SOIL SURVEY

Macon County North Carolina

Series 1944, No. 6

Issued April 1956

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION
and the
TENNESSEE VALLEY AUTHORITY

How to Use THE SOIL SURVEY REPORT

FARMERS who have worked with their soils for a long time know about differences among soils on their own farms, and perhaps about differences among soils on the farms of their immediate neighbors. What they do not know, unless soil surveys have been made, is how nearly their soils are like those on experiment stations or other farms, either in their State or other States, where farmers have gained experience with new or different farm practices or enterprises. The farmers of Macon County can avoid some of the risk and uncertainty involved in trying new crops and management practices by using this soil survey report. It gives them an opportunity to compare their soils with soils on which new developments have proved successful.

SOILS OF A PARTICULAR FARM

All the soils in Macon County are shown on the soil map that accompanies this report. To learn what soils are on a farm, it is first necessary to locate the farm on the map. This can be done by using roads, streams, villages, dwellings, and other landmarks to locate the boundaries.

The next step is to identify the soils on the farm. Suppose, for instance, one finds on a farm an area marked with the symbol Sa. Look at the Color Grouping and Legend on the soil map and find Sa. This symbol identifies a soil—State loam, undulating phase. All areas of this soil, wherever they appear on the map, have the same symbol and the same color. If the area is very small the symbol may be outside of it, but an arrow shows where the symbol belongs.

What is State loam, undulating phase, like; for what is it used; and to what uses is it suited? For this information turn to the section, Soil Types and Phases. How productive is this soil? The answer will be found in table 12. Find in the left-hand column of this table State loam, undulating phase, and read in the columns opposite the yields of different crops it can be expected to produce. Compare these yields with those given in the table for other soils of the county. Notice, also, the difference between yields under good and common management.

What uses and management practices are recommended for State loam, undulating phase? First read what is said about this soil in the section, Soil Types and Phases. Then refer to the section, Land Use, Management, and Productivity, in which the soils are placed in different groups according to the kind of management they need. State loam, undulating phase, is in management group 1–B. What is said about crops, crop rotations, liming, fertilization, water relations, erosion control, and other management practices for soils of group 1–B will apply to State loam, undulating phase.

SOILS OF THE COUNTY AS A WHOLE

A general idea of the soils of the county is given in the introductory part of the section, The Soils of Macon County. It tells about the principal kinds of soils, where they are found, and how they are related. Study the soil map and notice how the different kinds of soils tend to be arranged in different patterns in different parts of the county. These patterns frequently indicate well-recognized differences in type of farming, land use, and land use problems.

A newcomer to the county, especially if he considers purchasing a farm, will want to know about the climate; the types and sizes of farms; the principal farm products and how they are marketed; the kinds and conditions of farm tenure; kinds of farm buildings, equipment, and machinery; availability of churches, schools, roads, railroads, and electric services, and water supplies; the industries of the county; and the cities, villages, and population characteristics. Information on these will be obtained in two sections—General Nature of the Area, and The Agriculture of Macon County.

Those interested in how the soils of the county were formed and how they are related to the great soil groups of the world should read the section, Morphology, Genesis, and Classification of Soils.

This publication on the soil survey of Macon County, N. C., is a cooperative contribution from the—

SOIL CONSERVATION SERVICE

the

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION

and the

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SOIL SURVEY OF MACON COUNTY, NORTH CAROLINA[1]

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United States Department of Agriculture in cooperation with the North Carolina Agricultural Experiment Station and the Tennessee Valley Authority

(This report supersedes the Soil Survey of Macon County, series 1929, No. 16)

CONTENTS

[1] Report revised by R. C. Jurney, Soil Survey, Soil Conservation Service.

[2] Field work for this report was done under the direction of Soil Survey while it was a part of the Bureau of Chemistry and Soils. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

MACON COUNTY is a mountainous area in the western part of North Carolina. About 40 percent of it is in farms, and the rest is in cutover forest or idle land reverting to forest. Harvesting of pulpwood, extract wood, and other forest products supplements farm income, as agriculture alone would not support the population.

The farms—75 percent of them less than 70 acres in size—produce corn, wheat, rye, oats, and hay mainly for farm use, and cabbage, potatoes, green beans, and tobacco for sale. Almost every farm has a few hogs, one to three milk cows, and a small flock of chickens to provide meat, milk, and eggs for the farm family. Large areas of land are eroded and abandoned because scarcity of good farmland has encouraged clearing and cultivation of areas better suited to forest or permanent pasture. Some soils that could be farmed or pastured successfully under good management are still forested. Farmers in the county can benefit by obtaining a better adjustment of land use.

This survey was made cooperatively by the United States Department of Agriculture, the North Carolina Agricultural Experiment Station, and the Tennessee Valley Authority; it is designed to aid the farmers of Macon County in determining how suitable various crops are for their particular soils. It describes the soils, classifies them according to their suitability for farming, and suggests management for them. The survey is not intended as a substitute for the detailed information on management and crop varieties that can be obtained from county agricultural agents, local representatives of the Soil Conservation Service, the State experiment stations, or similar sources. Soils change gradually, but farm management changes from year to year. The successful farmer knows his soils and applies up-to-date management.

GENERAL NATURE OF THE AREA

LOCATION AND EXTENT

Macon County is in the southwestern part of North Carolina (fig. 1). It is bounded by Clay, Cherokee, and Graham counties on the west; by Swain County on the north; by Jackson County on the east; and by the State of Georgia on the south. The total area of the county is approximately 504 square miles, or 332,800 acres. Franklin, the county seat, is 55 miles southwest of Asheville and 145 miles west of Charlotte.

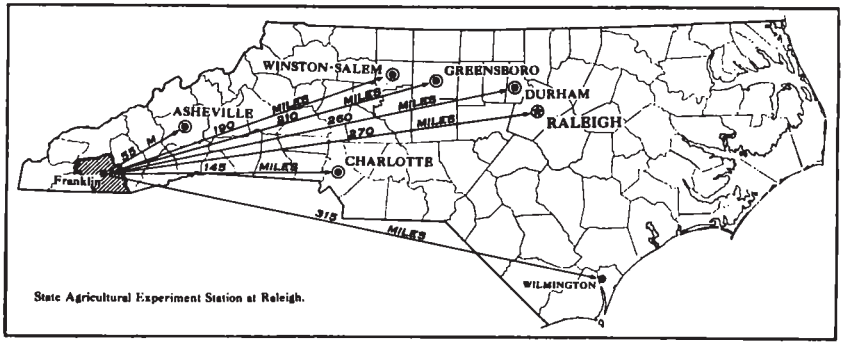

FIGURE 1.—Location of Macon County in North Carolina.

PHYSIOGRAPHY, RELIEF, AND DRAINAGE

Macon County lies within the Blue Ridge province of the Appalachian Highlands (*1*).[3]

The Blue Ridge, Cowee, and Nantahala Mountains are the principal ranges in the county. Spurs of these ranges extend in many directions. The mountains have rather sharp crests and steep slopes. Relief is comparatively smooth in a few narrow high plateau areas near Highlands, in some of the coves, and in places near the base of some mountains. In the central part of the county the rolling topography of the foothills in the Little Tennessee River valley between the Cowee and the Nantahala Mountains strikingly contrasts with the surrounding rough mountainous country.

Along the streams are strips or small areas of almost level bottomland from a few feet to more than a half mile wide, most of which are subject to periodic overflow. A few remnants of old terraces along the Little Tennessee River lie about 400 feet above the river channel; these are most extensive at Franklin and to the south.

Altitudes, as shown by United States Geological Survey topographic sheets, range from 1,840 to almost 6,000 feet. There are 17 mountain peaks with altitudes of more than 5,000 feet each, and 27 peaks with altitudes between 4,000 and 5,000 feet. Some of the more prominent peaks are Wine Spring Bald, 5,500 feet; Wayah Bald, 5,400 feet; Yellow Bald, 5,240 feet; Shortoff Mountain, 5,054 feet; and Satulah Mountain, 5,000 feet. The lowest part of the county is in Little Tennessee River valley, where the average upland altitude is about 1,970 feet.

[3] Italic numbers in parentheses refer to Literature Cited, p. 124.

Because of the rolling, hilly, and steep topography, natural drainage is excellent for most of the county. In some small nearly level places in first bottoms, however, drainage is fair or poor. Creeks, branches and smaller drainageways that extend to all parts of the county give the upland complete surface drainage. Areas west of the Blue Ridge are drained by the Little Tennessee and the Nantahala Rivers. The small part east of the Blue Ridge is drained by the Chattooga River and its tributaries. The Little Tennessee and Nantahala Rivers flow northward, eventually reaching the Mississippi River; the Chattooga River flows southeastward, eventually reaching the Atlantic Ocean.

GEOLOGY

All soils of the uplands have developed from the weathered products of the underlying rocks. The geologic formations consist principally of crystalline rocks, some of them highly metamorphosed. The important formations are mentioned in the following paragraphs:

Carolina gneiss occurs in the central part of the county and consists of an immense series of interbedded mica schist, garnet schist, mica gneiss, kyanite gneiss, and fine granitoid layers (*9*). Most of these rocks are light gray or dark gray; they weather to dull gray or greenish gray.

Roan gneiss, is intermixed with the Carolina gneiss and occurs chiefly in the central part of the county. It consists of a series of interbedded mica schist and mica gneiss and hornblende schist and hornblende gneiss (*9*). The hornblende beds are dark green or black and the micaceous beds are dark gray.

Whiteside granite occurs on Whiteside Mountain, to the north and west of Highlands, and east of Highlands to the county line. This granite underlies most of the southeastern part of the county. It is medium gray but becomes lighter colored upon weathering (*10*). Porphyritic crystals of orthoclase feldspar are prominent in this rock.

Great Smoky conglomerate, occurring in the northwestern part of the county, is made up of a variety of strata, including conglomerate, sandstone, quartzite, graywacke, mica schist, garnet schist, and slate (*9*). It is of a uniform gray color and weathers to a lighter color.

Nantahala slate, found in the northwestern part of the county and associated with the Great Smoky conglomerate, is composed of black-and-gray banded slates and of schists distinguished by mica, garnet, staurolite, or chloritoid (*9*). It is black and dark gray and weathers to a lighter color.

The economic minerals produced in this county are mica, kaolin, and asbestos (*4*). Near Norton and on Commissioner Creek, good asbestos occurs. Corundum occurs principally on Hickory Knoll Creek, near Ellijay and Cullasaja, on the summit of Turkey Knob, and in the gravel of Cowee Creek. A good grade of garnet schist occurs in large quantities 3 miles north of Franklin. Kaolin clay occurs 4 miles northwest of Franklin, on Trimont Mountain, 4 miles north of Franklin, near Wests Mill, along Watauga Creek, and to the southwest of Franklin. Mica occurs near Iotla, Wests Mill, and along with the clay deposits. Many precious and semiprecious stones occur, including amethyst, garnet, sapphire, beryl, aquamarine (*11*) and, on Cowee Creek, fine rubies (*5*).

CLIMATE

The climate of Macon County is influenced by the high altitudes. During the fairly short summers the nights are cool and the days are seldom sultry or very hot. Winters are not extremely cold, although a few short, erratic spells of very cold weather may be expected. Rainfall is plentiful and well distributed through the growing season, as well as through the year. The average annual temperature and precipitation differ widely from place to place because of great differences in elevation. On the higher mountains precipitation is greater and the annual temperature is lower than in the valley parts of the county.

The average frost-free period near Highlands is 173 days (April 26 to October 17). In the valley sections the average frost-free period is somewhat longer. Killing frosts have occurred as late as May 26 and as early as September 13 near Highlands, but not in the valley areas.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation near Highlands, Macon County, and at Cullowhee, Jackson County, N. C.*

HIGHLANDS (NEAR), ELEVATION, 3,800 FEET

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Total for the driest year	Total for the wettest year	Average snowfall
	° *F.*	° *F.*	° *F.*	*Inches*	*Inches*	*Inches*	*Inches*
December	40. 9	69	−10	8. 80	3. 29	14. 32	3. 0
January	39. 7	65	−14	6. 90	9. 12	13. 27	5. 3
February	40. 6	67	−19	6. 70	3. 72	12. 11	5. 6
Winter	40. 4	69	−19	22. 40	16. 13	39. 70	13. 9
March	45. 3	75	−7	8. 40	4. 06	5. 62	2. 5
April	53. 6	81	15	6. 40	3. 51	2. 71	1. 2
May	61. 1	84	26	6. 00	5. 36	8. 52	0
Spring	53. 3	84	−7	20. 80	12. 93	16. 85	3. 7
June	67. 9	87	32	7. 40	1. 90	15. 47	0
July	70. 5	87	39	8. 70	4. 64	2. 90	0
August	70. 1	85	40	7. 50	1. 02	7. 60	0
Summer	69. 5	87	32	23. 60	7. 56	25. 97	0
September	66. 3	84	27	6. 80	. 83	10. 36	0
October	55. 8	79	15	6. 30	8. 47	12. 30	. 1
November	46. 3	72	3	5. 00	7. 52	6. 02	. 4
Fall	56. 1	84	3	18. 10	16. 82	28. 68	. 5
Year	54. 8	87	−19	84. 90	[3] 53. 44	[4] 111. 20	18. 1

See footnotes at end of table.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation near Highlands, Macon County, and at Cullowhee, Jackson County, N. C.*—Continued

CULLOWHEE, ELEVATION 2,100 FEET

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Total for the driest year	Total for the wettest year	Average snowfall
	° *F.*	° *F.*	° *F.*	*Inches*	*Inches*	*Inches*	*Inches*
December	40.3	77	−11	4.20	0.77	3.08	2.1
January	40.4	79	−9	3.90	4.57	4.54	2.7
February	41.6	79	−9	3.20	2.39	4.39	2.4
Winter	40.8	79	−11	11.30	7.73	12.01	7.2
March	47.6	87	4	5.20	2.67	3.51	2.1
April	55.5	91	17	3.60	1.43	4.10	.1
May	63.2	92	28	3.60	1.63	5.11	[5]
Spring	55.4	92	4	12.40	5.73	12.72	2.2
June	70.4	97	36	4.00	1.49	7.22	0
July	73.5	99	43	4.20	2.80	10.47	0
August	72.7	96	38	4.00	.74	11.40	0
Summer	72.2	99	36	12.20	5.03	29.09	0
September	68.5	92	31	3.50	.67	4.37	0
October	57.5	88	15	2.70	3.35	6.05	[5]
November	46.3	79	5	2.20	2.85	2.21	.8
Fall	57.4	92	5	8.40	6.87	12.63	.8
Year	56.4	99	−11	44.30	[3] 25.36	[6] 66.45	10.2

[1] Average temperature at Highlands based on a 52-year record, 1896 to 1947; highest and lowest temperatures from a 25-year record, 1906 to 1930.

Average temperature at Cullowhee based on a 42-year record, 1910 to 1951; highest and lowest temperatures from a 22-year record, 1909 to 1930.

[2] Average precipitation at Highlands based on a 62-year record, 1886 to 1947; wettest and driest years based on a 22-year record, 1909 to 1930; snowfall on a 23-year record, 1908 to 1930.

Average precipitation at Cullowhee based on a 42-year record, 1910 to 1951; wettest and driest years based on a 21-year record, 1910 to 1930; snowfall on a 22-year record, 1909 to 1930.

[3] In 1925.

[4] In 1915.

[5] Trace.

[6] In 1949.

The average annual snowfall is 10 to 20 inches (*2*), and the average annual number of days with snow cover is 10 to 30, except possibly at the lower elevations in the valleys. Snow often remains on some of the higher slopes during much of midwinter.

Normal monthly, seasonal, and annual temperature and precipitation are given in table 1, for two United States Weather Bureau

stations. The Highlands weather station is on an intermountain plateau in Macon County; the Cullowhee station in adjoining Jackson County is in a river valley. Information for these two stations is representative of the weather in the hilly and mountainous areas and the valley areas.

WATER SUPPLY

The many streams furnish abundant water for livestock. Excellent spring water for domestic use is available on nearly every farm, and well water can be obtained at 100 feet or less. A few artificial lakes provide recreation, and many streams are stocked with game fish. A large hydroelectric power development is at Beechertown, another plant at Highlands, and a small plant near Frankiln. Several potential sites for development of more waterpower are in the county.

VEGETATION

Macon County lies within two subdivisions of the eastern forest region: (1) The birch-beech-maple-hemlock, and (2) the chestnut-chestnut oak-yellow poplar. The first grows mainly on the higher slopes and the tops of ridges and mountains; the second occupies the lower slopes, valleys, and areas along streams.

The county had an almost unbroken cover of virgin forest before pioneer settlement. Perhaps half the trees were chestnut. Hemlock, tuliptree (yellow-poplar), Southern red oak, and some black locust were fairly common along streams; white and Virginia (scrub) pine, ash, tuliptree, basswood, maple, blackgum, silverbell, black walnut, and butternut grew along the lower slopes; varieties of hickory were on the ridges; scarlet oak, Southern red oak, chestnut oak, and Table-mountain pine were fairly abundant on the upper slopes; beech, birch, and sugar maple were on the highest elevations, generally about 4,000 feet; some balsam fir and spruce were on the north slopes and tops of the high mountains.

The undergrowth in the virgin forest was mostly dogwood, serviceberry, mountain-laurel, and rhododendron. Rhododendron was more common at the higher elevations and mountain-laurel at the lower. Huckleberry, buckberry, and briers were fairly extensive in the undergrowth, and trailing-arbutus and galax grew on the middle to higher slopes of the mountains.

The chestnut was completely wiped out by blight, but many of the dead trees still stand and are being harvested for acid or extract wood.

Most of the original forest has been cut for timber. These cutover areas are now in second- and third-growth timber. The stand consists of tuliptree, various oaks, maple, black locust, white and shortleaf pines, birch, and hickory. There is a great deal more pine and black locust than there was in the virgin forest.

Idle and abandoned areas soon grow up in weeds, broomsedge, and briers, and within 3 or 4 years white pine, shortleaf pine, black locust, or tuliptree (yellow-poplar) appear. Except in severely eroded areas, the trees grow rapidly and make a good stand within a few years. Since 1935 some of the land, especially severely eroded and gullied areas, has been reforested by planting.

ORGANIZATION AND POPULATION

The Cherokee Indians held the territory in which Macon County lies when De Soto passed through in 1540. The first white settlements were made in the Highlands area.

The county was formed from Haywood County in 1828 (*5*), and named for Nathaniel Macon, a North Carolina statesman and soldier of the Revolutionary War. Franklin, the county seat, was named in honor of Jesse Franklin, Governor of North Carolina, 1820–21 (*11*). The first courthouse was erected in 1828. Franklin is the site of the old Cherokee town of Nikwasi (sacred town), which the Indians occupied until 1819.

The present inhabitants are mostly descendants of the original settlers, who came from other parts of North Carolina, from Virginia, and from South Carolina. There are only few foreign-born. About 10 percent of the population is Negro.

In 1950, the population of the county was 16,174, all classed as rural. Franklin and Highlands, the largest towns, had populations of 1,975 and 515, respectively. The population is unevenly distributed. Most of it is concentrated in the central and south-central parts along the Little Tennessee River. Other somewhat more thickly populated parts of the county are in valleys that have small bodies of good agricultural land.

TRANSPORTATION AND MARKETS

One railroad, the Tallulah Falls, runs to Franklin from Cornelia, Ga., where it connects with the main line of the Southern. Five main highways serve the county, and all are open for travel throughout the year. Secondary roads and trails extend into all parts of the county, but they may be impassable to heavy vehicles at times in winter. According to the 1950 census, the average farm in the county is 6 miles from the trading center most frequently visited, and 0.6 of a mile of this is unimproved road.

The smaller towns serve as purchasing points for supplies needed on the farms. Franklin is the only local market for farm products. Much farm produce is brought in by farmers, but hucksters also gather it on trade routes through the county. Some vegetables are shipped to Asheville, N. C., and Atlanta, Ga. Livestock is shipped by truck or train to outside markets. Milk is collected by truck and hauled to the local creamery or to creameries in nearby counties. The tanbark, acid wood, pulpwood, and lumber are shipped mostly to processing plants outside the county.

INDUSTRIES

Next to farming, the most important enterprise in the county is the harvesting and preparing of timber, tanbark, pulpwood, acid or extract wood, and other forest products (*4*). Sawmills are located throughout the county, and many are portable.

Several small plants in the county process mineral products, chiefly mica. Small local gristmills grind corn and feed for rural communities, but there is no flour mill in the county.

THE SOILS OF MACON COUNTY

GENERAL NATURE OF THE SOILS

The soils of Macon County are classified in 24 series and 5 miscellaneous land types. The soil series are grouped according to the position they occupy on prominent features of the landscape. Four kinds of positions are recognized: (1) Mountain uplands, or landscapes of high elevation, long and generally steep slopes, and narrow valleys; (2) intermountain uplands, or landscapes of lower elevation and a less steep but nevertheless strongly rolling to hilly relief with somewhat more open valleys; (3) terraces along stream bottoms—higher than these bottoms and not subject to flooding—subdivided as high stream terraces and low stream terraces; and (4) first bottoms, or land areas that lie near streams, made up of waterborne material and subject to overflow by the adjacent streams.

The miscellaneous land types are Mines, pits, and dumps; Rock outcrop; Rough gullied land (Fannin and Clifton soil materials); Stony colluvium (Tusquitee and Tate soil materials); and Stony rough land (Porters and Ashe soil materials).

The external and internal characteristics and related features of the soil series of the county and the position they occupy on the landscape are given in table 2.

SOILS OF MOUNTAIN UPLANDS

ASHE SERIES

The Ashe soils are developed over light-colored granite, gneiss, and schist rocks and have dark yellowish-brown surface soils and strong yellowish-brown relatively permeable subsoils. Although relief is rolling to steep and natural fertility is low, the less steep areas are suitable for agriculture and respond well to good management.

