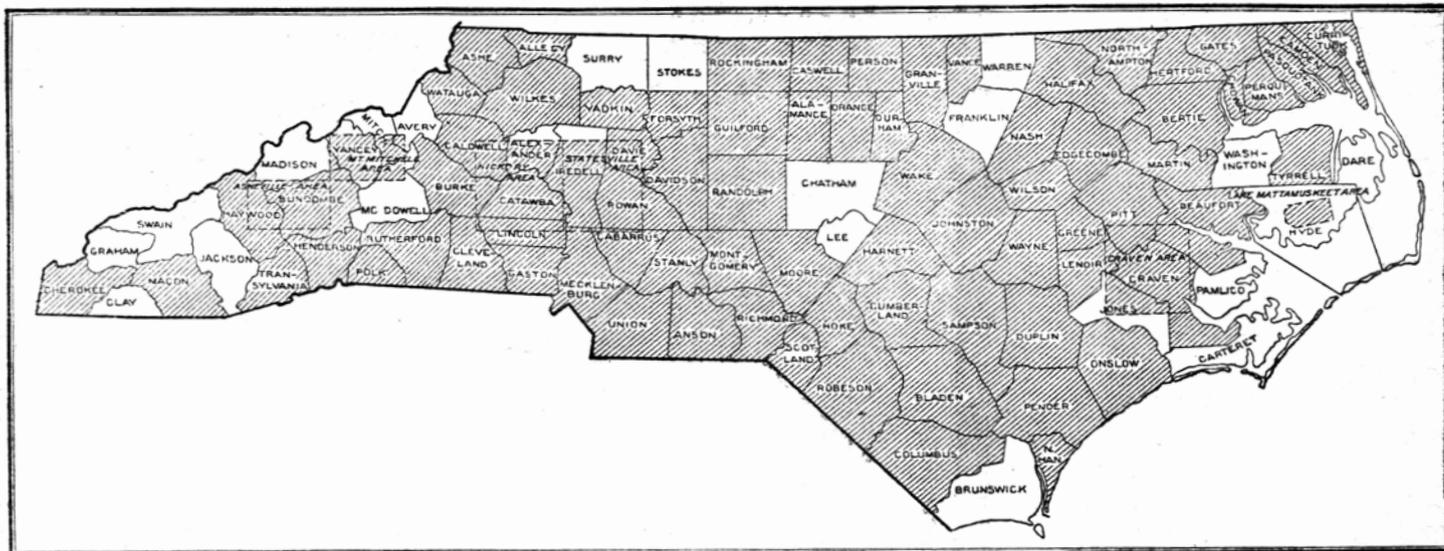
Soils of the second group, or those having light-gray surface soils and yellow or reddish-yellow subsoils, are the Herndon, Alamance, Orange, Granville, White Store, and Altavista soils. These soils cover a total area of 128 square miles, but a much smaller percentage of the land is used for agriculture than of the red-land soils. Cotton and corn are the main crops, and some wheat, oats, clover, Lespedeza, vetch, and tobacco are grown. The yields are not so high as on the red-land soils, and, although most of the crops produced in the county are not so well suited to these soils, tobacco is well suited and is grown in a small way on the Herndon soils. Herndon silt loam and Herndon very fine sandy loam offer promise of the extension of tobacco culture, provided economic conditions warrant.

The soils of the third group, or those having light sandy surface soils and yellow or yellowish-red friable sandy clay subsoils, are the Norfolk, Ruston, Bradley, and Hoffman soils. Owing to their sandy texture, most of the soluble plant food has been leached from the surface soils, and the subsoils contain much less potash than the subsoils of the red-land soils. These soils, however, respond readily to fertilization and produce some of the most profitable crops in the county.

The opportunities offered to prospective settlers are healthfulness of climate, fairly productive soil, reasonably priced land, an excellent system of hard-surfaced main roads, good sand-clay lateral roads, and splendid schools and churches.

Authority for printing soil survey reports in this form is carried in Public Act No. 269, Seventy-second Congress, second session, making appropriations for the Department of Agriculture, as follows:

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Areas surveyed in North Carolina, shown by shading

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