PORTERS SERIES

The Porters soils developed over dark-colored granite, gneiss, and schist. They have dark-brown to moderate-brown surface soils and moderate-brown relatively permeable subsoils. Natural fertility is moderately high. Because of their hilly to very steep slopes, however, these soils are used principally for pasture and forest (pl. 1, *A*).

CHANDLER SERIES

The Chandler soils have developed over highly micaceous rock, chiefly schist and gneiss, and are shallow to bedrock. They have moderate yellowish-brown stony loam surface soils and strong yellowish-brown to light yellowish-brown loam or silt loam subsoils. A large quantity of mica is present throughout the soil mass. Because of the hilly to steep relief and the low natural fertility, the Chandler soils are poorly suited to agricultural use (pl. 1, *A*). The less steep areas are fairly well suited to grazing when adequately managed.

TALLADEGA SERIES

The Talladega soil, like the Chandler, has developed from highly micaceous rock, chiefly mica gneiss or mica schist. It has a moderate-

brown loam surface soil and a strong-brown loam to silty clay loam subsoil. Because of its steep relief and low natural fertility, it is poorly suited to crops and pasture (pl. 1, *A*).

RAMSEY SERIES

The Ramsey soils have developed on steep and very steep slopes over highly siliceous rocks. They have weak-brown friable stony loam or silt loam surface soils and poorly developed strong yellowish-brown friable loam or fine sandy clay subsoils. They are generally shallow to bedrock. Because of their steep relief and low fertility, these soils are poorly suited to crops and pasture and are best suited to forest. Some of the less steep areas could be used for pasture under adequate management.

BURTON SERIES

The Burton soil is distinguished by its brownish-black to black stony loam surface soil that contains a large quantity of organic matter. The subsoil is moderate-brown to strong yellowish-brown friable clay loam or loam. Most areas of this soil are in elevated coves or on north-facing slopes in association with Ashe or Porters soils. The relief is hilly, with a few strongly sloping and steep areas. Its high elevations and high stone content prevent its use for crops, but it does support a good grass cover and is well suited to grazing.

CLIFTON SERIES

The Clifton soils are common to both the mountain and intermountain uplands. They have developed over dark-colored basic igneous or metamorphic rock and have moderate-brown or dusky-brown surface soils and strong-brown to moderate-brown subsoils. The natural fertility is fairly high. The surface relief is hilly to steep, and the less steep areas are reasonably well suited to pasture or crops.

TUSQUITEE SERIES

The Tusquitee soils, common to both the mountain and intermountain uplands, have developed on colluvium or local alluvium washed from adjacent areas of the associated Hayesville, Porters, Clifton, and Rabun series. Soils of the associated series have developed in place from the underlying rock, and the differences among them arise chiefly from differences in the parent rock. These differences are very greatly modified by the processes that form the Tusquitee soils. Tusquitee soils are brown, fertile, and among the most suitable in the county for agriculture.

TATE SERIES

The Tate soils occur on both the mountain and intermountain areas. They have developed on colluvium or local alluvium washed from adjacent areas of the associated Ashe, Chandler, and Halewood series. They have brownish-gray loam surface soils and moderate yellowish-brown friable sandy clay loam subsoils. The surface relief is undulating to hilly. Although the soils are moderately low in natural fertility, they respond readily to good management. They are well suited to truck crops, forage, and pasture.

TABLE 2.—*Soil series of Macon County, N. C., grouped according to physiographic position*

SOILS OF MOUNTAIN UPLANDS

Soil series	Parent material (substratum)	Relief	Surface soil (A horizon) [1]	Subsoil (B horizon)
Ashe	Residuum from—Granite, gneiss, or schist	Rolling to steep	Dark yellowish-brown friable loam or stony loam.	Strong yellowish-brown friable loam or sandy clay loam.
Porters	Granite, gneiss, or schist	Hilly to very steep	Dark-brown to moderate-brown very friable loam or stony loam.	Moderate-brown very friable loam to clay loam.
Chandler	Mica schist or mica gneiss	Hilly to steep	Moderate yellowish-brown friable stony loam.	Strong yellowish-brown to light yellowish-brown friable loam or silt loam.
Talladega	Mica schist or mica gneiss	Steep	Moderate-brown friable micaceous loam	Strong-brown friable loam or light silty clay loam.
Ramsey	Highly siliceous rocks	Steep and very steep	Weak-brown friable stony loam or silt loam	Strong yellowish-brown friable loam or fine sandy clay.
Burton	Granite, gneiss, or schist	Hilly	Brownish-black to black friable stony loam	Moderate-brown to strong yellowish-brown friable clay loam or loam.
Clifton	Hornblende gneiss and schist	Hilly to steep	Moderate-brown friable clay loam or dusky-brown very friable stony loam or stony clay loam.	Strong-brown to moderate-brown firm but friable clay loam.
Tusquitee	Colluvium or local alluvium from Hayesville, Porters, Clifton, and Rabun soils.	Undulating to hilly	Dark-brown friable loam or stony loam	Dark yellowish-brown friable loam or clay loam.
Tate	Colluvium or local alluvium from Ashe, Chandler, and Halewood soils.	Undulating to hilly	Brownish-gray friable loam	Moderate yellowish-brown friable sandy clay loam.

SOILS OF INTERMOUNTAIN UPLANDS

Soil series	Parent material (substratum)	Relief	Surface soil (A horizon) [1]	Subsoil (B horizon)
Hayesville	Residuum from—Granite, gneiss, or schist	Rolling to steep	Light yellowish-brown friable loam, clay loam, stony loam, or stony clay loam.	Strong-brown to strong reddish-brown firm but friable clay loam to clay.
Halewood	Granite, gneiss, or schist	Hilly to steep	Weak-brown or yellowish-brown friable loam, clay loam, or stony loam.	Moderate yellowish-brown friable clay loam.
Rabun	Dark-colored basic crystalline rocks.	Rolling to steep	Moderate-brown friable clay loam or stony clay loam.	Moderate reddish-brown firm but friable clay loam or clay.
Fannin	Mica schist or mica gneiss	Hilly to steep	Moderate-brown friable stony loam or stony clay loam.	Strong-brown firm but friable clay loam.
Clifton	Hornblende gneiss and schist	Hilly to steep	Moderate-brown friable clay loam or dusky-brown very friable stony loam or stony clay loam.	Strong-brown to moderate-brown firm but friable clay loam.
Tusquitee	Colluvium or local alluvium from Hayesville, Porters, Clifton, and Rabun soils.	Undulating to hilly	Dark-brown friable loam or stony loam	Dark yellowish-brown friable loam or clay loam.
Tate	Colluvium or local alluvium from Ashe, Chandler, and Halewood soils.	Undulating to hilly	Brownish-gray friable loam	Moderate yellowish-brown friable sandy clay loam.

Soils of High Stream Terraces				
Hiwassee	Old alluvium	Undulating to hilly	Dark reddish-brown friable clay loam or gravelly clay loam.	Moderate reddish-brown friable silty clay to clay.
Masada	Old alluvium	Undulating to hilly	Brownish-gray friable loam or gravelly loam.	Strong yellowish-brown friable clay loam.
Soils of Low Stream Terraces				
Altavista	Moderately recent alluvium	Undulating	Weak-brown very friable loam	Moderate yellowish-brown friable to very slightly sticky silty clay loam.
State	Moderately recent alluvium	Undulating	Weak-brown friable loam or gravelly loam	Moderate-brown friable clay loam.
Warne	Moderately recent alluvium	Nearly level to undulating	Brownish-gray friable silt loam	Light yellowish-brown, mottled with moderate yellowish brown, compact silty clay.
Augusta	Moderately recent alluvium	Level to undulating	Brownish-gray friable loam or silt loam	Yellowish-gray, mottled with brown, firm or slightly compact but friable fine sandy clay.
Soils of the First Bottoms				
Congaree	Recent alluvium	Level and nearly level	Weak-brown or moderate-brown very friable or friable fine sandy loam or silt loam.	Moderate yellowish-brown friable fine sandy loam, silt loam, or light silty clay loam.
Buncombe	Recent alluvium	Level and nearly level	Weak-brown or moderate-brown very friable loamy fine sand.	Yellowish-brown very friable or loose loamy fine sand.
Chewacla	Recent alluvium	Level, nearly level, or very gently undulating.	Weak-brown friable silt loam or brownish-gray friable loam.	Weak-brown to brownish-gray, mottled with moderate brown, friable silt loam or light silty clay loam.
Wehadkee	Recent alluvium	Nearly level	Moderate-brown, mottled with light brown, friable silt loam.	Brownish-gray, mottled with moderate brown, friable silt loam.
Toxaway	Recent alluvium	Nearly level	Brownish-black to almost black friable silt loam.	Brownish-gray friable loam.

[1] Where very little or no accelerated erosion has taken place; with increased erosion ,the color and texture approach those of the subsoil.

SOILS OF INTERMOUNTAIN UPLANDS

HAYESVILLE SERIES

The Hayesville soils have developed over granite, gneiss, or schist on rolling to steep relief. They have light yellowish-brown surface layers and strong-brown to strong reddish-brown subsoils. These soils are moderately fertile and the less sloping areas are suited to crops.

HALEWOOD SERIES

The soils of the Halewood series resemble those of the Hayesville series in many respects. They have the same parent materials—granite, gneiss, or schist—but usually occur at higher elevations. The Halewood soils have less red and more friable subsoils than the Hayesville. Most areas of Halewood soils are too steep for cultivation but are moderately well suited to pasture when adequately managed.

RABUN SERIES

Dark-colored basic igneous and basic metamorphic rocks, as olivine or hornblende schist, are the rocks from which the Rabun series has formed. The Rabun soils differ from the Clifton chiefly in having darker surface soils and redder, heavier subsoils. The Rabun soils are fertile and well suited to pasture and forage crops. The less steep areas may be used for cultivated crops.

CLIFTON SERIES

Soils of the Clifton series also have developed from dark-colored basic igneous and metamorphic rocks. They have lighter colored surface soils and subsoils than the Rabun and contain less clay. Most areas of the Clifton soils are suited to pasture but are too steep or too stony for cultivated crops.

FANNIN SERIES

The Fannin soils have developed over mica schist or mica gneiss, and the surface soil and upper subsoil in many places resemble those of the Hayesville series. Generally, however, the entire profile contains a large quantity of finely divided mica flakes, sufficient to give the soil a greasy or soapy feel, especially in the lower subsoil and in the parent material. The surface soil is moderate-brown friable stony loam or stony clay loam; the subsoil is strong-brown clay loam. The less steep areas that are relatively stone-free are moderately well suited to crops. Other areas may be used for pasture.

SOILS OF HIGH STREAM TERRACES

HIWASSEE SERIES

The Hiwassee soils are on the oldest and highest stream terraces. They have dark reddish-brown clay loam or gravelly clay loam surface soils, which are brownish red in eroded areas. The subsoil is moderate reddish-brown, firm silty clay to clay. These soils are fertile and well drained, and most areas are well suited to crops.

MASADA SERIES

The Masada soils are associated with Hiwassee soils. The soils of the two series are similar in position in the landscape, relief, and character of parent material, but the Masada soils have lighter colored surface soils and strong yellowish-brown more friable subsoils. They are fertile and well suited to crops and pasture.

SOILS OF LOW STREAM TERRACES

ALTAVISTA SERIES

The Altavista soil has a weak-brown loam surface soil and a moderate yellowish-brown, firm silty clay loam subsoil. Because of its favorable surface relief and good response to management, it has a very wide range of use suitability.

STATE SERIES

The State soils have weak-brown loam or gravelly loam surface soils and moderate-brown, friable clay loam subsoils. They are probably the most productive soils in the county and are highly prized for crops.

WARNE SERIES

The Warne soil is characterized by a light yellowish-brown, mottled with moderate yellowish brown, compact silty clay subsoil. It has slow to rapid external drainage and very slow internal drainage. The surface soil is brownish-gray silt loam. Productivity and crop suitability are limited by the compact subsoil, very slow internal drainage, and low fertility.

AUGUSTA SERIES

The Augusta soil is associated with Warne and Chewacla soils. It has formed from moderately recent alluvium and has a brownish-gray friable surface soil and a mottled yellowish-brown firm or slightly compact subsoil. Internal drainage is very slow. The soil is fairly easily worked and very easily conserved. The range of crop suitability is medium.

SOILS OF THE FIRST BOTTOMS

CONGAREE SERIES

The Congaree soils have weak-brown or moderate-brown surface soils and moderate yellowish-brown friable subsoils. Because of their favorable relief, naturally high fertility, and good internal drainage, these soils are especially suitable for corn, truck crops, and hay (pl. 1, *B*).

BUNCOMBE SERIES

The Buncombe soil has a weak-brown or moderate-brown very friable loamy fine sand surface soil and a yellowish-brown very friable or loose loamy fine sand subsoil. It has excessive drainage. It is easy to work but has only a medium range of crop suitability.

CHEWACLA SERIES

The Chewacla soils have weak-brown friable silt loam or brownish-gray friable loam surface soils and weak-brown to brownish-gray, mottled with moderate brown, friable silt loam or light silty clay loam subsoils. Because of their slow internal drainage and very slow external drainage, they are not so suitable for crops as the Congaree soils (pl. 1, *B*). Corn and hay are the principal crops.

WEHADKEE SERIES

The Wehadkee soil is very poorly drained internally and externally and is subject to frequent overflow. The surface soil is moderate-brown, mottled with light brown, friable silt loam; the subsoil is brownish-gray, mottled with moderate brown, friable silt loam. Most of this soil is used for pasture.

TOXAWAY SERIES

The Toxaway soil has a brownish-black to almost black organic silt loam surface soil and a brownish-gray friable loam subsoil. It is naturally poorly drained and is used chiefly for pasture. When adequately drained, it is excellent for corn, grass, hay crops, and, in places, for potatoes or other truck crops.

SOIL TYPES AND PHASES

In the following pages the soils, identified by symbols the same as those used on the soil map, are described in detail and their agricultural relations are discussed. Their location and distribution are shown on the soil map, and their approximate acreage and extent are given in table 3. Their use suitability, present management and management requirements, crop adaptations, crop rotations, water-control practices, fertilizer requirements, and estimated average crop yields are discussed in the section, Land Use, Management, and Productivity.

TABLE 3.—*Approximate acreage and extent of the soils mapped in Macon County, N. C.*

Soil	Acres	Percent[1]
Altavista loam, undulating phase	371	0.1
Ashe loam:		
Rolling phase	706	.2
Eroded rolling phase	545	.2
Hilly phase	3,221	1.0
Eroded hilly phase	1,620	.5
Steep phase	1,629	.5
Eroded steep phase	836	.3
Ashe stony loam:		
Hilly phase	1,263	.4
Eroded hilly phase	1,646	.5
Steep phase	19,141	5.7
Eroded steep phase	3,271	1.0
Severely eroded steep phase	432	.1
Augusta loam	78	[2]
Buncombe loamy fine sand	508	.2
Burton stony loam, hilly phase	253	.1

See footnotes at end of table.

TABLE 3.—*Approximate acreage and extent of the soils mapped in Macon County, N. C.*—Continued

Soil	Acres	Percent[1]
Chandler stony loam:		
Hilly phase	480	0. 1
Eroded hilly phase	312	. 1
Steep phase	8, 611	2. 6
Eroded steep phase	3, 348	1. 0
Chewacla loam, overwash phase	785	. 2
Chewacla silt loam	4, 030	1. 2
Clifton clay loam, eroded hilly phase	54	(2)
Clifton stony clay loam:		
Eroded hilly phase	1, 383	. 4
Severely eroded hilly phase	734	. 2
Eroded steep phase	4, 001	1. 2
Severely eroded steep phase	2, 061	. 6
Clifton stony loam:		
Hilly phase	1, 105	. 3
Steep phase	9, 922	3. 0
Congaree fine sandy loam	1, 521	. 5
Congaree silt loam	735	. 2
Fannin stony clay loam:		
Eroded hilly phase	1, 566	. 5
Severely eroded hilly phase	2, 144	. 7
Eroded steep phase	1, 639	. 5
Severely eroded steep phase	1, 753	. 5
Fannin stony loam:		
Hilly phase	1, 286	. 4
Steep phase	1, 644	. 5
Halewood clay loam, severely eroded steep phase	199	. 1
Halewood loam:		
Eroded hilly phase	322	. 1
Steep phase	739	. 2
Eroded steep phase	451	. 1
Halewood stony clay loam, severely eroded steep phase	149	(2)
Halewood stony loam:		
Hilly phase	187	. 1
Eroded hilly phase	343	. 1
Steep phase	2, 192	. 7
Eroded steep phase	1, 239	. 4
Hayesville clay loam:		
Eroded rolling phase	141	(2)
Eroded hilly phase	798	. 3
Severely eroded hilly phase	1, 375	. 4
Eroded steep phase	204	. 1
Severely eroded steep phase	440	. 1
Hayesville loam:		
Hilly phase	760	. 2
Steep phase	321	. 1
Hayesville stony clay loam:		
Eroded rolling phase	195	. 1
Eroded hilly phase	511	. 2
Severely eroded hilly phase	1, 018	. 3
Eroded steep phase	199	. 1
Severely eroded steep phase	551	. 2
Hayesville stony loam:		
Hilly phase	300	. 1
Steep phase	232	. 1

See footnotes at end of table.

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TABLE 3.—*Approximate acreage and extent of the soils mapped in Macon County, N. C.*—Continued

Soil	Acres	Percent[1]
Hiwassee clay loam:		
Eroded undulating phase	455	0.1
Eroded rolling phase	1,151	.4
Eroded hilly phase	398	.1
Hiwassee gravelly clay loam:		
Eroded undulating phase	191	.1
Eroded rolling phase	1,629	.5
Eroded hilly phase	733	.2
Masada gravelly loam:		
Eroded undulating phase	138	(2)
Eroded rolling phase	302	.1
Eroded hilly phase	156	(2)
Masada loam:		
Eroded undulating phase	85	(2)
Eroded rolling phase	153	(2)
Mines, pits, and dumps	64	(2)
Porters loam:		
Hilly phase	577	.2
Steep phase	15,879	4.8
Eroded steep phase	3,112	1.0
Porters stony loam:		
Hilly phase	375	.1
Steep phase	39,107	11.7
Eroded steep phase	2,506	.8
Very steep phase	4,645	1.4
Rabun clay loam:		
Eroded rolling phase	603	.2
Hilly phase	1,251	.4
Eroded hilly phase	4,600	1.4
Severely eroded hilly phase	549	.2
Steep phase	324	.1
Eroded steep phase	666	.2
Severely eroded steep phase	527	.2
Rabun stony clay loam:		
Eroded rolling phase	171	.1
Hilly phase	732	.2
Eroded hilly phase	721	.2
Severely eroded hilly phase	996	.3
Steep phase	447	.1
Eroded steep phase	544	.2
Severely eroded steep phase	477	.1
Ramsey stony loam:		
Steep phase	10,040	3.0
Eroded steep phase	3,409	1.0
Severely eroded steep phase	641	.2
Very steep phase	3,803	1.1
Rock outcrop	1,769	.5
Rough gullied land (Fannin and Clifton soil materials)	1,326	.4
State gravelly loam, undulating phase	381	.1
State loam:		
Undulating phase	405	.1
Eroded undulating phase	453	.1
Stony colluvium (Tusquitee and Tate soil materials)	723	.2
Stony rough land (Porters and Ashe soil materials)	100,060	30.2
Talladega shaly loam, steep phase	680	.2

See footnotes at end of table.

TABLE 3.—*Approximate acreage and extent of the soils mapped in Macon County, N. C.*—Continued

Soil	Acres	Percent[1]
Tate loam:		
Undulating phase	1,109	0.3
Eroded undulating phase	372	.1
Rolling phase	932	.3
Eroded rolling phase	1,571	.5
Hilly phase	821	.3
Eroded hilly phase	324	.1
Toxaway silt loam	286	.1
Tusquitee loam:		
Undulating phase	648	.2
Eroded undulating phase	851	.3
Rolling phase	564	.2
Eroded rolling phase	3,743	1.1
Tusquitee stony loam:		
Undulating phase	98	[2]
Eroded undulating phase	259	.1
Rolling phase	2,327	.7
Eroded rolling phase	2,807	.9
Hilly phase	4,614	1.4
Eroded hilly phase	2,910	.9
Warne silt loam	409	.1
Wehadkee silt loam	790	.3
Total land area	330,880	99.4
Water	1,920	.6
Total area	332,800	100.0

[1] Percentages are rounded to nearest 0.1 percent.
[2] Less than 0.1 percent.

Altavista loam, undulating phase (2 to 7 percent slopes) (AA).—This soil occurs in small scattered areas on low stream terraces in association with State, Warne, and Congaree soils. The parent material consists of moderately recent alluvium derived from uplands underlain by igneous and metamorphic rocks. External drainage is moderate; internal drainage is moderate to slow. The soil is strongly acid throughout the profile. Originally it had a hardwood forest cover consisting chiefly of oaks, hickory, and yellow-poplar. The soil occurs along the Little Tennessee River upstream from Franklin.

Profile description:

0 to 6 inches, weak-brown very friable loam; contains numerous brier and grass roots and a few mica flakes.
6 to 22 inches, moderate yellowish-brown friable to very slightly sticky silty clay loam; some finely divided mica flakes.
22 to 30 inches +, dark-yellow friable silt loam or slightly sticky silty clay loam, faintly mottled with gray; contains many finely divided mica flakes; underlain at variable depths by mottled gray and yellow sand and clay mixed with gravel.

The number of pebbles in the soil varies but is generally small. External drainage in the more nearly level areas is slow or very slow, and mottling is pronounced in the lower subsoil.

Mapped with this phase because of small extent and similar profile characteristics are about 63 acres of very slightly eroded silt loam, 111 acres of moderately eroded silt loam, 7 acres of level silt loam, 50 acres of slightly eroded undulating fine sandy loam, 18 acres of moderately eroded fine sandy loam, and 17 acres of level or nearly level fine sandy loam. Areas with slight erosion have lost up to 25 percent of the original surface soil; those with moderate erosion have lost 25 to 75 percent of the original surface soil and have a slightly finer texture.

Use and management.—The undulating phase is used largely for crops, principally corn, potatoes, and green beans. A small acreage is idle. The smooth surface, moderate drainage and good moisture relations, and ready response to good management make it a very suitable soil for farming.

Ashe loam, steep phase (30 to 60 percent slopes) (AG).—The soil has formed on mountain uplands from weathered material derived from light-colored granite, gneiss, and some schist. It is associated with Porters soils and Stony rough land (Porters and Ashe soil materials). External drainage is moderate to rapid, and internal drainage is moderate. The reaction is strongly acid. The forest cover is chiefly chestnut, white, post, and Spanish oaks, maple, locust, serviceberry, dogwood, sourwood, white pine, hemlock, mountain-laurel, and rhododendron. The soil occurs in relatively large bodies at high elevation in the southern part of the county near Highlands.

Profile description:

0 to 8 inches, dark yellowish-brown friable porous loam, the first 3 inches of which is brownish black and contains much organic matter; contains some finely divided mica flakes and many small and a few large roots; openings or holes are filled or coated with brown organic matter.

8 to 22 inches, strong yellowish-brown friable porous loam or sandy clay loam; contains some finely divided mica flakes and a few large roots.

22 to 34 inches, light yellowish-brown friable porous loam; varies somewhat in color and in some places still retains the original structure lines of the parent rock.

The chief variations are in the depth and degree of distinctness of the soil profile layers and in the quantity of organic matter on the surface. The soil is shallow to moderately deep to bedrock. A few loose rock fragments and some small outcrops of bedrock are on the surface.

Use and management.—Forest covers most of this soil. Fertility is moderate to low, and organic content is low except in the topmost layer in forested areas. The soil is very permeable to roots and moisture. The slopes are too steep for satisfactory production of tilled crops, but good grazing is obtained under suitable management.

Ashe loam, eroded steep phase (30 to 60 percent slopes) (AD).—The principal difference between this phase and the steep phase of Ashe loam is that erosion has removed 25 to 75 percent of the original surface soil from this phase. In most areas the plow layer consists of light-brown to yellowish-gray friable loam—a mixture of surface and subsoil materials. A few relatively shallow gullies have formed. The soil is readily permeable to roots and moisture and is medium to strongly acid. External drainage is rapid; internal drainage is moderate.

The chief variations are in degree of sheet erosion and gullying and in the depth and degree of development of the soil profile. Some stones are on the surface and in the soil profile in a few areas, but they do not interfere with tillage. About 111 acres of Ashe loam, severely eroded steep phase, has been included because of small extent and similar profile characteristics. This inclusion has lost more than 75 percent of the original surface soil through erosion, and in places some of the upper subsoil is gone. These severely eroded areas generally have gullies that are crossable with farm implements but are not obliterated by ordinary tillage.

Use and management.—All areas are cleared and used mostly for pasture. About 30 percent is in crops or is idle. A clean-cultivated crop is occasionally grown to control weeds, and the land is then reseeded to pasture mixtures. Because of the steep slope, however, the soil is poorly suited to crops requiring tillage. If it is used for crops, the soil should be used in long rotations consisting chiefly of close-growing crops. Pasture plants respond well to lime and phosphate.

Ashe loam, hilly phase (15 to 30 percent slopes) (AE).—Milder relief and, in most places, greater depth to bedrock distinguish this soil from the steep phase of Ashe loam. It is associated with other members of the Ashe series. External and internal drainage are moderate, and the entire profile is strongly acid. The forest cover is similar to that on the steep phase. The organic content and the depth and degree of development of the profile vary somewhat.

Use and management.—Practically all areas are forested. Many, if cleared, would be suited to most crops grown at high elevations in the southern part of the county. Although the soil is not so susceptible to erosion as the steep phase, its hilly relief makes frequent growing of row crops inadvisable. Good management requires substantial applications of fertilizer and lime, relatively long rotations, and tillage practices that minimize runoff.

Ashe loam, eroded hilly phase (15 to 30 percent slopes) (AB).—Milder relief and moderate erosion are the principal differences between this soil and Ashe loam, steep phase. This soil has lost 25 to 75 percent of its original surface soil by erosion, and in most places the subsoil is within plow depth. The plow layer, a mixture of original surface soil and subsoil, is a light-brown to yellowish-gray friable loam. External drainage is moderate to rapid; internal drainage is moderate. The soil is acid throughout the profile. It is readily permeable to roots and water.

The soil profile varies somewhat in distinctness of the soil layers and in depth to bedrock. In some areas a few stones are on the surface and in the soil profile, but they do not interfere seriously with tillage. About 77 acres has been included that has lost more than 75 percent of the surface soil and, in places, part of the subsoil by erosion. Some gullies have formed. They are crossable with farm implements but cannot be obliterated by ordinary tillage.

Use and management.—Corn and market vegetables are the principal crops; they are generally grown in rotation with lespedeza and pasture grasses. Good management requires heavy applications of

fertilizer and lime, relatively long crop rotations, and tillage that helps the soil retain moisture.

Ashe loam, rolling phase (7 to 15 percent slopes) (AF).—This soil differs from Ashe loam, steep phase, chiefly in having much gentler relief, slower external drainage, and less susceptibility to erosion. In some places the soil profile is deeper and better developed. In cultivated areas the surface soil consists of dark yellowish-brown friable loam. External and internal drainage are moderate, and the reaction is strongly acid.

Use and management.—About 20 percent of the soil is used for crops and pasture and the rest is in forest. Although fertility is low, this rolling phase has such favorable relief that it is suited to most crops grown in the area and especially to truck crops and grass. Corn and small grains are grown, but the season is somewhat short for them. Erosion losses from intertilled crops will be small if suitable crop rotation and other good management practices are followed. Much of the soil could be cleared for crops and other soils could then be put back into forest.

Ashe loam, eroded rolling phase (7 to 15 percent slopes) (AC).—This soil differs from Ashe loam, steep phase, mainly in having much gentler slopes and less susceptibility to erosion. In many places it differs in having a greater depth to bedrock. The surface soil is light-brown to yellowish-gray friable loam. The reaction is strongly acid throughout the profile, and both external and internal drainage are moderate.

The chief variations are in extent of erosion and in degree of distinctness of the profile layers. A few stones occur on the surface and in the soil, but they do not interfere with tillage.

Included with this phase is about 20 acres that has undulating relief, of which about 14 acres is moderately eroded and 6 acres is only slightly eroded. These areas have moderate external and internal drainage.

Use and management.—All this soil is used for crops or pasture or is idle. It is considered very suitable for truck crops such as cabbage, green beans, and potatoes, and for grass. Under adequate management runoff can be controlled and further erosion prevented.

Ashe stony loam, steep phase (30 to 60 percent slopes) (AN).—This phase is similar to Ashe loam, steep phase, except that it contains more stone and is shallower to bedrock. Stones ranging from the size of small rock fragments to boulders interfere materially with tillage. External drainage is moderate to rapid; internal drainage is moderate. The soil is associated with other Ashe soils and is widely scattered in the mountainous sections. The areas may vary somewhat in content of stones and in degree of distinctness of the profile layers.

Forest species similar to those on Porters loam, steep phase, cover this soil. Because of steep slope, susceptibility to erosion, stony character, and low natural fertility, this soil is best suited to forest.

Ashe stony loam, eroded steep phase (30 to 60 percent slopes) (AK).—Stones and moderate erosion differentiate this soil from Ashe loam, steep phase. Although the extent of erosion varies greatly, in most areas the plow layer is a mixture of the original surface soil and

the subsoil and consists of grayish-yellow friable loam. Stones usually interfere with tillage (pl. 2, *left*), and there are a few shallow gullies. External drainage is rapid, internal drainage is moderate, and the reaction is strongly acid.

The most noticeable variations are in the degree of stoniness and in the degree of erosion, but there are differences in the distinctness of the individual profile layers and in the depth to bedrock.

Use and management.—Because of stoniness, steepness, erosion, and shallowness, this phase is best suited to forest, but none is in this use. About one-fifth is in crops, one-fifth is idle, and the rest is in pasture. Much of it can be kept in pasture for a long period if overgrazing is avoided and a good sod is maintained.

Ashe stony loam, severely eroded steep phase (30 to 60 percent slopes) (AM).—Except for stoniness, eroded condition, and shallower depth to bedrock, this phase is similar to Ashe loam, steep phase, in profile characteristics. From 75 percent to all the original surface soil and, in places, some subsoil material have been eroded away. In most places the plow layer is a mixture of surface soil and subsoil and consists of brownish-yellow friable loam. A moderate number of gullies—crossable with farm machinery but not obliterated by ordinary tillage—are present. Stones on and in the soil interfere with tillage.

External drainage is rapid to very rapid, internal drainage is moderate, and the reaction is strongly acid. The soil is readily permeable to plant roots.

The number of stones, extent of erosion, and degree of profile development vary. The stone content varies from only a moderate number to more than half the entire soil mass.

Use and management.—Most of this soil is in pasture, much is idle, and some is in crops. Because of many stones, steep slope, severe erosion, and low plant-nutrient content, the soil is unsuitable for crops or pasture and should be returned to forest.

Ashe stony loam, hilly phase (15 to 30 percent slopes) (AL).—This soil differs from Ashe loam, steep phase, mainly in having milder relief and, consequently, less susceptibility to erosion and in containing many stones. Both external and internal drainage are moderate, and the reaction is strongly acid. The number of stones varies but is generally enough to interfere with tillage and to require much hand labor. The degree of profile development and the depth to bedrock (usually moderately deep) also vary considerably.

The shallow profile, hilly relief, and stony character make this soil unsuitable for tilled crops. Under good management, however, it can be used for grasses and clover for hay or for grazing. Most areas are in forest.

Ashe stony loam, eroded hilly phase (15 to 30 percent slopes) (AH).—Differences in relief, degree of stoniness, and extent of erosion distinguish this soil from Ashe loam, steep phase. The content of stone varies from a few stones on the surface and mixed with the soil to a soil mass composed mostly of stones. These stones range from small rock fragments to large boulders and interfere with tillage in most places. There are a few areas of rock outcrop.

From 25 to 75 percent of the original surface soil has been removed by erosion, and the brownish-yellow friable loam plow layer is a mixture of surface soil and subsoil material. A few gullies have formed. They are crossable with farm machinery but are not obliterated by ordinary tillage. External drainage is moderate to rapid; internal drainage is moderate.

Included because of small extent and similar profile characteristics is about 190 acres in which more than 75 percent of the surface soil and, in places, a part of the subsoil have been lost by erosion. In these areas tillage is mostly in the subsoil.

Use and management.—All areas are cleared and used mostly for pasture. About 20 percent is in crops. Because of erosion, hilly relief, and stoniness, the soil is not well suited to intertilled crops but does produce good pasture under proper management. Care is necessary to maintain a good sod at all times.

Augusta loam (0 to 7 percent slopes) (Ao).—The small scattered areas of this soil occur in association with other soils of the low stream terraces and with soils of first bottoms. The soil has formed from moderately recent alluvium derived from uplands underlain by granite, gneiss, schist, and possibly other rocks. The surface relief is level or nearly level to undulating. External drainage is slow to rapid; internal drainage is slow. The soil is subject to overflow during high floods. Natural internal drainage is restricted by a moderately high water table. Where not hindered by a high water table, the subsoil is permeable to water, air, and roots. The reaction is strongly to very strongly acid. The surface layer generally contains a moderate supply of organic matter. Mixed hardwoods constituted the original forest.

Profile description:

0 to 8 inches, brownish-gray friable porous loam or silt loam.
8 to 25 inches, yellowish-gray, mottled with brown, firm or slightly compact but friable fine sandy clay.
25 inches +, brownish-yellow, mottled with gray, yellow, and brown, fine sandy clay loam or clay loam; generally overlies gravelly or sandy material.

In places a few pebbles and other small fragments of rock are on the surface and in the profile. Some finely divided mica flakes are generally present.

Use and management.—Most areas are in crops and pasture, but some are idle. Because of its poor natural drainage, the soil is not well suited to crops unless it is drained. Nevertheless, corn, small grains, and hay do well where adequate drainage has been established and where liming and other good management practices are followed. Although open ditches can be used, tile drains properly installed are the best for draining the soil.

Buncombe loamy fine sand (0 to 3 percent slopes) (Ba).—This soil of the first bottoms has formed from very recent alluvial material derived from uplands underlain mainly by light-colored gneiss, granite, or schist. It is level or nearly level and subject to overflow. It generally occupies areas lying between the stream channel and other soils of the bottom lands. In many places it is situated in

bends of streams where overflowing is frequent and damage by the swiftly moving waters is great. Small areas lie along the Little Tennessee and Cullasaja Rivers and along some smaller streams. External drainage is slow to moderate; internal drainage is very rapid. The soil is strongly acid throughout and is very low in organic matter. In places there are a few ash trees and other water-loving hardwoods.

Profile description:

0 to 9 inches, moderate-brown or weak-brown very friable loamy fine sand; contains very little decayed organic matter but many live roots.
9 to 36 inches +, yellowish-brown very friable or loose loamy fine sand; contains many small mica flakes and some small roots of bushes; underlain by alluvial material that is mottled with gray and brown and has a sandy loam or clay loam texture.

In some places the top layer consists of fine or medium sand and the underlying layer is loose loamy sand or sand. In many bends of streams the surface is somewhat hummocky because of overflow by swiftly flowing floodwaters.

Use and management.—Although the Buncombe soil is inherently less fertile than the Congaree soils it is used for green beans, cabbage, and other truck crops and for corn and hay. About 20 percent is idle. The soil is very easily tilled, and many areas can be improved considerably by adding green manure. Heavy fertilization would give yields comparable to those on Congaree fine sandy loam. Truck crops mature a few days earlier than on the associated Congaree soils.

Burton stony loam, hilly phase (15 to 30 percent slopes) (Bʙ).—This soil has formed from granite, gneiss, or schist rocks on the tops and in north-facing coves of some of the higher mountains. External drainage is moderate. Internal drainage is moderate, except in small draws at the head of some drainageways or around springs, where it is slow because of seepage water. The soil is permeable to roots, strongly acid, and too stony for easy tillage. The stones range from a few inches to more than 10 inches in diameter, and in places there are small areas of rock outcrop. The organic content is very high.

Some areas near Wine Springs Bald have milder relief (7 to 15 percent slopes), and an area of steep relief (30 to 60 percent slopes) is located near Highlands Falls. The principal natural vegetation is grass or shrubs, chiefly baldgrass (a variety of bluegrass) and rhododendron. These areas are known as balds.

Profile description:

0 to 2 inches, brownish-black stony loam; very high organic-matter content; peatlike; friable and porous; contains many small roots.
2 to 8 inches, black friable stony loam; very high organic-matter content.
8 to 20 inches, moderate-brown clay loam; contains a small quantity of organic matter that is well combined with the mineral material; friable and porous; permeable to roots and moisture.
20 to 32 inches, strong yellowish-brown friable porous loam; soft decayed granitic rock appears at variable depths.

The dark-colored organic layers are 8 to 24 inches thick, and the degree of stoniness varies. In some areas there are a few stones; but in others the soil mass is composed mostly of rock fragments.

Use and management.—Because of high elevation and short growing season, this soil is not well suited to the crops generally grown

in the county. Tilled crops would require much hand labor because of the stones. The soil, however, is well suited to pasture grasses and is sometimes referred to as natural grassland.

Chandler stony loam, steep phase (30 to 60 percent slopes) (CD).—This soil of the mountain uplands is derived from material weathered from mica schist or mica gneiss. The depth to parent rock is usually 10 to 20 inches. The steep slope, shallow profile, and high mica content cause the soil to be very susceptible to erosion. External drainage is rapid, internal drainage is moderate to rapid, and the reaction is strongly acid. The stones range in size from small rock fragments to large boulders and in number from an occasional piece to so many that the soil mass consists mostly of stony material.

Areas are widely distributed in mountainous parts of the county in association with soils of the Porters, Ashe, Clifton, and Halewood series. This soil has a cover of hardwoods—maple, oak, poplar, and sourwood—and a few white and shortleaf pines. The undergrowth is largely rhododendron, mountain-laurel, huckleberry, briers, and galax.

Profile description:

0 to 5 inches, moderate yellowish-brown friable loam; contains many small- and medium-sized roots, an occasional quartz fragment, and many mica flakes that impart a slick or greasy feel; has a very thin layer of brownish-black friable loam high in organic matter at the surface.

5 to 14 inches, strong yellowish-brown friable loam with a slick or soapy feel caused by the high mica content; many roots are present.

14 to 20 inches, light yellowish-brown friable loam or silt loam; high content of mica gives a slick or soapy feel; contains a few small fragments of schist; underlain by partly weathered mica schist.

Use and management.—Largely because of steep slope, susceptibility to erosion, stoniness, and shallow profile, the soil is in forest. The stones on the surface and in the surface soil would interfere with cultivation in many places.

Chandler stony loam, eroded steep phase (30 to 60 percent slopes) (CB).—This phase differs from the steep phase of Chandler stony loam mainly in thickness of the surface soil. Uncontrolled runoff has removed 25 to 75 percent of the original surface soil, and the remaining soil has been mixed with the subsoil material during tillage. Thus, the plow layer is yellowish-brown to strong yellowish-brown friable loam. The quantity of soil removed by erosion varies greatly, but in most areas the subsoil is within plow depth. A few gullies have formed; they are crossable with common farm machinery but are too deep to be filled by ordinary tillage. The soil is strongly acid throughout the profile. External drainage is rapid to very rapid; internal drainage is moderate to rapid. Areas are widely distributed in mountainous sections.

This phase varies considerably in degree of stoniness and erosion and in depth to the parent rock. About 233 acres of severely eroded soil has been included because of similar profile characteristics. Tillage is mostly in the subsoil in these areas. The numerous gullies cut these areas and are deeper and longer than those in the moderately eroded soil.

Use and management.—About half of this soil is in open pasture; the rest is used for crops or is idle. The eroded conditions, degree of stoniness, and shallow depth to bedrock make the soil unsuitable for tilled crops or for pasture grasses. Cleared areas should be returned to forest.

Chandler stony loam, hilly phase (15 to 30 percent slopes) (Cc).—Milder relief, which causes less rapid runoff and less susceptibility to erosion, is the main difference between this soil and the steep stony loam. External drainage is moderate to rapid, internal drainage is moderate, and the reaction is strongly acid. The soil is permeable to roots.

The profile is shallow to moderately deep. There is also considerable range in the degree of stoniness.

Largely because of stones, shallow profile, and generally low fertility, this phase is not suited to tilled crops or pasture. All of the soil is in forest.

Chandler stony loam, eroded hilly phase (15 to 30 percent slopes) (Ca).—This phase is distinguished from the steep phase of Chandler stony loam mainly by its milder slope and moderate erosion. It has lost 25 to 75 percent of the original surface soil. The plow layer, a mixture of surface soil and subsoil, is a moderate yellowish-brown to strong yellowish-brown friable loam or silt loam. External drainage is rapid, internal drainage is moderate, and the reaction is strongly acid. This soil is associated with other Chandler soils in mountainous parts of the county.

The soil is shallow to moderately deep to bedrock. In most places stones, ranging greatly in size, interfere with tillage.

Erosion has been severe on a small included acreage, where more than 75 percent of the original surface soil and, in places, a part of the underlying material have been removed. Many gullies, which are difficult to cross with farm machinery and impossible to fill by ordinary tillage, have formed and have cut into the parent material.

Use and management.—This phase is largely in pasture, although some is in crops and a small part is idle. It is not suited to intertilled crops because of erosion, stones, hilly relief, and low plant-nutrient content. Much of it should be planted to pine or other suitable seedlings. The less eroded areas are fair for hay or pasture, but care is necessary to maintain a good sod and to prevent further erosion. Grass generally requires heavy applications of lime and fertilizer.

Chewacla silt loam (0 to 3 percent slopes) (Cf).—This soil of the first bottoms has formed from recent alluvial material washed largely from uplands underlain by granite, gneiss, or schist. It is level or nearly level and is subject to overflow. External drainage is very slow, internal drainage is slow, and the reaction is strongly acid. The water table is 30 inches or less from the surface. The areas are along most of the larger streams of the county.

Profile description:

0 to 6 inches, weak-brown friable silt loam.
6 to 18 inches, weak-brown, mottled with moderate brown, friable silt loam; contains a few finely divided mica flakes.
18 to 30 inches +, brownish-gray, mottled with moderate brown, light silty clay loam; contains some finely divided mica flakes.

Included is about 97 acres of Chewacla fine sandy loam that has better external and internal drainage than this silt loam. A few areas of Chewacla-Toxaway silt loams—a complex of Toxaway and Chewacla soils so intricately mixed that they are not shown separately on the soil map—have been included. Another inclusion consists of a few areas where Chewacla soil material has been deposited on Toxaway soil in layers 6 to 24 inches thick.

Use and management.—Chewacla silt loam is well suited to many crops grown in the county, particularly corn and leafy vegetables. Practically all areas have been cleared of the original forest cover and are used for crops, mainly corn and hay. Experiments show that artificial drainage of the more nearly level areas considerably increases their value for row crops, especially truck crops.

Chewacla loam, overwash phase (0 to 3 percent slopes) (Ce).—Areas of Chewacla soil that have been covered with colluvium or alluvium from higher lying slopes make up this unit. The surface soil consists of this wash and is brownish-gray friable loam. It ranges greatly in thickness. Relief is nearly level to very gently undulating. External drainage is very slow to moderate, internal drainage is slow to moderate, and the reaction is strongly acid. Areas occur along many streams throughout the county, chiefly in the central or valley part.

Use and management.—Most of this soil has been cleared of the original forest and is used for crops, mainly corn and hay. A small acreage is idle. Corn, cabbage and other leafy vegetables, and grass are well suited. Crops are frequently damaged by flooding or by water from adjacent slopes that deposits considerable soil material.

Clifton clay loam, eroded hilly phase (15 to 30 percent slopes (Cg).—This soil occurs on mountain and intermountain uplands. It has lost 25 to 75 percent of the original loam surface soil by erosion, and the subsoil is within plow depth in most areas. The plow layer usually is a mixture of original surface soil and subsoil material. Unless well protected, the soil is subject to further losses by erosion. In some areas there are a few gullies, which are crossable with ordinary farm machinery but are not obliterated by common tillage practices. The reaction is moderately to strongly acid throughout the profile. External drainage is rapid; internal drainage is moderate. The soil is moderately deep or deep to bedrock and is readily penetrated by plant roots.

Profile description:

0 to 6 inches, moderate-brown friable clay loam.

6 to 23 inches, strong-brown clay loam; somewhat stiff but brittle when dry, firm but friable when moist, and slightly sticky when wet; contains numerous roots, openings that are coated with organic matter, and some small stones in places.

23 to 35 inches, moderate-brown clay loam mixed with stones; more friable than overlying layer when dry or moist and much less sticky when wet; underlain by moderate-brown to dark-brown partly weathered rock, apparently hornblende gneiss.

Use and management.—The soil is used principally for crops and pasture; only a small part is idle. Because it is inextensive and occurs in small areas, it is not important in the agriculture of the county.

It is poor to fair cropland and fair pastureland. Before it was cleared, this soil supported white, red, post, chestnut, and black oaks, dogwood, sourwood, cherry, hickory, and chinquapin.

Clifton stony loam, hilly phase (15 to 30 percent slopes) (CN).—This phase is associated with other Clifton soils on mountain and intermountain uplands. It has formed from hornblende gneiss and schist. The stones, varying from small rock fragments to large boulders, and occasional small areas of rock outcrop, interfere with tillage. The depth to bedrock ranges from 27 to 38 inches and averages about 30. Both external and internal drainage are moderate, and the reaction is medium to strongly acid. Several small to large areas occur throughout the central part of the county in the valley of the Little Tennessee River and on the lower slopes of some of the nearby mountains. The natural vegetation is largely mixed hardwoods, chiefly various oaks.

Profile description:

0 to 6 inches, brown very friable porous stony loam containing a small quantity of organic matter.
6 to 23 inches, strong-brown firm but friable clay loam; sticky when wet, brittle when dry; many roots are present, and organic matter coats some cavities in the material.
23 to 35 inches, moderate-brown friable clay loam; passes into moderate-brown to dark-gray partly weathered hornblende gneiss.

Many 2- to 6-inch rock fragments are scattered over the surface. Some rock fragments are in the surface soil and subsoil, and many are mixed through the parent material.

Use and management.—All this phase is in forest. Some of the less stony areas could be cleared for pasture. In other counties of western North Carolina areas of this soil are used for grazing with fair to excellent success. Adequate management is necessary for good pasture, including proper liming and fertilization and controlled overgrazing.

Clifton stony loam, steep phase (30 to 60 percent slopes) (Co).—The chief differences between this phase and Clifton stony loam, hilly phase, are its steeper slopes, more rapid external drainage, and greater susceptibility to erosion. Stones—a few inches to more than 10 inches in diameter—and small areas of rock outcrop would interfere with tillage if areas were cleared for cultivation. There is some variation in the quantity of stones on and in the soil. The depth to bedrock varies but is usually 25 to 30 inches. The soil is medium to strongly acid throughout the profile. It occurs in association with other Clifton soils on lower mountain slopes in the south-central part of the county.

Use and management.—This phase is all in hardwood forest—largely various oaks, some beech, ash, maple, and dogwood, and an occasional white pine. Forest is its best use. When farms require land for pasture, however, some of the less steep and less stony areas might be cleared. Good management practices, as adequate liming and fertilization and controlled grazing, would be necessary.

Clifton stony clay loam, eroded hilly phase (15 to 30 percent slopes) (CH).—Moderate erosion and finer surface soil texture are the principal differences between this phase and Clifton stony loam,

hilly phase. The plow layer (a mixture of original surface soil and subsoil material) consists of moderate-brown friable stony clay loam. A few shallow gullies have formed in places.

External drainage is rapid; internal drainage is moderate. The surface soil is strongly acid, and the subsoil is medium to strongly acid. Areas are scattered throughout the central part of the county in the Little Tennessee River valley uplands and on lower slopes of some mountains adjacent to the valley.

Variations within this soil are in depth to bedrock (20 to 32 inches), degree of stoniness, and extent of erosion. A few areas with rolling relief (7 to 15 percent slopes) have been included because of small extent. Another inclusion consists of a few rolling areas that have been eroded to the extent that 75 percent or more of the original surface soil and, in places, some of the subsoil have been lost. A few gullies occur on this inclusion.

Use and management.—Although the stones on the surface and in the surface soil interfere with tillage, all this soil is cleared. It is in crops and pasture and some is idle. Only a small part, however, is suitable for field crops unless the stones are removed, which requires considerable hand labor. Because of the stones and the high susceptibility to further erosion, this soil is better suited to pasture or trees than to field crops. Applications of lime and other amendments and controlled grazing are required to maintain a good sod. The more severely eroded areas should be planted to white pine or locust seedlings.

Clifton stony clay loam, severely eroded hilly phase (15 to 30 percent slopes) (CL).—This soil is distinguished from Clifton stony loam, hilly phase, chiefly in having been severely eroded. The plow layer is moderate-brown to strong-brown friable clay loam. In most places the soil has lost more than 75 percent of the original surface soil and some of the subsoil. There are many shallow and fairly deep gullies. The content and size of the stones vary greatly. The depth of the profile to bedrock ranges from 18 to 30 inches but averages 25. External drainage is rapid to very rapid, but internal drainage is slow to moderate. The reaction is medium to strongly acid. This soil occurs in large and small areas associated with other Clifton soils in the central part of the county.

Use and management.—Although all areas were once under cultivation, most are now idle and are growing up in trees. Some areas are in open pasture, and a small part is in crops.

The Civilian Conservation Corps planted pine trees in many areas in an attempt to check erosion, and in most places it was brought under control. Other areas should be planted to white pine, shortleaf pine, or black locust as soon as possible.

Clifton stony clay loam, eroded steep phase (30 to 60 percent slopes) (CK).—Except for its eroded condition and steeper slopes, this soil is similar to Clifton stony loam, hilly phase. All areas have been cultivated at some time and are now moderately eroded. In most places the subsoil is within plow depth, and to this depth the soil is a mixture of surface and subsoil consisting of moderate-brown friable clay loam. In a few places are some shallow gullies. The

stony surface interferes considerably with cultivation. The depth to bedrock varies from 22 to 27 inches. External drainage is rapid to very rapid, and internal drainage is moderate. The surface soil is strongly acid, and the subsoil is generally medium acid.

Areas range in size from 2 to more than 50 acres. They are scattered throughout the central part of the county on the Little Tennessee River valley uplands and on lower slopes of some of the mountains in close association with other Clifton soils.

Use and management.—Although this phase is used for pasture and crops, a large part is idle. Because of the content of stones and degree of erosion, most areas are not suitable for tillage. Under good management, including proper liming and fertilizing and controlled grazing, the land would support considerable pasture in spring, early summer, and fall, and erosion would be checked.

Clifton stony clay loam, severely eroded steep phase (30 to 60 percent slopes) (CM).—In most areas 75 percent to all of the surface soil and, in places, part of the subsoil have been removed by erosion. A shallow soil remains, generally not more than 25 inches to bedrock. The plow layer is moderate-brown to strong-brown friable clay loam or light clay, which is a mixture of surface soil and subsoil material or in some places is subsoil material only. Many gullies have formed, but generally they are crossable with farm machinery. External drainage is very rapid, but internal drainage is slow to moderate. The entire soil profile is medium to strongly acid.

Areas range in size from a few acres to more than 40. They are mostly on the Little Tennessee River valley uplands and on the adjacent lower mountain slopes in close association with the other Clifton soils.

Use and management.—The soil is mostly idle or in pasture. A part is in crops. Because of its severely eroded condition, steep slope, and high stone content, the soil is unsuitable for crops or pasture and should be in forest. In some places considerable preparation, as mulching and diversion of water, are necessary to obtain a satisfactory stand of trees. White and shortleaf pines and black locust are the most desirable species for planting.

Congaree fine sandy loam (0 to 3 percent slopes) (CP).—This soil of the first bottoms has formed from recent alluvial material derived from uplands that are underlain mainly by light-colored gneiss, granite, or schist. It is level or nearly level and is subject to overflow by the adjacent streams. External drainage is slow, internal drainage is moderate to rapid, and the reaction is strongly acid.

The soil lies along first bottoms of the Little Tennessee and Cullasaja Rivers and along most of the smaller streams of the county. It is closely associated with Congaree silt loam and with Toxaway, Chewacla, and Wehadkee soils.

Profile description:

0 to 13 inches, weak-brown very friable and porous fine sandy loam; contains some finely divided mica flakes and numerous roots.

13 to 30 inches +, moderate yellowish-brown friable porous fine sandy loam; contains many finely divided mica flakes and some roots.

The principal variations are in texture and in thickness of the profile layers. The surface layer ranges from 8 to 18 inches thick and may be very fine sandy loam or loam; the subsoil layer ranges from 20 to 28 inches thick and may be loamy fine sand, loamy sand, or silt loam. Finely divided mica flakes are usually distributed throughout the entire profile.

Use and management.—As this soil is easy to work and does not have drainage or erosion problems, it is one of the most desirable in the county for truck crops, corn, and grass for hay or grazing. Practically all the acreage is used for crops. As the soil is subject to periodic overflow, crops are damaged by high water about 1 year out of every 4.

Congaree silt loam (0 to 2 percent slopes) (Cr).—Finer texture and somewhat more nearly level relief are the principal differences between this soil and Congaree fine sandy loam. The surface soil is moderate-brown or weak-brown friable smooth silt loam, and the subsoil is moderate yellowish-brown friable silt loam to light silty clay loam. External drainage is slow to very slow; internal drainage is moderate. The soil is strongly acid throughout. Areas are along most streams in the county, especially the Little Tennessee and Cullasaja Rivers.

The most notable variations are in texture, in consistence of the subsoil, and in height above stream level. The subsoil is silt loam, silty clay loam, fine sandy loam, or loamy sand. Consistence of the subsoil when wet ranges from sticky to only slightly cohesive. Some areas are only slightly above stream level and are more subject to overflow than the more elevated areas.

Use and management.—This soil is one of the most suitable in the county for corn, truck crops, and hay because of its inherently high fertility and easy workability. It can be used very intensively and in short rotations. Flooding, the chief hazard to crops, causes damage about once every 4 years. On the lower lying areas where overflows are more frequent, the general use is for hay crops or pasture.

Fannin stony loam, hilly phase (15 to 30 percent slopes) (Fe).—This soil of the intermountain uplands is derived from mica schist or mica gneiss and is associated with soils of the Hayesville, Halewood, and Clifton series. External drainage is moderate to rapid; internal drainage is moderate. The reaction is strongly acid. Stones ranging from small rock fragments to large boulders are on the surface and in the soil profile and are numerous enough to interfere with tillage. The organic-matter content is low, except for a very shallow layer of leafmold on the surface. The natural vegetation consists largely of black, Spanish, white, and Southern red oaks, hickory, maple, sourwood, dogwood, yellow-poplar, and shortleaf pine and an undergrowth of mountain-laurel, huckleberry, and some gooseberry.

Profile description:

0 to 6 inches, moderate-brown friable smooth loam with a few small mica flakes and many roots; first 2 inches are dark-brown very friable loam that contains considerable organic matter.

6 to 26 inches, strong-brown firm but friable clay loam; has a slick soapy feel in the lower part because of large quantity of finely divided mica flakes.

26 to 32 inches, strong-brown friable loam; contains a very large quantity of finely divided mica flakes; underlain by light-brown, yellow, black, and almost white soft weathered rock that retains the original structure lines.

The most noticeable variations are in the degree of stoniness and in depth of the soil profile. In most places the profile has well defined layers and is 25 to 40 inches deep. In the more stony areas the profile is generally less than 30 inches deep.

Use and management.—Most of this soil is forested. If cleared and cultivated, it would be very susceptible to erosion. The stony surface and hilly relief should also discourage clearing much of it for tilled crops. Good management practices—adequate fertilization and liming and controlled grazing—are necessary to obtain suitable pasture. A good pasture cover would protect the soil against damage by surface runoff.

Fannin stony loam, steep phase (30 to 60 percent slopes) (FF).—This soil is associated with other Fannin soils on intermountain uplands. It differs from Fannin stony loam, hilly phase, principally in its steeper slopes and shallower profile. External drainage is rapid, internal drainage is moderate, and the reaction is strongly acid. The organic content is low, except for a shallow surface layer of leaf mold, twigs, and leaves. The forest consists of various hardwoods (principally oak, hickory, and maple) and a few white and shortleaf pines.

Use and management.—Crops are not well suited because of steep relief, stoniness, and susceptibility to erosion. The less steep areas might be cleared and used for pasture if sufficient care is taken to control water. Good pasture management includes heavy fertilization, liming, and controlled grazing.

Fannin stony clay loam, eroded hilly phase (15 to 30 percent slopes) (FA).—Its eroded condition and differences in color and texture of the surface soil distinguish this soil from Fannin stony loam, hilly phase. Erosion has removed 25 to 75 percent of the surface soil pl. 4, *A*), and the quantity of soil material lost varies considerably within short distances. The soil to plow depth is a mixture of original surface soil and subsoil material and has strong-brown or moderate-brown color and clay loam texture. Gullies, which are crossable with ordinary farm equipment but are seldom obliterated by common tillage, have formed in a few places. The depth to bedrock ranges from 20 to 35 inches. External drainage is rapid; internal drainage is moderate. Stones on the surface and mixed with the surface soil interfere with tillage. The reaction is strongly acid. Areas are associated with other Fannin soils and with Chandler, Hayesville, Halewood, and Clifton soils on the intermountain uplands.

Included with this phase because of limited extent are several areas that have rolling relief (7 to 15 percent slopes) and are moderately eroded, and several that have rolling relief and are severely eroded. The severely eroded areas have lost 75 percent or more of the original surface soil and in places some of the subsoil, and to plow depth they consist mostly of subsoil material.

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Use and management.—All this phase is cleared and used for crops or open pasture or is idle. The high stone content, susceptibility to erosion, and hilly relief make the soil poorly suited to tilled crops. It is fair for pasture if management practices are good. Management requirements consist of applying fertilizer and lime, mowing undesirable herbage, preventing overgrazing, and maintaining a good sod.

Fannin stony clay loam, severely eroded hilly phase (15 to 30 percent slopes) (Fc).—Because of severe erosion, this soil differs from Fannin stony loam, hilly phase, in color and texture of the surface soil. Although the quantity of soil removed by erosion varies greatly, the loss generally has been 75 percent to all the surface soil and in many areas some of the subsoil. The present soil to plow depth consists largely of subsoil material and is strong-brown friable clay loam. In some areas there are many gullies that are not filled by ordinary tillage operations, and some are difficult to cross with farm equipment. The depth of the soil to bedrock ranges from 18 to 32 inches but is usually 26 inches. Stones of variable sizes are on the surface and in the soil and interfere with tillage. External drainage is very rapid; internal drainage is slow to moderate.

Use and management.—This phase is mostly in pasture or is idle, although some is used for crops. Because of the hilly relief, high stone content, severe erosion, and susceptibility to further erosion, the soil is poorly suited to crops or pasture. Its best use is forest. White and shortleaf pines and black locust seedlings can be planted with promise of good stands if protected from fire and grazing. Some areas may require mulching before planting trees.

Fannin stony clay loam, eroded steep phase (30 to 60 percent slopes) (Fb).—Steeper slope and moderate erosion differentiate this soil from Fannin stony loam, hilly phase. Areas occur on intermountain uplands in association with other Fannin soils. External drainage is rapid to very rapid, internal drainage is moderate, and the reaction is strongly acid. Stones of varying size are present and interfere with tillage.

The quantity of surface soil removed by erosion varies but generally is 25 to 75 percent. In most places the subsoil is within plow depth, and the soil to this depth is moderate-brown friable clay loam consisting of mixed surface soil and subsoil material. The soil profile ranges in depth to bedrock from 15 to 30 inches, averaging 25 inches. A few shallow to moderately deep gullies occur in some areas. They are crossable with most farm equipment but seldom are obliterated by tillage.

Use and management.—All areas have been cultivated at some time, but at the time of survey about one-half of this soil was used for open pasture, one-third was idle, and the rest was in crops. The soil is generally unsuitable for cultivation because of the steep slope, high stone content, and eroded condition, but it would produce fair pasture under good management. Its best use is forest.

Fannin stony clay loam, severely eroded steep phase (30 to 60 percent slopes) (Fd).—In addition to much steeper relief and greater erosion, this phase has a more shallow profile than Fannin stony loam,

hilly phase. The depth to bedrock ranges from 10 to 25 inches but averages 22 inches in most areas. Erosion has removed 75 percent to all the original surface soil and in most places some of the subsoil. To plow depth the soil consists of subsoil material, or mixed surface soil and subsoil material, and is strong-brown friable clay loam. Some severely gullied areas are difficult to cross with farm equipment, and the gullies are not obliterated by tillage. External drainage is very rapid, and internal drainage is moderate. The soil is strongly acid throughout. Stones (the number varies greatly from place to place) on the surface and in the soil interfere with tillage. Areas are on intermountain uplands in association with other Fannin soils.

Use and management.—Although all of this severely eroded steep phase has been cultivated at some time, most of it is now used for open pasture. Many areas are lying idle or have been abandoned to trees. The soil is poorly suited to crops or pasture because of steep slope, many stones, and severe erosion, and is best used for forest. Black locust and white or shortleaf pine seedlings may be planted to control runoff and thereby reduce erosion. In some places it will be necessary to mulch or otherwise protect the seedlings from damage by erosion, heaving, or other unfavorable soil disturbance.

Halewood loam, eroded hilly phase (15 to 30 percent slopes) (HA).—This soil of the intermountain uplands is derived from residual weathered material from granite, gneiss, or schist. It is associated with other Halewood soils and with Hayesville, Clifton, and Fannin soils. Erosion has removed variable quantities of soil, and in most areas 25 to 75 percent of the original surface soil has been lost. The remaining surface soil is a few inches deep, and the subsoil is within plow depth. Gullies have formed in places. They are too deep to be obliterated by tillage but are crossable with farm equipment. External drainage is moderate to rapid; internal drainage is moderate. The soil is strongly acid throughout and is low in organic matter.

The native vegetation consisted largely of white, post, black, and Spanish oaks, sourwood, hickory, some poplar and shortleaf and white pines, and an undergrowth of azalea and mountain-laurel.

Profile description:

0 to 6 inches, weak-brown or yellowish-brown friable porous loam; in forested areas upper 2 inches is dark-brown friable loam containing considerable organic matter and many small roots.

6 to 28 inches, moderate yellowish-brown friable clay loam; contains a very few mica flakes.

28 to 32 inches, moderate yellowish-brown friable porous loam; contains many mica flakes and black mineral specks, probably hornblende, and a few small angular pieces of quartz; grades to a moderate yellowish-brown soft weathered granitic rock containing black and white mineral particles.

The surface soil and subsoil vary somewhat in color. Some rock fragments are on the surface in places, but they do not interfere with tillage.

Included are a few small wooded areas that apparently have not been eroded and several small cleared areas that have been severely eroded. In the severely eroded areas nearly all the original surface

has been removed, and the plow layer is largely subsoil material consisting of yellowish-brown friable light clay loam.

Use and management.—Halewood loam, eroded hilly phase, has a medium range of use suitability. It is chiefly used for crops and pasture, but a fairly large acreage is idle and a few areas are wooded. It is easily subject to further erosion, and an adequate system of crop rotation is needed to control runoff. Sod-forming or other close-growing crops on the land 2 out of 3 years or a system combining crop rotation and stripcropping should prove effective.

Halewood loam, steep phase (30 to 60 percent slopes) (Hc).—The soil differs from Halewood loam, eroded hilly phase, in that it is generally shallower to bedrock and has an upper surface soil of dark-brown friable loam that contains much organic matter from decayed vegetation. External drainage is rapid; internal drainage is moderate. The reaction is strongly acid throughout. Areas occur on intermountain uplands and on lower slopes of mountains and are associated with other Halewood soils.

All this phase is in hardwood forest. Largely because of steep slopes it is not suitable for intertilled crops. It would be suitable for pasture if good management, including proper fertilization, liming, and controlled grazing, were practiced.

Halewood loam, eroded steep phase (30 to 60 percent slopes) (Hb).—The main differences between this phase and Halewood loam, eroded hilly phase, are its steeper slopes, more rapid external drainage, and shallower depth to bedrock. Erosion has removed 25 to 75 percent of the surface soil. Tillage has mixed the remaining surface soil with the subsoil, and the surface soil to plow depth now consists of weak-brown or yellowish-brown friable clay loam that is somewhat finer textured than the original surface soil. Gullies, crossable with farm machinery but too deep to be obliterated by ordinary tillage, occur here and there. This phase is strongly acid throughout the profile. The depth to bedrock ranges from 17 to 28 inches but is usually 25 inches. The soil also ranges considerably in extent of erosion, but only slightly in color of the surface soil and subsoil.

Use and management.—The original hardwood forest has been cut, and the soil is used mainly for pasture. Some areas are used for crops. Steep slopes and erosion make the soil poorly suited to tilled crops, but it should produce good pasture under suitable management that includes water-control measures.

Halewood clay loam, severely eroded steep phase (30 to 60 percent slopes) (H).—This soil is steeper and more eroded than Halewood loam, eroded hilly phase. External drainage is very rapid, and erosion has removed 75 percent to all the original surface soil and in places some of the subsoil. The plow layer is mostly subsoil material of moderate yellowish-brown friable clay loam. Gullies have formed that are too deep to be eliminated by ordinary tillage but can be crossed with farm machinery. The reaction is strongly acid.

The principal variations are in the quantity of soil removed by erosion. Differences in depth to bedrock and in subsoil color are noticeable.

Because of steep slope and severity of erosion, this phase is poorly suited to crops and pasture and is best suited to forest. About 30 percent is idle and the rest is in open pasture. All areas should be returned to forest by planting locust, pine, or other seedlings.

Halewood stony loam, hilly phase (15 to 30 percent slopes) (HG).—This soil has formed on intermountain uplands from material weathered from granite, gneiss, or schist. It is associated with other Halewood soils and with Hayesville soils. Small rocks to large boulders are present on the surface and throughout the profile. There are some small outcrops of bedrock. External and internal drainage are moderate. The soil is strongly acid. Forest consists principally of white, post, black, and Spanish oaks, sourwood, hickory, and some poplar and shortleaf and white pines. Azalea and mountain-laurel constitute the main undergrowth.

Profile description:

0 to 2 inches, dark-brown very friable loam; contains much organic matter.
2 to 7 inches, weak-brown very friable stony loam.
7 to 28 inches, moderate yellowish-brown friable clay loam; contains some stones, a few small mica flakes, and some roots.
28 to 34 inches, moderate yellowish-brown friable loam containing angular rock fragments and a large quantity of mica flakes; underlain by soft weathered granitic rock.

The content of stones varies but is sufficient to hinder tillage. The depth to bedrock ranges considerably but is usually about 30 inches.

The hilly phase is entirely in forest. It would be poor for tilled crops, but it would produce good pasture under proper management—liming and fertilizing, controlled grazing, and control of runoff.

Halewood stony loam, eroded hilly phase (15 to 30 percent slopes) (HE).—Before being cleared of forest and cultivated, these areas were Halewood stony loam, hilly phase. They have lost 25 to 75 percent of the original surface soil by erosion. External drainage is moderate to rapid, internal drainage is moderate, and the reaction is strongly acid. The stones on the surface and in the surface soil interfere with cultivation in most places. The subsoil is usually within plow depth, and the plow layer consists of weak-brown or yellowish-brown friable clay loam. There are a few small shallow gullies.

The depth to bedrock ranges from 18 to 34 inches and averages 27 inches. The degree of stoniness varies somewhat, and there are slight differences in the color of the surface soil from place to place.

Use and management.—This phase is used for crops and pasture, and about 20 percent is idle. Because it is stony and eroded, this soil is poorly suited to intertilled crops. It would produce fair to good pasture if properly limed and fertilized, maintained in an adequate sod cover, and not overgrazed.

Halewood stony loam, steep phase (30 to 60 percent slopes) (HH).—The principal differences between this phase and the Halewood stony loam, hilly phase, are its steeper slope and somewhat shallower profile. This soil is associated with other Halewood soils and with Hayesville and Fannin soils on intermountain uplands. It has rapid external drainage and moderate internal drainage. The soil is strongly acid throughout and is deficient in organic matter

except in the first few inches of the surface soil. The forest cover is similar to that on Halewood stony loam, hilly phase.

The depth to bedrock varies from 18 to 30 inches and averages 26. The quantity of stones on the surface and in the soil varies considerably.

The high stone content and the steep relief make Halewood stony loam, steep phase, unsuitable for crops and very poor for pasture. Its best use is forest.

Halewood stony loam, eroded steep phase (30 to 60 percent slopes) (HF).—From 25 to 75 percent of the surface soil has been removed by erosion; otherwise, this phase is similar to Halewood stony loam, steep phase. The plow layer, a mixture of surface soil and subsoil material, is a weak-brown or yellowish-brown friable clay loam. There are a few gullies that are crossable with farm machinery but are not obliterated by ordinary tillage. The soil has rapid to very rapid external drainage and moderate internal drainage. It has a low organic-matter content and is strongly acid. It varies considerably in depth to bedrock (15 to 26 inches) and in degree of stoniness and extent of erosion.

Use and management.—All of this soil is cleared; it is used largely for open pasture. A relatively small acreage is in crops, and a considerable part is idle. It is poorly suited to crops because of its steep slope, susceptibility to erosion, and stony surface. Under proper management, including use of water control measures, some areas are suitable for pasture. The best use is forest.

Halewood stony clay loam, severely eroded steep phase (30 to 60 percent slopes) (HD).—This soil occurs in intermountain areas in association with other Halewood soils. It differs from Halewood stony loam, hilly phase, in degree of erosion, slope, stoniness, and texture of the surface soil. Stones on and in the surface soil interfere materially with tillage. Erosion has removed 75 percent to all the surface soil and left the subsoil within plow depth in most of each area. In places some of the subsoil has been removed. The plow layer is a moderate yellowish-brown friable clay loam. Gullies, crossable with farm machinery but too deep to be obliterated by tillage, are numerous. There is very little organic matter on or in this soil. External drainage is rapid to very rapid; internal drainage is moderate.

The most important variations are in the degree of sheet and gully erosion and in the stoniness of the soil. Stones prevent tillage in some places. Minor variations in color and profile development occur.

This phase is largely in open pasture, although some areas are idle. Because of the many stones, steep slopes, and severe erosion, the soil is unsuitable for crops or pasture. It is best suited to forest, and pine, locust, or other seedlings should be planted.

Hayesville loam, hilly phase (15 to 30 percent slopes) (HN).—Areas of this soil, which is derived from residual material weathered from light-colored gneiss, granite, or schist, occur on intermountain uplands in association with other Hayesville soils and with Halewood, Fannin, and Chandler soils. The organic content is low, but

in forested areas there is a slight accumulation of leaf mold on the surface. The soil is strongly acid throughout the profile. It is practically all in forest—principally black, Spanish, post, and white oaks, dogwood, sourwood, poplar, locust, and yellow pine.

Profile description:

0 to 8 inches, light yellowish-brown friable loam; contains many fine roots; some quartz gravel and sand grains are on the surface.
8 to 16 inches, strong-brown friable clay; contains some small roots and some quartz gravel.
16 to 35 inches, strong reddish-brown firm but friable clay; sticky when wet; contains a few large roots and a few small mica flakes.
35 inches +, mixed, red, yellow, gray, and brown soft weathered granitic rock; retains original structure lines.

The depth to bedrock ranges from 22 to 35 inches. The quantity of gravel on the surface and in the profile varies.

Hayesville loam, hilly phase, would be well suited to small grains and other sod-forming crops if cleared. Intertilled crops would be advisable for long rotations only and would require good management to control runoff.

Hayesville loam, steep phase (30 to 60 percent slopes) (Ho).—Stronger relief, greater susceptibility to erosion, and more rapid external drainage are the principal differences between this soil and the hilly phase of Hayesville loam. Internal drainage is moderate, and the reaction is strongly acid. The organic content is low, although there is a thin organic layer on the surface.

Variations occur in the depth of the profile to parent rock and in the amount of gravel on the surface and in the soil. In most places the depth to bedrock is 20 to 32 inches. Included are small slightly eroded areas that have been cleared of forest and are used for crops or pasture.

Practically all of Hayesville loam, steep phase, is in hardwood forest. If cleared and properly managed, it could be used for pasture. Good management practices include proper fertilization, liming, and restricted grazing.

Hayesville clay loam, eroded hilly phase (15 to 30 percent slopes) (Hr).—This phase differs from the hilly phase of Hayesville loam mainly in that it is moderately eroded and has a surface layer of finer texture. External drainage is rapid, internal drainage is moderate, and the reaction is strongly acid. Erosion has removed 25 to 75 percent of the original surface soil. The plow layer, a mixture of surface soil and subsoil materials, is a moderate-brown, yellowish-brown, or reddish-brown friable clay loam. Gullies have formed in a few places and, although crossable with farm machinery, are too deep to be obliterated by ordinary tillage.

The soil varies somewhat in depth to bedrock, degree of erosion, and amount of gravel on the surface and in the profile.

This phase is now all cleared and is in crops or pasture or is idle. It is suited to pasture, but hilly relief, eroded condition, and susceptibility to further erosion make it only fair for intertilled crops or small grains. Suitable rotations, stripcropping, and other measures to control water should be used where it is necessary to grow row crops.

Hayesville clay loam, severely eroded hilly phase (15 to 30 percent slopes) (HL).—The clay loam surface soil and severe erosion differentiate this phase from Hayesville loam, hilly phase. External drainage is rapid to very rapid; internal drainage is moderate. In most areas 75 percent to all of the surface soil has been removed by erosion, and in some areas part of the subsoil has been removed. Gullies have formed in places. They are too deep to be obliterated by ordinary tillage but can be crossed with farm machinery.

The plow layer of strong-brown or reddish-brown friable clay loam is subsoil material mixed with some surface soil. The soil is strongly acid throughout, and the entire profile is low in organic matter. Variations occur in depth to bedrock, in degree of erosion, and in quantity of gravel on the surface and in the soil profile.

Use and management.—Although this phase is used to a relatively small extent for crops, severe erosion has made it unsuitable for further cropping. A fairly large acreage is idle, and a large acreage is in open pasture. Proper management, including the prevention of further erosion, is required for good yields. Many areas should be returned to forest by planting locust, pine, or other seedlings.

Hayesville clay loam, eroded steep phase (30 to 60 percent slopes) (HK).—This phase differs from Hayesville loam, hilly phase, in that it has steep slopes and has been moderately eroded. External drainage is rapid to very rapid; internal drainage is moderate. A few gullies, crossable with farm machinery but too deep to be obliterated by ordinary tillage, have formed. Erosion has removed 25 to 75 percent of the surface soil. The plow layer is subsoil material mixed with surface soil by tillage; it is a brown, yellowish-brown, or reddish-brown friable clay loam. The soil is low in organic matter and is strongly acid.

The depth to bedrock, degree of erosion, and quantity of gravel on the surface and mixed through the profile vary.

Included are a few small areas that have been severely eroded and have lost 75 percent to all the original surface soil and, in places, a part of the subsoil.

Use and management.—This soil is used for pasture and crops; some areas are idle. It is well suited to hay and pasture if runoff is controlled, but its steep slope and highly eroded condition make it poorly suited to tilled crops unless they are grown in long rotations that consist mostly of close-growing crops.

Hayesville clay loam, severely eroded steep phase (30 to 60 percent slopes) (HM).—Steep slopes, severe erosion, and clay loam or clay plow layers differentiate this soil from Hayesville loam, hilly phase. Erosion has removed more than 75 percent or all the original surface soil and, in places, some of the subsoil. The plow layer is strong-brown or reddish-brown friable clay loam or clay. External drainage is rapid, and internal drainage is moderate. Gullies that have formed in some places are not too deep to be crossed with farm machinery, but they cannot be obliterated by ordinary tillage. The soil is extremely low in organic matter and is strongly acid. Its principal variations are in extent of erosion and in depth to bedrock.

Because of steep slope and severe erosion, this phase is not suited to crops or pasture. It is largely in pasture and to some extent in crops or idle. It should be returned to forest by planting pine, locust, or other seedlings.

Hayesville clay loam, eroded rolling phase (7 to 15 percent slopes) (Hʏ).—The subsoil is within plow depth in most areas of this moderately eroded soil. The surface soil, a mixture of original surface soil and subsoil material, is brown, yellowish-brown, or reddish-brown friable clay loam. Shallow gullies occur here and there; and although crossable with farm machinery, they cannot be obliterated by the usual tillage. External drainage is moderate to rapid, and internal drainage is moderate. The soil contains very little organic matter and is strongly acid.

Noticeable variations occur in depth of the soil profile to bedrock, in extent of erosion, and in quantity of small rock fragments on the surface and in the profile.

Included are a few small rolling areas that have been severely eroded and have lost 75 percent to all the original surface soil and, in places, a part of the subsoil. These areas generally have very rapid external drainage.

Use and management.—Hayesville clay loam, eroded rolling phase, one of the best soils of the intermountain uplands, is used largely for crops. Some areas are idle and some are in pasture. Under good management, erosion should not be a problem and yields should be moderately high. Sod crops or other close-growing crops should be grown on the more severely eroded areas. The soil is fair to good cropland and good pastureland.

Hayesville stony loam, hilly phase (15 to 30 percent slopes) (Hᴜ).—The principal difference between this phase and Hayesville loam, hilly phase, is stoniness. The stones range from a few inches to more than 10 inches in diameter and are numerous enough to interfere with tillage. The soil has a light yellowish-brown friable surface soil and a strong-brown or strong reddish-brown friable to firm subsoil. Areas are associated with other Hayesville soils on intermountain uplands. External drainage is moderate to rapid, internal drainage is moderate, and the reaction is strongly acid. Except in the surface 2 to 3 inches, the soil is low in organic matter.

Variations are most evident in the degree of stoniness and in the depth of the soil profile to bedrock. Included are a few small areas that are slightly eroded as a result of cropping practices. Other small tracts have rolling relief (7 to 15 percent slopes) and, consequently, less rapid external drainage.

If cleared of its hardwood forest cover, this phase would be suitable for hay and pasture. The strong slopes and stony surface make tillage difficult, but row crops can be grown if long rotations, proper tillage, and other good management practices are used.

Hayesville stony loam, steep phase (30 to 60 percent slopes) (Hv).—This soil is similar to Hayesville loam, hilly phase. It differs principally in that it is steep and contains many stones. When cleared, it is very susceptible to erosion. The surface soil is light yellowish-brown friable stony loam; the subsoil is strong-brown to

strong reddish-brown friable clay loam. External drainage is rapid, and internal drainage is moderate. Stones ranging from a few inches to more than 10 inches in diameter interfere seriously with tillage. The soil is strongly acid throughout the profile. The organic content is low, except for a very thin layer of leaf mold on the surface and a very small quantity of humus in the first few inches of the surface soil.

The depth to bedrock ranges from 18 to 30 inches, and the degree of stoniness varies from place to place.

This phase is in forest and should remain in that use because of its steep slope, susceptibility to erosion, and large quantity of stones on the surface and in the profile.

Hayesville stony clay loam, eroded hilly phase (15 to 30 percent slopes) (HP).—Degree of stoniness, texture of surface soil, and extent of erosion differentiate this phase from Hayesville loam, hilly phase. Erosion has removed 25 to 75 percent of the surface soil, and the subsoil is within plow depth in most areas. The plow layer is composed of original surface soil mixed with subsoil material and is brown, yellowish-brown, or reddish-brown friable clay loam. A few gullies, crossable with farm machinery but not obliterated by ordinary tillage, have formed. The stones on the surface and in the plow layer interfere with tillage. Internal drainage is moderate, and external drainage is rapid. The soil is low in organic matter and is strongly acid throughout.

Variations within this phase occur principally in degree of erosion, stoniness, and depth to bedrock.

Use and management.—This phase is used for pasture and crops. Some areas are idle. Largely because of strong slope, stony surface, and eroded condition, the soil is not well suited to crops other than pasture. If water is controlled and other suitable management is followed good pasture can be produced. Under careful management the soil possibly could be improved for hay and row crops.

Hayesville stony clay loam, severely eroded hilly phase (15 to 30 percent slopes) (Hs).—External drainage is rapid to very rapid, and erosion has removed 75 percent or more of the surface soil and, in places, part of the subsoil. The subsoil is within plow depth in most areas; it gives the plow layer a strong-brown or reddish-brown color and a friable clay loam texture. The soil is moderately gullied, and the gullies are crossable with farm machinery but not obliterated by tillage. Internal drainage is moderate, organic matter is low, and the reaction is strongly acid.

Variations occur in the degree of erosion and stoniness and in depth to bedrock. In most places, however, the stones interfere with cultivation.

Although this phase is used largely for pasture and crops, it is unsuited to these uses and should be returned to forest by planting pine or locust seedlings. Some preparation, as mulching, probably would be necessary to assure a stand of trees.

Hayesville stony clay loam, eroded steep phase (30 to 60 percent slopes) (HR).—On the surface and in the profile are many stones, a few inches to more than 10 inches in diameter, that interfere somewhat

with tillage. Erosion has removed 25 to 75 percent of the surface soil and left the subsoil within plow depth in most areas. The plow layer is a mixture of surface soil and subsoil materials and consists of brown, yellowish-brown, or reddish-brown friable clay loam. There are a few gullies, and they are crossable with farm machinery but are too deep to be obliterated by ordinary tillage. External drainage is rapid to very rapid, and internal drainage is moderate. The soil is low in organic matter and is strongly acid throughout.

Variations occur in the extent of erosion, stoniness, and in depth to bedrock.

All the eroded steep phase is cleared and used mostly for pasture and crops. It is unsuited to these mainly because of steep relief, stoniness, and susceptibility to erosion. It should be returned to forest by planting pine or other suitable trees.

Hayesville stony clay loam, severely eroded steep phase (30 to 60 percent slopes) (HT).—Although internal drainage is moderate, external drainage is very rapid in this soil. Erosion has removed 75 percent to all the surface soil and, in places, some of the subsoil. The plow layer, which is subsoil material mixed with surface soil or entirely subsoil material, is strong-brown or reddish-brown friable clay loam or clay. The soil is severely gullied, and the gullies are deep and fairly long. Many stones interfere with tillage. The soil is low in organic matter and strongly acid.

The profile is relatively shallow to bedrock, but some variation in depth exists. Stones on the surface and in the soil range from a few inches to more than 10 inches in diameter. The degree of erosion varies considerably.

Use and management.—This phase is used for pasture and to a smaller extent for crops. Some areas are idle. The soil should be returned to forest by planting to locust, pine, or other tree seedlings. Because of severe erosion, it should be protected by mulches, diversion channels, and other measures when planted to trees.

Hayesville stony clay loam, eroded rolling phase (7 to 15 percent slopes) (HQ).—From 25 to 75 percent of the original light yellowish-brown friable stony loam surface soil has been removed from this soil by erosion, and the subsoil is within plow depth in most areas. The plow layer, a mixture of surface soil and subsoil materials, consists of brown, yellowish-brown, or reddish-brown friable clay loam. The subsoil and underlying layer are similar to those of Hayesville loam, hilly phase, except they are slightly thicker in many places. The stones on the surface and in the plow layer do not interfere greatly with cultivation. Organic content is low, and the reaction is strongly acid.

Included are a few small severely eroded areas that have lost 75 percent to all the surface soil and, in places, some of the subsoil. The plow layer is mostly subsoil material and is strong-brown or reddish-brown friable clay loam to clay.

Use and management.—Hayesville stony clay loam, eroded rolling phase, is used largely for crops, but some areas are in pasture or are idle. The soil is well suited to crops and pasture but is subject to further damage by erosion where runoff is not controlled. If man-

agement requirements are met and care is taken to prevent further erosion by suitable rotations and tillage practices, the soil should produce good yields.

Hiwassee clay loam, eroded undulating phase (3 to 7 percent slopes) (Hy).—This soil of the high stream terraces is derived from old alluvium and is associated with Masada soils (pl. 2, *right*). Erosion has removed 25 to 75 percent of the dark reddish-brown friable clay loam surface soil, and the subsoil is within plow depth in most places. External drainage is slow to moderate, and internal drainage is moderate to slow. The soil is low in organic matter and is medium acid. In places it is difficult to till because it does not scour readily from the plow. The native vegetation was hardwoods.

Profile description:

0 to 5 inches, brownish-red friable clay loam; sticky when wet.
5 to 48 inches, moderate reddish-brown friable silty clay to clay; sticky or slightly plastic when wet, hard when dry.
48 to 66 inches, fine gravel; contains some moderate reddish-brown and moderate yellowish-brown clay.

The depth to bedrock generally ranges from 30 to 60 inches. There are also variations in the degree of erosion.

Included is about 3 acres that has not been cleared of forest cover and is not eroded. Other included small areas have lost less than 25 percent of their surface soil by erosion.

Use and management.—Hiwassee clay loam, eroded undulating phase, is practically all used for crops. A small part is idle. Although it is somewhat hard to handle because of stickiness and has a narrow range of moisture conditions for tillage, it is one of the best soils in the county for corn, wheat, clover, alfalfa, and grasses. If proper rotations are followed, it is suitable for intensive use.

Hiwassee clay loam, eroded rolling phase (7 to 15 percent slopes) (Hx).—Rolling relief and shallower depth of profile (26 to 54 inches) are the main differences between this phase and the eroded undulating phase of Hiwassee clay loam. Erosion has removed 25 to 75 percent of the surface soil, and the subsoil is within plow depth in most areas. The plow layer is brownish-red friable clay loam. The range of moisture conditions over which the soil can be cultivated is very narrow. Organic content is low, reaction is medium acid, external drainage is moderate, and internal drainage is moderate to slow.

Included are a few small areas that have not been cleared of forest and are not appreciably eroded. A few other small patches are only slightly eroded.

Use and management.—This eroded rolling phase is used for crops, although about 20 percent is idle. It is well suited to most crops in the county, but its fine texture makes it more suitable for small grains, corn, and hay than for such crops as potatoes and cabbage.

Hiwassee clay loam, eroded hilly phase (15 to 30 percent slopes) (Hw).—This phase is similar to the eroded undulating phase except that it has a stronger slope and is shallower to bedrock (18 to 36 inches). Erosion has removed 25 to 75 percent of the original surface soil and brought the subsoil within plow depth in most areas. The plow layer is a mixture of original surface soil and subsoil mate-

rials and consists of reddish-brown friable clay loam. A few shallow gullies have formed.

Like the other Hiwassee soils, this phase is known as push land because it tends to stick to tillage implements. The soil has moderate to rapid external drainage, moderate to slow internal drainage, low organic content, and a medium acid reaction.

In a few small areas the soil has lost less than 25 percent of the surface soil by erosion. Small patches of Masada loam, eroded hilly phase, have also been included. The Masada soil has the same origin as the Hiwassee, but it has a brownish-gray friable loam surface soil and a strong yellowish-brown friable clay subsoil. It does not have the push land quality characteristic of Hiwassee soils. All these areas are included in this mapping unit because of their small extent.

Use and management.—Hiwassee clay loam, eroded hilly phase, is used largely for crops and pasture. A small acreage is idle. Because of its hilly relief, the soil is more suitable for close-growing or sod-forming crops than for intertilled crops. Tillage is limited by the very narrow range of moisture content.

Hiwassee gravelly clay loam, eroded undulating phase (3 to 7 percent slopes) (H3).—This phase differs from the eroded undulating phase of Hiwassee clay loam principally because it contains considerable rounded stone. It occurs on high stream terraces with other Hiwassee soils and Masada soils and with Hayesville, Clifton, and Halewood soils of the uplands.

Erosion has removed 25 to 75 percent of the surface soil, and the plow layer of reddish-brown friable gravelly clay loam is a mixture of surface soil and subsoil materials. External drainage is slow to moderate, and internal drainage is moderate to slow. Organic matter is low, and acidity is medium to strong. The range of moisture conditions for tillage is relatively narrow. Pebbles on the surface and in the surface soil interfere somewhat with tillage.

The quantity of gravel, degree of erosion, and depth to bedrock vary somewhat. Included because of limited extent are areas that have been only slightly eroded and areas that show no erosion.

Use and management.—Hiwassee gravelly clay loam, eroded undulating phase, is used largely for crops. A relatively small part is idle or in pasture. The soil has a very wide range of use suitability; it is fair to good for crops, good for pasture, easily conserved, and moderately productive.

Hiwassee gravelly clay loam, eroded rolling phase (7 to 15 percent slopes) (H2).—Erosion has removed 25 to 75 percent of the original surface soil and left the subsoil within plow depth. Subsoil material mixed with the remaining surface soil has given the plow layer a reddish-brown color and a friable clay loam texture. External drainage is moderate; internal drainage is moderate to slow. The soil is medium to strongly acid and low in organic matter.

Variations occur in degree of erosion, quantity of gravel on the surface, and depth to bedrock (24 to 50 inches). Small areas of a slightly eroded phase and about 72 acres that have not been appreciably eroded are included.

Use and management.—Hiwassee gravelly clay loam, eroded rolling phase, has a narrow range of moisture conditions for tillage. It is used largely for crops, although some cropland is idle. A small part is in pasture. The soil is fair to good for crops and good for pasture. Measures to control surface runoff are among the major soil management requirements.

Hiwassee gravelly clay loam, eroded hilly phase (15 to 30 percent slopes) (Hz).—Erosion has removed 25 to 75 percent of the surface soil. In most areas the plow layer (a mixture of original surface soil and subsoil materials) is reddish-brown friable clay loam. External drainage is moderate to rapid, internal drainage is moderate to slow, and the reaction is medium to strongly acid. The soil has a relatively narrow range of moisture content suitable for tillage.

The quantity of gravel on the surface and in the profile varies. Other variations are in the degree of erosion and in the depth to bedrock. A few slightly eroded areas and some areas of the eroded undulating phase are included.

Use and management.—Hiwassee gravelly clay loam, eroded hilly phase, is used mostly for row crops and pasture. Some cropland is idle. The soil, however, is suitable mostly for hay and pasture. Under common management it becomes severely eroded when used for row crops. With good management, however, some areas should be suitable for small grains and row crops.

Masada loam, eroded undulating phase (2 to 7 percent slopes) (Mb).—This soil of the high stream terraces is derived from old alluvium and is associated with Hiwassee soils. Erosion has removed 25 to 75 percent of the original brownish-gray friable loam surface soil and left subsoil within plow depth in most areas. External drainage is slow, internal drainage is moderate, and the reaction is medium to strongly acid. Before it was cleared, this phase supported hardwoods and an undergrowth of rhododendron and mountain-laurel.

Profile description:

0 to 6 inches, yellowish-brown friable heavy loam.
6 to 21 inches, strong yellowish-brown friable clay loam; contains a few mica flakes and a few plant roots.
21 to 28 inches, moderate yellowish-brown clay with mottlings of medium gray; when dry breaks into small angular particles hard to crush, and when moist is slightly plastic; a few mica flakes are present.
28 to 45 inches, dark-yellow clay mottled with medium gray; slightly plastic when wet; hard when dry, and breaks into irregular-shaped lumps; contains some ¼- to 1-inch pieces of gravel.
45 inches +, quartz gravel (½ to 4 inches in diameter) cemented together by yellowish-brown clay.

Variations occur in extent of erosion and in depth to the gravel layer or bedrock.

Included are about 44 acres that is moderately eroded, about 23 acres that shows even less erosion, and another 23 acres that has been eroded very little.

Use and management.—Masada loam, eroded undulating phase, is used mostly for crops. A small part is idle and a small acreage is in pasture. Relatively high fertility, smooth relief, and ease of handling make this soil especially well suited to nearly all the commonly grown crops, but care must be taken to prevent further erosion.

Masada loam, eroded rolling phase (7 to 15 percent slopes) (MA).—Its rolling relief and more shallow profile differentiate this phase from the eroded undulating phase of Masada loam. The two soils are both moderately eroded, are yellowish-brown friable loam to plow depth, and have about the same use suitability.

This eroded rolling phase has moderate external and internal drainage. It is low in organic matter and medium to strongly acid. Areas are associated with other Masada soils on low stream terraces. The native vegetation was a hardwood forest with an undergrowth of rhododendron and mountain-laurel.

Included are a few areas that have not been appreciably eroded.

Use and management.—Masada loam, eroded rolling phase, is mostly in crops; small areas are idle or in pasture. Owing to its relatively high fertility, smooth relief, and ease of handling, it is well suited to nearly all the commonly grown crops. Effective measures to control runoff are necessary to prevent further loss of soil by erosion.

Masada gravelly loam, eroded undulating phase (2 to 7 percent slopes (ME).—Except for the many pebbles on the surface and mixed through the soil mass, this phase is similar to Masada loam, eroded undulating phase. Erosion has removed 25 to 75 percent of the surface soil. The plow layer, a mixture of surface and subsoil materials, is a yellowish-brown friable gravelly loam. The soil has slow external drainage, moderate internal drainage, medium to strongly acid reaction, and low organic-matter content.

The depth to the gravel layer ranges from 28 to 55 inches. The degree of erosion and the quantity of gravel on and in the soil mass also vary.

A few small areas are included that have lost less than 25 percent of their surface soil, and some small patches are included that have not been appreciably eroded.

Most areas of this soil are used for crops or are idle. A small part is in pasture. Because of favorable relief, moderately high fertility, and other favorable qualities, the soil is good cropland and good pastureland. The gravel, however, interferes somewhat with cultivation.

Masada gravelly loam, eroded rolling phase (7 to 15 percent slopes) (MD).—This soil differs from the eroded undulating phase of Masada gravelly loam chiefly in that it has stronger slope, is more gravelly, and is somewhat shallower to the layer of gravel. From 25 to 75 percent of the original surface soil has been removed by erosion. The plow layer is yellowish-brown friable gravelly loam. Gravel on the surface and in the plow layer interferes somewhat with tillage. Both external and internal drainage are moderate. The soil has low organic content and medium to strong acidity.

The soil profile ranges from 24 to 50 inches in depth to the gravel bed, and there are some variations in degree of erosion and content of gravel. A few small areas are included that have not been appreciably eroded.

Use and management.—The largest part of Masada gravelly loam, eroded rolling phase, is used for crops, but small parts are idle or in pasture. The soil is well suited to hay, small grains, and pasture, but

rolling relief, gravelly surface soil, and eroded condition make it unsuitable for intertilled crops unless it receives special care. Good management requires long rotations. A row crop should not be planted more often than once every 3 years. Other practices such as proper tillage and fertilization are necessary.

Masada gravelly loam, eroded hilly phase (15 to 30 percent slopes) (Mc).—The relief is strong, the soil gravelly, and the profile is relatively shallow to a bed of gravel (16 to 32 inches); otherwise, this phase is similar to the eroded undulating phase of Masada gravelly loam. From 25 to 75 percent of the original surface soil has been removed by erosion. The subsoil is within plow depth in most places. The plow layer is yellowish-brown friable gravelly loam. Gravel on the surface and in the plow layer interferes with tillage to some extent. External drainage is rapid; internal drainage is moderate. The supply of organic matter is low, and the reaction is strongly acid.

The degree of erosion and the content of gravel vary. Included with this phase are a few acres that are not appreciably eroded. A few small areas of State loam, a soil of the low stream terraces, are also included. State loam has a weak-brown loam surface soil and a moderate-brown friable clay loam subsoil.

Much of this phase is in crops, and the rest is idle or in pasture. Small grains and hay crops can be produced, but gravelly texture, hilly relief, and eroded condition make the soil poorly suited to intertilled crops.

Mines, pits, and dumps (Mr).—This land type consists of areas where strip mining has been done. Mines and pits include areas from which soil and rock material have been removed to a depth of several feet. Dumps are areas where the land has been covered with varying thicknesses of soil and rock material taken from mines.

Porters loam, steep phase (30 to 60 percent slopes) (Pc).—This soil of the mountain uplands is derived from granite, gneiss, or schist. It is associated with other Porters soils, with members of the Ashe, Clifton, Halewood, and Hayesville series, and with Stony rough land (Porters and Ashe soil materials). External drainage is moderate to rapid, internal drainage is moderate, the reaction is strongly acid, and the organic-matter content is fairly high in the upper part of the profile. The forest cover includes chestnut, Southern red and black oaks, yellow-poplar, maple, sourwood, some hickory, and an undergrowth of azalea, rhododendron, mountain-laurel, ferns, and weeds. Chestnut once predominated, but only a few living sprouts remain.

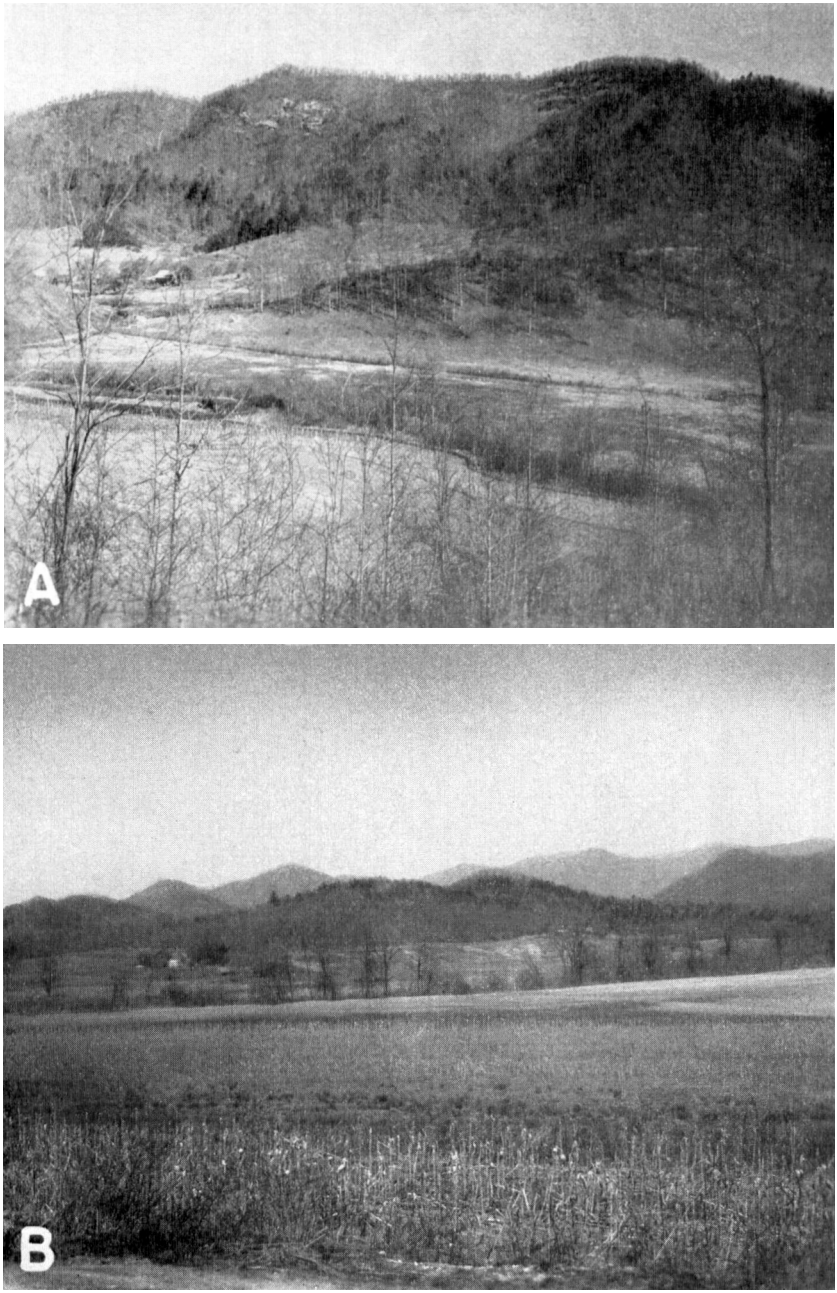
Profile description:

0 to 8 inches, dark-brown very friable loam; contains much organic matter and many roots; soft fine-crumb structure.

8 to 14 inches, moderate-brown very friable porous loam to clay loam; contains some organic matter, a few small rock fragments, and many roots; soft crumb structure.

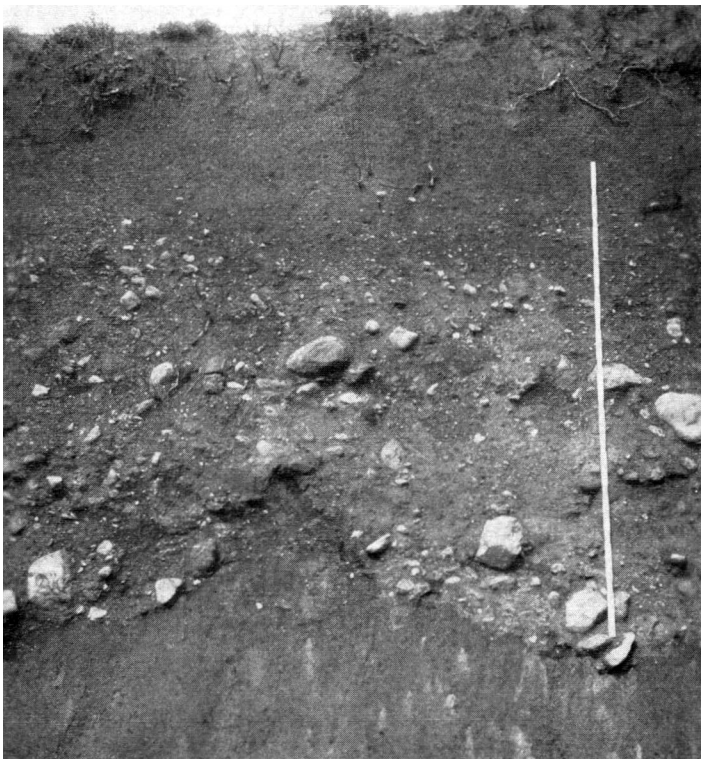
14 to 32 inches, dark yellowish-brown friable loam mixed with small rock fragments and partly weathered rock; some finely divided mica flakes.

The main variation is in depth to bedrock, which ranges from 15 to 30 inches.



A, Landscape in rugged part of Macon County: Stony rough land (Porters and Ashe soil materials) in background; Talladega and Chandler soils on lower foothills; and Tusquitee and Chewacla soils on cleared areas.

B, Landscape in the intermountain part of Macon County: Productive Congaree and Chewacla soils on bottom land in foreground; Fannin soils on cleared middle ground; and Porters soils and Stony rough land (Porters and Ashe soil materials) in background.



Left: View of Ashe stony loam, eroded steep phase, showing the many stones that interfere with cultivation.
Right: Profile of Hiwassee clay loam, eroded undulating phase; ruler indicates a 45-inch gravelly layer that rests on residuum from metamorphic or igneous rock.

Although practically all this phase is in forest, some areas have been cut for timber. The soil is too steep for tilled crops, but it would make excellent pasture if cleared of forest and given proper management.

Porters loam, eroded steep phase (30 to 60 percent slopes) (PA).—Erosion has removed 25 to 75 percent of the surface soil, but in most other respects this soil is similar to the steep phase of Porters loam. The plow layer in most places is moderate-brown very friable loam. External drainage is rapid, and internal drainage is moderate. There are a few shallow gullies. The soil contains a fairly large quantity of organic matter and is strongly acid.

Both the depth to bedrock and the degree of erosion vary considerably. The depth of the profile ranges from 12 to 25 inches. Some included areas have been severely eroded and have lost 75 percent to all the surface soil and, in places, some of the subsoil.

Use and management.—Porters loam, eroded steep phase, is used largely for pasture, although some is used for tilled crops and a small part is idle. It is poorly suited to tilled crops because of its steep slope and eroded condition. If care is taken to maintain a good sod and to prevent overgrazing, the soil will make satisfactory grazing land. The included severely eroded areas should be returned to forest by planting to pine, locust, or other seedlings.

Porters loam, hilly phase (15 to 30 percent slopes) (PB).—Except for its milder relief and greater depth to bedrock (18 to 36 inches), this soil is similar to Porters loam, steep phase. It has moderate external and internal drainage, fairly high organic content, and strongly acid reaction.

Some areas have lost 25 to 75 percent of the original surface soil by erosion, and the subsoil is within plow depth in most places. Other areas have been so eroded that 75 percent to all the surface soil and, in places, some of the subsoil have been lost. All these areas are included because of small total extent.

Use and management.—Except for the eroded areas, Porters loam, hilly phase, has not been cleared of forest. The forest cover is similar to that on the steep phase. Many areas are well suited to small grains, hay, cabbage, potatoes, and pasture. The moderately eroded areas are suitable for small grains if proper measures are taken to control runoff and to avoid further erosion. The severely eroded areas are not suitable for crops, and their best use is pasture maintained by good management.

Porters stony loam, steep phase (30 to 60 percent slopes) (PF).—Stones on the surface and mixed through the soil range from small rock fragments to large boulders. In other respects this phase is similar to Porters loam, steep phase. External drainage is moderate to rapid; internal drainage is moderate. The soil is fairly well supplied with organic matter and is strongly acid throughout.

This soil is all under forest cover. Largely because of the steep slopes and stony surface, it is unsuited to crops and poorly suited to pasture and should remain in forest.

Porters stony loam, eroded steep phase (30 to 60 percent slopes) (PD).—All this phase is cleared land that has lost 25 to 75 percent of

the original surface soil by erosion. Nearly everywhere the subsoil is within plow depth, and the plow layer is moderate-brown very friable stony loam. A few gullies crossable with farm machinery have formed, but they are too deep to be obliterated by ordinary tillage. External drainage is moderate to rapid, internal drainage is moderate, organic content is fairly high, and the reaction is strongly acid.

Included with this phase are areas that have been severely eroded and have lost 75 percent to all the surface soil and, in places, some of the subsoil. These areas contain many deep gullies.

Porters stony loam, eroded steep phase, is mostly in open pasture. A small part is idle. It is poorly suited to crops or to pasture and should be returned to forest by planting to locust, pine, or other seedlings.

Porters stony loam, very steep phase (60 percent + slopes) (PG).—This phase differs from Porters loam, steep phase, mainly in that it has a steeper slope, is stony, and usually is shallower to bedrock. The degree of stoniness and depth to bedrock vary considerably. External drainage is rapid, internal drainage is moderate, organic content is high, and the reaction is strongly acid.

Forest, dominantly hardwod, covers this soil. Largely because of very steep slope, stoniness, and shallowness to bedrock, it is unsuitable for crops or pasture and should remain forested.

Porters stony loam, hilly phase (15 to 30 percent slopes) (PE).—Milder relief and stoniness are the principal differences between this phase and Porters loam, steep phase. Tillage is hindered by stones on the surface and in the soil. The stones range from small rock fragments to large boulders. External and internal drainage are moderate, organic-matter content is fairly high, and the reaction is strongly acid. The natural vegetation is about the same as on Porters loam, steep phase.

The stone content varies from place to place. The depth to bedrock also varies considerably, generally from 15 to 30 inches. Included with this soil are small areas from which 25 to 75 percent of the surface soil has been removed by erosion and some areas from which 75 percent of the surface soil and, in places, a part of the subsoil have been lost.

If cleared of forest, Porters stony loam, hilly phase, could be used for pasture under adequate management. The included eroded areas are used for crops and pasture, but for protection against further erosion, sod cropping and restricted grazing are necessary. The severely eroded areas should be returned to forest by planting to locust or pine seedlings.

Rabun clay loam, hilly phase (15 to 30 percent slopes) (RD).—This soil of the intermountain uplands is derived from residual material from weathered dark-colored basic crystalline rocks. It is associated with Clifton, Halewood, Hayesville, and Porters soils. External drainage is moderate to rapid; internal drainage is moderate. The thin layer of leaf mold on the surface and the organic matter in the upper surface soil are soon lost when the soil is cleared and cultivated. The reaction is medium acid throughout.

The forest includes post, Spanish, white, and black oaks, maple, hickory, sourwood, dogwood, and an undergrowth of mountain-laurel, huckleberry, and briers.

Profile description:

0 to 8 inches, moderate-brown friable granular clay loam; contains many fine roots and a small quantity of organic matter; some leaf mold on the surface.

8 to 30 inches, moderate reddish-brown firm but friable granular clay loam or clay; somewhat brittle when dry and slightly sticky when moist; contains a few large roots and a few small brownish-yellow pieces of rock; on old road cuts or banks the soil has a tendency to flake off.

30 inches +, moderate reddish-brown friable clay mixed with strong-yellow partly weathered rock; contains many black specks and has a comparatively light weight; has few roots.

The depth of the soil profile to bedrock ranges from 30 to 48 inches. This is one of the deepest profiles of the soils on the uplands in the county.

If cleared of its forest cover, Rabun clay loam, hilly phase, would be well suited to such sod-forming crops as small grains, hay, and grass. Its steep slope and susceptibility to erosion make it unsuitable for intertilled crops.

Rabun clay loam, eroded hilly phase (15 to 30 percent slopes) (RA).—The main difference between this phase and the hilly phase is that this phase has lost 25 to 75 percent of the original surface soil by erosion. The subsoil in most places is within plow depth. The plow layer is reddish-brown friable clay loam. A few shallow gullies have formed. They are crossable with farm machinery but cannot be filled in by ordinary tillage. The soil has rapid external drainage but moderate internal drainage. It is low in organic matter and is medium acid throughout.

The most noticeable variations are those in the degree of erosion and in the depth of soil over bedrock (28 to 45 inches).

Much of this soil is used for clean-cultivated crops, to which it is not well suited. A fairly large acreage is in open pasture, and a small part is idle. Sod crops, as small grains and hay, are best. Some intertilled crops could be grown if very long rotations were used.

Rabun clay loam, severely eroded hilly phase (15 to 30 percent slopes) (RE).—The severely eroded condition of this phase differentiates it from Rabun clay loam, hilly phase. From 75 percent to all the original surface soil has been removed by erosion. The subsoil is within plow depth or exposed at the surface. The plow layer is reddish-brown friable clay loam or clay. There are many gullies, most of which are too deep to be filled in by ordinary tillage. External drainage is rapid to very rapid, and internal drainage is moderate. The soil has a low organic content and medium acidity.

Considerable variation exists in the degree of erosion and in the depth to bedrock (24 to 40 inches). The extent to which the soil is gullied ranges from moderate to severe. The texture of the surface soil ranges from clay loam to clay.

Use and management.—A large part of the soil is in open pasture, a fairly large part is idle, and a small part is in crops. Severe erosion has resulted from growing row crops, particularly corn. The soil is highly susceptible to further erosion, but it can be used for grass for

hay or grazing, provided the cover is maintained. Intertilled crops are unsuitable.

Rabun clay loam, steep phase (30 to 60 percent slopes) (RG).—This phase differs from the hilly phase mainly in that it has a stronger slope and less depth to bedrock (25 to 42 inches). External drainage is rapid; internal drainage is moderate. The steep slope and the rapid external drainage would make the soil more susceptible to erosion if cleared, but because of its forest cover little erosion has taken place. The soil is medium to strongly acid and is low in organic matter.

This phase supports a cover of hardwood forest. Its steep slopes, rapid external drainage, and susceptibility to erosion if cleared almost limit its use to forest. Some areas, however, are suitable for pasture if good management is practiced.

Rabun clay loam, eroded steep phase (30 to 60 percent slopes) (RC).—Steep slope and eroded condition are the principal differences between this phase and the hilly phase of Rabun clay loam. External drainage is rapid to very rapid, and 25 to 75 percent of the original surface soil has been removed by erosion. The subsoil is within plow depth in most places. The plow layer is reddish-brown friable clay loam. In many places there are gullies, but they are crossable with farm machinery. The soil has moderate internal drainage, is medium to strongly acid, and is low in organic matter.

This phase varies somewhat in extent of erosion; in some areas it has been only slightly eroded. The depth to bedrock varies from 23 to 40 inches.

Use and management.—The soil is used mostly for crops and to some extent for pasture. A small acreage is idle. It is very poorly suited to row crops but is suitable for sod. The steeper and more severely washed areas should be returned to forest by planting to locust, pine, or other seedlings.

Rabun clay loam, severely eroded steep phase (30 to 60 percent slopes) (RF).—From 75 percent to all the moderate-brown surface soil and, in places, some of the subsoil have been eroded away. Tillage is partly or wholly in the subsoil. The soil is reddish-brown friable clay loam or clay to plow depth. Gullies have formed in many places. The depth to bedrock ranges from 20 to 38 inches. External drainage is very rapid, but internal drainage is moderate. The soil is low in organic matter and medium to strongly acid.

About 50 acres of Clifton clay loam, severely eroded hilly phase, is included with this soil. This inclusion has a moderate-brown to strong-brown clay loam surface soil and a strong-brown to moderate-brown friable clay loam subsoil.

Use and management.—Rabun clay loam, severely eroded steep phase, is used for pasture and to a small extent for crops. A fairly large part is idle. It is suited only to forest. The production of crops and pasture should be discontinued, and the soil should be returned to forest by planting to locust, pine, or other seedlings.

Rabun clay loam, eroded rolling phase (7 to 15 percent slopes) (RB).—This phase differs from Rabun clay loam, hilly phase, mainly in that it has milder slope, is moderately eroded, and is generally deeper to bedrock (28 to 55 inches). The degree of erosion varies

greatly, but in most areas 25 to 75 percent of the surface soil has been removed and the subsoil is within plow depth. The plow layer, made up of original surface soil mixed with subsoil by tillage, is a reddish-brown friable clay loam. There are a few short, shallow gullies. External drainage is moderate to rapid; internal drainage is moderate. The soil is low in organic matter and is medium acid throughout.

Some areas are severely eroded, and tillage is mostly in the subsoil; others are only slightly eroded. A few areas of the moderately eroded undulating phase (3 to 7 percent slopes) are included with this unit because of their limited extent.

Use and management.—Rabun clay loam, eroded rolling phase, is used largely for crops. A relatively small part of the cropland is idle. Some areas are in open pasture. Under good management the soil is suitable for intertilled crops, clover, alfalfa, wheat, barley, and grasses. Sod crops should be on the severely eroded areas.

Rabun stony clay loam, hilly phase (15 to 30 percent slopes) (RM).—Stoniness and shallower depth to bedrock are the main differences between this phase and Rabun clay loam, hilly phase. Rock fragments a few inches to more than 10 inches in diameter are present in numbers that interfere with cultivation. The depth to bedrock ranges from 28 to 45 inches. External drainage is moderate to rapid; internal drainage is moderate. The soil is low in organic matter and is medium acid throughout.

All this soil is in hardwood forest. It would be poorly suited to crops that require tillage, but it would be suited to pasture under good management.

Rabun stony clay loam, eroded hilly phase (15 to 30 percent slopes) (RH).—This phase differs from Rabun clay loam, hilly phase, mainly in that it is stony and is moderately eroded. Stones ranging from small rock fragments to large boulders are on the surface and mixed with the soil and interfere with tillage. The extent of erosion varies, but in most places 25 to 75 percent of the original surface soil has been lost and the subsoil is within plow depth. The plow layer, composed of the surface soil mixed with subsoil material by tillage, is a reddish-brown friable clay loam. A few gullies, crossable with farm machinery but not obliterated with ordinary tillage, have formed. External drainage is rapid; internal drainage is moderate. The soil is low in organic matter and is medium acid.

The principal variations are in degree of erosion and stoniness and in depth of the soil profile to bedrock (25 to 42 inches). In a few areas the soil is only slightly eroded.

Use and management.—This phase is largely in crops or is idle. A fairly large part is in open pasture. Although the soil is stony and somewhat eroded, it is fairly well suited to hay and row crops grown under good management. Runoff should be controlled because further loss by erosion will seriously impair the soil for crops or pasture.

Rabun stony clay loam, severely eroded hilly phase (15 to 30 percent slopes) (RN).—Erosion has carried off 75 percent to all the surface soil and, in places, a part of the subsoil. Some areas are severely gullied. Except for the severe erosion and stoniness, this phase is similar to Rabun clay loam, hilly phase. The plow layer

consists largely of subsoil material and is reddish-brown friable clay loam or clay. Stones interfere with cultivation. The soil has rapid to very rapid external drainage and moderate internal drainage. It is low in organic matter and is strongly acid throughout.

Many variations occur in the extent of erosion, degree of stoniness, and depth to bedrock (22 to 35 inches).

Use and management.—About half this phase is idle, a fairly large part is in open pasture, and a relatively small part in crops. Some areas are suitable for pasture if management is good. Intertillage, however, will cause further erosion. The most severely eroded and gullied areas should be planted to pine or locust seedlings.

Rabun stony clay loam, steep phase (30 to 60 percent slopes) (Rp).—Except for stronger slope, stoniness, and less depth to bedrock, this phase is similar to Rabun clay loam, hilly phase. The stones would hinder cultivation. The depth to bedrock ranges from 22 to 40 inches. The soil has rapid external drainage, moderate internal drainage, and medium to strongly acid reaction. It is low in organic matter, although in the heavily forested areas organic matter occurs in a thin layer on the surface and to some extent in the first few inches of the surface soil.

If cleared of forest, this soil could be used for hay or pasture, although harvesting hay on the steep slope with machinery would be difficult.

Rabun stony clay loam, eroded steep phase (30 to 60 percent slopes) (Rl).—From 25 to 75 percent of the surface soil has been removed by erosion, and gullies have formed in places. The soil, to plow depth, is a mixture of the remaining surface soil and subsoil material and consists of reddish-brown friable clay loam. External drainage is rapid to very rapid; internal drainage is moderate. The soil is strongly acid and contains very little organic matter.

There are variations in the degree of stoniness and erosion and in the depth of the soil profile to bedrock (20 to 37 inches). Some included areas, not shown on the soil map, are only slightly eroded.

Use and management.—About half this phase is in open pasture, a fairly large part is idle, and a relatively small part is in crops. Although limited for use by erosion and stoniness, the soil is suited to grass. The harvesting of hay by machine is difficult on the steep slopes. Under good management the soil is suitable for pasture, but it is poorly suited to crops that require tillage.

Rabun stony clay loam, severely eroded steep phase (30 to 60 percent slopes) (Ro).—This soil has lost 75 percent to all the original surface soil and, in places, some of the subsoil. The subsoil is within plow depth. This plow layer consists of reddish-brown friable clay loam or clay. Gullies, some of them deep, have formed in many places. Stones on the surface and in the plow layer interfere somewhat with tillage. External drainage is very rapid, internal drainage is moderate, the organic content is low, and the reaction is strongly acid.

The degree of sheet and gully erosion varies widely, and there are differences in the degree of stoniness. The depth to bedrock ranges from 16 to 32 inches.

Much of this soil is used for pasture, but some is idle and a small part is in crops. The soil is unsuited to cultivated crops and is very poorly suited to pasture. It should be returned to forest by planting pine, locust, or other seedlings.

Rabun stony clay loam, eroded rolling phase (7 to 15 percent slopes) (RE).—Milder slope, stoniness, and eroded condition are the chief differences between this phase and Rabun clay loam, hilly phase. Stones on the surface and in the surface soil hinder tillage. Erosion has removed 25 to 75 percent of the original surface soil, and nearly everywhere the subsoil is within plow depth. The plow layer consists of reddish-brown friable clay loam. A few shallow gullies are in the soil. This phase has moderate to rapid external drainage and moderate internal drainage. It is low in organic matter and is medium to strongly acid.

Variations occur in the extent of erosion, degree of stoniness, and depth to bedrock (25 to 50 inches). Some included areas are severely eroded. In these areas very little, or none, of the original surface soil remains and the plow layer consists mostly of subsoil material.

This phase is used mostly for clean-cultivated crops and hay. A fairly large part is in pasture and a small part is idle. The soil is fair cropland and fair to good pastureland. The severely eroded areas are best suited to pasture.

Ramsey stony loam, steep phase (30 to 60 percent slopes) (Rs).—This brown soil of the mountain uplands is derived from material weathered from highly siliceous rocks. It is in the northern part of the county, mostly in association with Porters soils. It has rapid external drainage and moderate to rapid internal drainage. The profile is shallow to bedrock and usually poorly developed. The reaction is strongly to very strongly acid, and a fair quantity of organic matter is in the surface soil. Rock fragments ranging from small slatelike particles to large sandstone boulders are present in sufficient numbers to interfere seriously with tillage. In places there are small outcrops of bedrock. The soil is under a forest cover of post and black oaks, yellow-poplar, sourwood, dogwood, maple, and locust.

Profile description:

0 to 5 inches, weak-brown friable stony loam or silt loam; contains many roots; a few shale fragments are on the surface and in the soil.

5 to 18 inches, strong yellowish-brown friable loam or fine sandy clay; contains a few shale fragments and many roots; a few cavities are lined with organic matter.

18 inches +, partly weathered slate or shale rock, yellowish gray streaked with light olive.

The more evident variations within the soil are in degree of stoniness and in depth to bedrock (10 to 20 inches). The subsoil varies from poorly developed to well developed in some places. In a small acreage the slope range is 15 to 30 percent.

Largely because of the shallow profile, steep relief, and stoniness, this phase is unsuitable for crops or pasture and is best used for forest.

Ramsey stony loam, eroded steep phase (30 to 60 percent slopes) (RR).—Erosion has removed 25 to 75 percent of the original surface soil, and in places the subsoil or parent material is within plow depth. The plow layer consists of yellowish-brown friable stony loam. There

are some gullies, but all are shallow. External drainage is rapid to very rapid; internal drainage is moderate to rapid. Stones, ranging from small shale and slate fragments to large sandstone boulders, hinder tillage. The soil in most places is low in organic matter. It is strongly acid throughout.

The depth to bedrock ranges from 8 to 15 inches. The degree of stoniness and extent of erosion vary somewhat from place to place. About 84 acres of Ramsey stony loam, moderately eroded hilly phase (15 to 30 percent slopes), is not separated on the soil map from this eroded steep phase.

Use and management.—Ramsey stony loam, eroded steep phase, is largely in open pasture. A small part is in crops, and a small part is idle. Chiefly because the soil is steep, stony, considerably eroded, and low in fertility, it is unsuitable for crops and pasture. It should be planted to pine or other suitable trees.

Ramsey stony loam, severely eroded steep phase (30 to 60 percent slopes) (RT).—In some places erosion has removed practically all the surface soil; in others, all the surface soil and a part of the subsoil have been lost. Gullies that cut deeply in the parent material are common. Many rock fragments of various sizes are present and interfere somewhat with cultivation. External drainage is very rapid, and internal drainage is moderate to rapid. The soil is low in organic matter and is very strongly acid.

This soil varies considerably in the distinctness of profile layers, quantity of stones, and extent of erosion.

Use and management.—A large part of this phase is in open pasture, and the rest is idle or in crops. Because the soil is steep, stony, severely eroded, generally shallow to bedrock, and low in fertility, it is unsuited to crops or pasture. It should be returned to forest by planting pine or other trees. In areas where erosion damage is great, mulching and other protective measures are required to establish a stand of trees.

Ramsey stony loam, very steep phase (60+ percent slopes) (RU).—The very steep slope and the generally shallower depth to bedrock are the principal differences between this phase and Ramsey stony loam, steep phase. The stones on and in the soil range from shale or slate fragments to sandstone boulders. External drainage is very rapid, and internal drainage is moderate to rapid. The reaction is very strongly acid. Areas occur in the mountainous parts of the county.

This phase is shallow (7 to 12 inches to bedrock). The quantity of stones and distinctness of profile layers vary somewhat. Notable differences in the quantity of organic matter are evident. At some high elevations several inches of organic matter are in the top layer, and in this respect the soil resembles Burton soil. At lower elevations the quantity is only moderate.

Ramsey stony loam, very steep phase, is in forest and should so remain because of its extremely steep slope, great susceptibility to erosion, and stoniness.

Rock outcrop (15 to 150 percent slopes) (Rv).—This land consists of bare exposures—generally granite—and is on mountainsides that

are strongly sloping to almost precipitous. It occurs in stony areas of Ashe and Porters soils and in areas of Stony rough land (Porters and Ashe soil materials). A few scrub trees and bushes grow in rock crevices where small quantities of soil material have accumulated.

This land has no value for crops or pasture, nor can it be used for forest.

Rough gullied land (Fannin and Clifton soil materials) (15 to 30 percent slopes) (Rw).—This is a land type made up largely of small areas containing Fannin and Clifton soil materials and, in places, some Hayesville, Halewood, Rabun, or Porters soil materials. There are small patches in which the original soil profile remains, but in general the soil has been so badly eroded (pl. 4, *A*) that it is practically impossible to rebuild it, except by slow processes such as forestation. External drainage is very rapid; internal drainage is moderate.

Use and management.—All areas are so severely gullied that they are practically worthless for pasture or crops. About half the total acreage is idle and is slowly reverting to pine woodland, and the rest is in open pasture. Where natural reforestation is not good, white pine, locust, or other trees should be planted. Lespedeza can be used as a cover until the trees are established. Mulching is necessary in many places to protect the seedlings against washing of the land.

State loam, undulating phase (3 to 7 percent slopes) (Sb).—This soil is on low terraces lying above overflow along the larger streams. It is derived from moderately recent alluvium and is associated with Hiwassee, Masada, Altavista, and Congaree soils, all of alluvial origin, and with Halewood, Hayesville, Porters, Clifton, and Rabun soils on the uplands. This phase has slow external drainage, moderate internal drainage, moderate organic content, and strongly acid reaction. It has been cleared of forest, which was hardwoods with an undergrowth consisting largely of mountain-laurel and rhododendron.

Profile description:

0 to 8 inches, weak-brown friable porous loam; contains some small roots; breaks into medium-sized lumps that are easily crushed.
8 to 19 inches, moderate-brown friable clay loam; slightly sticky when wet; contains some small roots.
19 inches +, moderate yellowish-brown clay or clay loam; shows faint light-brown mottling; slightly sticky when wet.

This soil varies only slightly in color of surface soil and subsoil and in depth of profile. In a few areas there are some angular rock fragments and pebbles on the surface, but they do not interfere with tillage. Some included areas have nearly level relief (0 to 3 percent slopes), and a small acreage has rolling relief (7 to 15 percent slopes). These areas are not separated on the soil map because of their relatively small extent and similar soil.

Use and management.—This soil is one of the best in the county for crops, and nearly all areas are in that use. It has a very wide range of use suitability and can be used intensively if water control and other good management are practiced. The soil is easily worked, easily conserved, and very highly productive.

State loam, eroded undulating phase (3 to 7 percent slopes) (Sa).—Erosion has removed 25 to 75 percent of the original surface soil, and the subsoil is within plow depth in most places. In other important respects the soil is similar to the undulating phase of State loam. External drainage is slow; internal drainage is moderate. The plow layer is moderate-brown or weak-brown friable heavy loam that is moderately high in organic matter. The soil is strongly acid throughout.

Included are about 177 acres of the slightly eroded undulating phase, about 62 acres of the moderately eroded rolling phase, and about 8 acres of the slightly eroded rolling phase. These three areas of State soil were not separated on the soil map.

Use and management.—State loam, eroded undulating phase, is easy to work and to conserve and is very highly productive. It has a very wide range of suitability. About 90 percent is used for crops, and the rest is lying idle. Although the soil has lost some original surface soil, it can be farmed intensively if measures are used to prevent further erosion.

State gravelly loam, undulating phase (3 to 7 percent slopes) (Sc).—Its gravel content is the principal feature differentiating this soil from State loam, undulating phase. The pebbles interfere somewhat with tillage. External drainage is slow; internal drainage is moderate. The soil has a fair supply of organic matter in the surface soil and is strongly acid throughout.

This phase varies little in color and depth, but there is some variation in the quantity of gravel on the surface and in the soil. In places drainage is affected by a gravel bed that underlies the soil.

Included are areas that have lost 25 to 75 percent of the original surface soil by erosion, areas that have lost less than 25 percent of the surface soil but much of the organic matter, areas that have rolling relief but no appreciable erosion, areas that have rolling relief and moderate erosion, and areas that are nearly level. These inclusions are not separated on the soil map.

Use and management.—A large part of State gravelly loam, undulating phase, is in crops, a fairly small part is in pasture, and a small part is idle. The soil is moderately easy to work and very easy to conserve. It has high productivity and a wide range of use suitability. It is well suited to intensive use, and intertilled crops grow well.

Stony colluvium (Tusquitee and Tate soil materials) (2 to 30 percent slopes) (Sd).—This very stony land type is on foot slopes of mountains and along streams. It is made up of colluvial and local alluvial materials derived from Porters and Ashe soils and, in places, from Congaree soils. It is nearly level to strongly sloping or hilly. External drainage is rapid, internal drainage is moderate to rapid, and the reaction is strongly acid.

The 8- to 12-inch surface layer consists of brown or dark-brown loam that contains a considerable quantity of organic matter. Below this layer is brown stony loam, about 12 inches thick, that contains much less organic matter and overlies dark-colored hard and soft rock fragments.

In some places much decayed plant material is on the surface. Gravel, angular rock fragments as much as 10 inches in diameter, and

boulders are scattered over the surface and mixed through the soil. There are a few outcrops of bedrock. In some areas the soil consists of riverwash—a brown-colored mixture of sand, gravel, and subangular rock fragments.

A large part is in forest and a fairly large part is in pasture. About 20 percent is used for crops, chiefly corn. If enough stones were removed, more of the land could be used for tilled crops.

Stony rough land (Porters and Ashe soil materials) (30 to 60 percent slopes) (SE).—Many small angular rock fragments, boulders, and outcrops of bedrock are on this steep, precipitous, or broken land (pl. 1, *B*). In some places the land is not very stony, but even here bedrock is only a few inches below the surface. Where there is soil, it generally consists of Porters or Ashe soil materials. On some of the highest mountains it consists of Burton soil material. External drainage is very rapid, and internal drainage is moderate to rapid.

This is the most extensive land type in the county, and comparatively large areas are in the steep mountainous sections. Practically all areas are in hardwood forest. Little timber has been cut because of the rough terrain and the poor quality of the timber.

Talladega shaly loam, steep phase (30 to 60 percent slopes) (TA).—This soil, derived from mica schist, occurs on mountain uplands and is associated with Chandler, Ashe, and Porters soils. External drainage is rapid; internal drainage is moderate. Rock fragments on the surface and mixed with the surface soil interfere with tillage. The reaction is strongly acid, and the organic content is low. The original forest included white, post, and black oaks, yellow pine, and dogwood. The largest areas are southeast of Rattlesnake Knob, west of Jarrett Knob, and on Osage Mountain.

Profile description:

0 to 5 inches, moderate-brown friable porous micaceous loam; contains many small roots and some small shalelike pieces of schist and quartz; many finely divided mica flakes give the soil a greasy or soapy feel.
5 to 14 inches, strong-brown friable porous loam or light silty clay loam; has a slick soapy feel; contains some soft shalelike pieces of mica schist and many small roots.
14 inches +, partly weathered mica schist; streaked gray, reddish brown, olive, and black; very smooth or greasy when crushed in the hand.

Variations are mostly in color. The depth to soft schist bedrock ranges somewhat.

Included are areas that have lost 25 to 75 percent of the surface soil by erosion and have subsoil within plow depth. Some areas have lost 75 percent to all the original surface soil and, in places, some of the subsoil. In these, the plow layer consists mostly of subsoil material. These more eroded areas are moderately to severely gullied.

Forest covers a large part of this phase. The eroded areas, which are the cleared land, are in crops or pasture or are idle. All this soil is best suited to forest; the cleared areas could be used best by planting to pine or other seedlings.

Tate loam, rolling phase (7 to 15 percent slopes) (TF).—Areas are on foot slopes in the southeastern and central parts of the county. The soil has formed from colluvial or local alluvial material derived from Ashe, Chandler, and Halewood soils, with which it is closely

associated. In most places it lies between soils of the uplands and soils of the bottom lands. In most places the color and texture of the surface soil and subsoil are similar to those of Ashe loam, steep phase. External drainage is slow to moderate, internal drainage is moderate, and the reaction is strongly acid. Most areas are covered with a dense growth of hardwoods and hemlocks.

Profile description:

0 to 5 inches, brownish-gray friable porous loam; contains a few mica flakes and many fine roots.
5 to 27 inches, moderate yellowish-brown friable sandy clay loam; slightly sticky when wet; contains many mica flakes and some roots.
27 to 32 inches +, strong yellowish-brown friable loam very slightly mottled with medium gray.

This phase has no very noticeable variations, although in forested areas there is considerable range in the quantity of leaf mold and other organic matter on the surface and in the quantity of organic matter in the upper few inches.

Use and management.—Small acreages are used for crops or are idle, but most of the soil is in forest. Truck crops such as cabbage, potatoes, and beans, which are grown in the higher altitudes of the county, are well suited. Fair to good yields of corn, wheat, and hay can be produced. All forested areas of this soil could be cleared and used intensively for crops.

Tate loam, eroded rolling phase (7 to 15 percent slopes) (Tc).—From 25 to 75 percent of the surface soil has been lost by erosion. The subsoil is within plow depth and gives the plow layer a somewhat finer texture than that of the rolling phase of Tate loam. External and internal drainage are moderate. The reaction is strongly acid, and the organic content is low.

The most evident variations are in the degree of erosion and the quantity of organic matter, particularly in the plow layer.

Use and management.—All this phase is cleared and is eroded because of poor management. A large part is now in crops, and small acreages are in pasture or are idle. The soil is well suited to truck crops, particularly cabbage, sweet corn, potatoes, and green beans. It is fairly well suited to common field crops and pasture. Good management is necessary for protection against erosion, especially since the soil occurs in a high rainfall area.

Tate loam, hilly phase (15 to 30 percent slopes) (Te).—The main differences between this phase and Tate loam, rolling phase, are its stronger slope and generally shallower profile. External and internal drainage are moderate. The soil contains a fair supply of organic matter in the first few inches and is strongly acid throughout. It occurs in relatively small areas at the foot of slopes in the southeastern and eastern parts of the county.

The only noticeable variation is in the quantity of organic matter, which is generally greatest on north-facing slopes.

If cleared of its hardwood forest cover, this phase would be well suited to small grains, hay, or other sod-forming crops. Intertilled cropping might cause serious damage by erosion if the soil were not protected by long crop rotations or by other methods.

Tate loam, eroded hilly phase (15 to 30 percent slopes) (TB).—Erosion has removed 25 to 75 percent of the surface soil. The plow layer, in most places a mixture of surface soil and subsoil materials, is yellowish-brown friable loam. External drainage is moderate to rapid; internal drainage is moderate. A few shallow gullies have formed. This phase has a fairly low supply of organic matter and is strongly acid throughout the profile. It is associated with areas of Ashe soils near Highlands in the southeastern part of the county.

The major variation within this phase is in the degree of erosion. About 78 acres of this soil is only slightly eroded.

Use and management.—All this phase is cleared—about 50 percent is used for crops, 40 percent is in pasture, and 10 percent is idle. The soil is best suited to close-growing crops, including sod crops. Clean-cultivated crops are not suited unless long crop rotations or other effective measures for controlling runoff are used.

Tate loam, undulating phase (3 to 7 percent slopes) (TG).—Gentler slope is the main difference between this phase and the rolling phase of Tate loam. In forested areas a thin layer of leaf mold covers the soil and a small quantity of organic matter is in the upper surface layer. The soil has a strongly acid reaction, slow external drainage, and moderate internal drainage.

Except for some variation in the quantity of organic matter, this phase is relatively uniform.

Use and management.—About three-fourths of the undulating phase is in forest, and the rest is in crops or idle. The soil is well suited to truck crops, particularly cabbage, beans, potatoes, and sweet corn, and to the common field crops. More of it could be cleared for intensive use so that steeper areas of other soils on the farm could be released for pasture or forest.

Tate loam, eroded undulating phase (3 to 7 percent slopes) (TD).—Erosion has removed 25 to 75 percent of the original surface soil, and the subsoil is within plow depth in most places. The plow layer is yellowish-brown friable somewhat heavy loam. External drainage is slow, and internal drainage is moderate. The soil is low in organic matter and is strongly acid throughout. The most common variation is in the degree of erosion.

Use and management.—Practically all this phase is used for crops, and it is well suited to any grown in the county. More areas could be intensively cultivated, thereby releasing steeper land on the farm for pasture and forest. In using the soil for intensive cropping, however, care must be taken to control runoff in order to avoid further erosion.

Toxaway silt loam (0 to 3 percent slopes) (TH).—This nearly level soil has formed from recent alluvium derived from soils underlain by granite, gneiss, and schist. It is readily distinguished by its almost black surface layer. It is associated with Congaree soils of the bottom lands and with Altavista and State soils of the low stream terraces. External drainage is very slow to slow; internal drainage is very slow. The trees that remain are water-loving species such as willow, river birch, beech, hophornbeam, and alder.

Profile description:

0 to 14 inches, brownish-black to almost black friable porous silt loam; contains many grass roots in the first 10 inches; high organic content.
14 to 29 inches, brownish-gray friable loam; contains a few roots.
29 inches +, light brownish-gray friable loam; contains very little clay and grades into a mixture of gravel and sand; the water table lies at or near the top of this layer.

The soil varies in the thickness of the layers of the profile—the first layer ranges from 8 to 14 inches, the second from 12 to 30 inches, and the third from a few inches to a few feet. The entire profile is very strongly to extremely acid, and the first layer nearly everywhere is high in organic matter.

Use and management.—Toxaway silt loam is subject to overflow and in its natural waterlogged condition is not very suitable for crops or pasture. Most areas are in pasture, and small acreages are in forest or are idle. Some areas have been drained to varying degrees and are in crops. Corn, the main crop, produces moderately high yields. Under good management, including adequate drainage, the soil will produce relatively high yields of most crops and pasture.

Tusquitee loam, rolling phase (7 to 15 percent slopes) (TM).—This phase occurs on foot slopes in association with Hayesville, Porters, Clifton, and Rabun soils. It is derived from colluvial or local alluvial materials washed from areas of these soils. External drainage is slow to moderate, and internal drainage is moderate. The soil contains a fair quantity of organic matter, and forested areas have a thin layer of leaf mold on the surface. The natural vegetation consists largely of maple, yellow-poplar, chestnut, locust, and post and white oaks and an undergrowth of dogwood, mountain-laurel, rhododendron, and berry bushes.

Profile description:

0 to 12 inches, dark-brown friable porous loam; contains some gravel and a few roots.
12 to 38 inches, dark yellowish-brown friable loam or clay loam; contains some gravel, a few somewhat larger stones, some mica flakes, and many small roots.
38 inches +, strong yellowish-brown loam; contains much gravel and many angular rock fragments, some of which are breaking down through weathering.

The organic matter on the surface and in the upper surface soil varies considerably in quantity from place to place and is greatest in areas of northern exposure.

Use and management.—About 10 percent of this phase is used for crops (pl. 3, *A*), 5 percent is idle, and the rest is in forest. The soil has a wide use suitability and is well suited to crops and pasture. More areas could be cleared for cultivation. A relatively high level of fertility can be maintained, even if the soil is used intensively.

Tusquitee loam, eroded rolling phase (7 to 15 percent slopes (TK).—Erosion has removed 25 to 75 percent of the surface soil and has caused a few shallow gullies. Otherwise, this phase is similar to Tusquitee loam, rolling phase. The plow layer consists of moderate-brown friable loam or heavy loam that contains subsoil material in places. The soil has moderate external and internal drainage and is strongly acid throughout. It has lost a major part of its organic

matter by erosion. Areas are in the east-central and northern parts of the county.

The degree of erosion constitutes the most evident variation. In some areas the soil has been only slightly eroded, although much of the organic matter has been lost by erosion. In a few areas stones are scattered over the surface and mixed through the soil, but they do not interfere seriously with tillage.

Use and management.—Tusquitee loam, eroded rolling phase, is cleared and used for crops (pl. 3, *B*) and some pasture. It is suited to any crop grown in the county and can be used in relatively short crop rotations. Good management practices are necessary to maintain soil fertility and to conserve soil material.

Tusquitee loam, undulating phase (3 to 7 percent slopes) (TN).—The milder slope and somewhat greater depth of profile differentiate this phase from the rolling phase of Tusquitee loam. External drainage is very slow to slow; internal drainage is moderate. The soil is moderately high in organic matter and is strongly acid.

Erosion has not appreciably affected the soil, although some organic matter has been removed in a few places. A few areas at the foot of slopes in valleys receive wash from adjacent cultivated fields.

Use and management.—About 75 percent of this soil is in forest. The cleared land is used for crops, although a small part is idle. The soil is one of the best in the county for crops or pasture. It is suitable for intertilled crops, grown in short rotations. More areas could be cleared for row crops, which would allow steeper land on the farm to be used less intensively.

Tusquitee loam, eroded undulating phase (3 to 7 percent slopes) (TL).—Although erosion has removed 25 to 75 percent of the original surface soil, the subsoil is within plow depth in only a few areas. The greatest damages the erosion causes are loss of organic matter and reduction in water-holding capacity. The soil has very slow to slow external drainage and moderate internal drainage.

An included acreage has been only slightly eroded, but it has lost much of its organic matter.

Use and management.—Nearly all this phase is used for crops. It is well suited to such use and has a very wide range of suitability. It is highly suitable for intertilled cropping. Good management is required to maintain a moderately high organic content and an adequate water-holding capacity.

Tusquitee stony loam, rolling phase (7 to 15 percent slopes) (TT).—The principal difference between this phase and Tusquitee loam, rolling phase, is degree of stoniness. Stones, ranging from pebbles to large boulders, are on the surface and in the soil mass in varying quantities. They hinder tillage in most places.

This phase occurs throughout the county, generally on foot slopes of mountains or hills. It has formed from colluvial material washed or rolled from adjoining lands. External drainage is slow to moderate; internal drainage is moderate. The soil is strongly acid throughout, and the upper surface soil has a comparatively high organic content.

Use and management.—About 80 percent of this phase is in forest, and the rest is in crops and pasture. The soil is suited to intertilled

cropping, largely because of favorable slope, high fertility, and ready response to good management practices. The stones can be removed by hand, in part at least, on farms that have the available labor.

Tusquitee stony loam, eroded rolling phase (7 to 15 percent slopes) (Tp).—This phase is similar to Tusquitee loam, rolling phase, in color, texture, and consistence, but it is stony, moderately eroded, and in most places somewhat shallower. The stones vary in size and number and nearly everywhere make tillage difficult. From 25 to 75 percent of the surface soil has been removed by erosion, and in some places the subsoil is within plow depth. The plow layer consists of moderate-brown friable stony loam. External and internal drainage are moderate. The soil is low in organic matter and strongly acid. Small areas occur in all parts of the county.

Included with this phase as mapped are areas that are only slightly eroded but have lost much of their organic matter by erosion.

Use and management.—Although stony and considerably eroded, Tusquitee stony loam, eroded rolling phase, is suitable for intertilled cropping. More than half is in pasture; the rest is in cropland, some of which is idle. The common crops are grown. Stones have been removed from some areas to make tillage easier. The soil is fair to good cropland and good pastureland. Good management is necessary to maintain fertility and to control water.

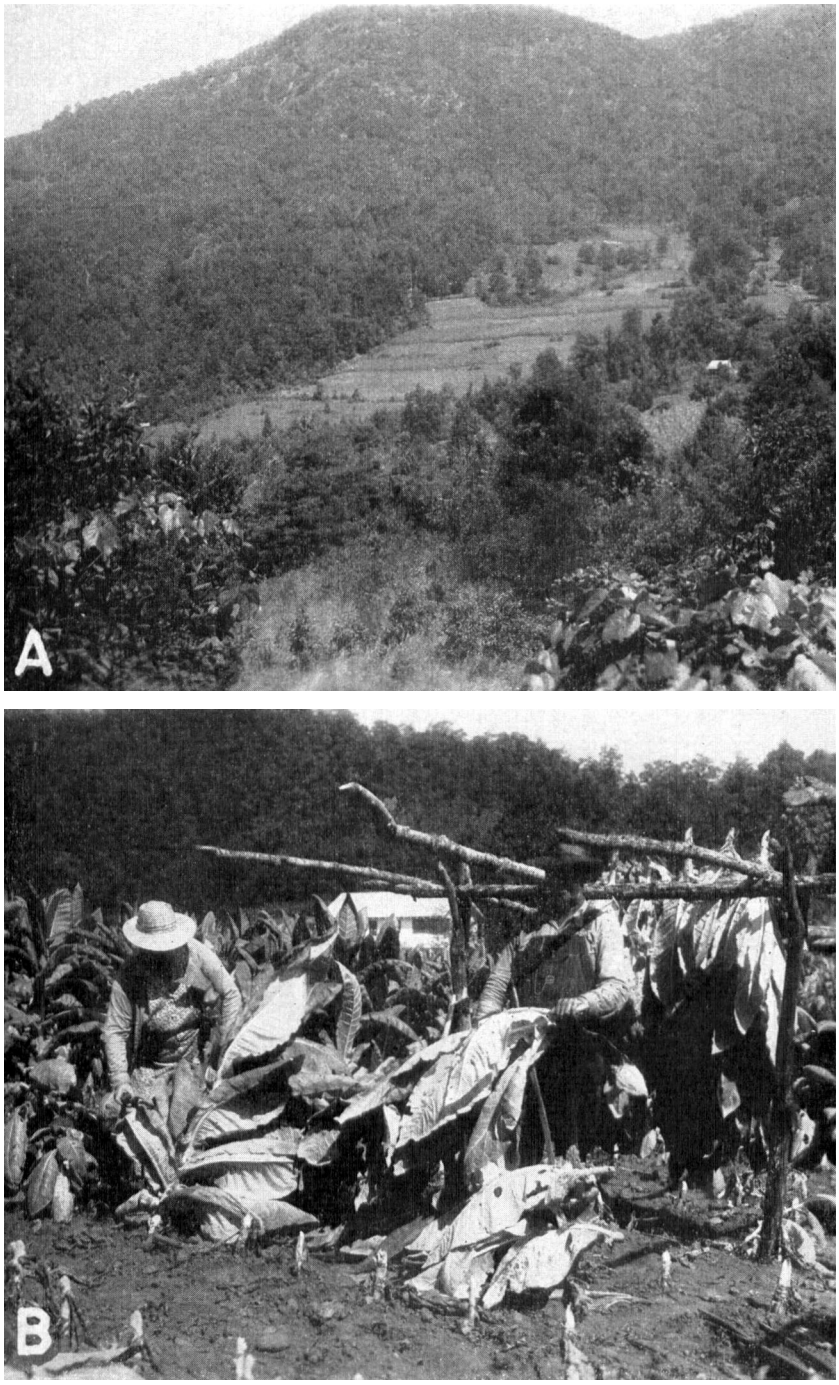
Tusquitee stony loam, hilly phase (15 to 30 percent slopes) (Ts).—The strong slope and stony surface and profile constitute the main differences between this phase and Tusquitee loam, rolling phase. The stones range from pebbles to boulders. If the soil were cleared of forest for cultivation, the stones would interfere with or prevent tillage. In a few areas, however, the stones are less numerous. The soil has a fairly high organic content in the surface layer and is strongly acid throughout the profile. External and internal drainage are moderate.

Largely because of strong slope and stoniness, the soil is not well suited to intertilled crops. The less stony areas could be cleared for pasture or hay, but harvesting the hay would be difficult.

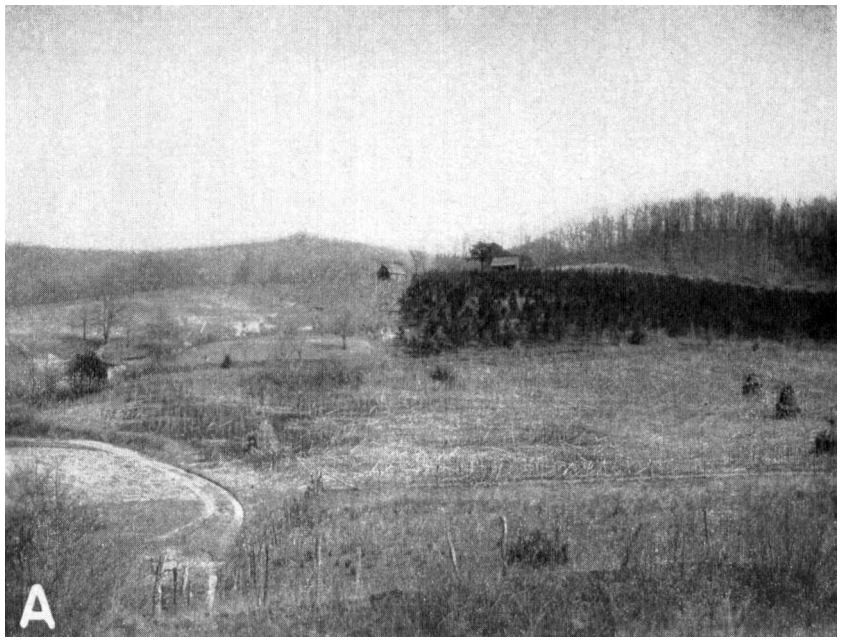
Tusquitee stony loam, eroded hilly phase (15 to 30 percent slopes) (To).—This moderately eroded soil has lost 25 to 75 percent of the surface soil through erosion. The subsoil is within reach of the plow in places. The soil to plow depth consists of moderate-brown friable stony loam. Stones ranging from the size of pebbles to large boulders hinder tillage. External drainage is moderate to rapid, internal drainage is moderate, and the reaction is strongly acid. The surface soil is moderately well supplied with organic matter.

Stones vary in number. The great quantity in some more severely eroded areas practically prevents tillage. In some areas the soil is only moderately eroded, and in some it is moderately eroded and not stony. These inclusions are not separated on the map because of otherwise similar profile and relatively small extent.

Use and management.—About half this phase is in pasture; the rest is in crops or is idle. The strong slope and stony character of the soil make it poorly suited to intertilled crops, although the less stony areas could be intertilled in long rotations under proper water-control



A, Stripcropping on Tusquitee loam, rolling phase; forest on Stony rough land (Porters and Ashe soil materials) in background.
B, Burley tobacco on Tusquitee loam, eroded rolling phase.



A, Fannin stony clay loam, eroded hilly phase, in foreground; Rough gullied (Fannin and Clifton soil materials) in right background has been planted to Virginia pine.

B, Harvesting timber in Macon County. About 80 percent of the county is covered by forest, mainly cutover hardwood stands such as this.

measures. The soil, however, is better suited to pasture and hay, even though stones and strong slopes interfere with harvesting of hay.

Tusquitee stony loam, undulating phase (3 to 7 percent slopes) (Tu).—The profile characteristics are in many respects similar to those of Tusquitee loam, rolling phase, but this undulating phase has milder slope, is stony, and has a deeper profile. Stones on the surface and in the surface soil interfere with tillage but do not prevent it. External drainage is slow; internal drainage is moderate. The reaction is strongly acid, and the upper surface soil has a comparatively high but variable organic content.

Use and management.—About 70 percent of this phase is in forest, and the rest is cropped or pastured. Although stony, the soil has a very wide range of use suitability. It is well suited to practically all crops grown in the county, especially to corn and hay. Intertilled crops can be grown. More areas could be cleared of forest and used for crops. Removing the larger stones would be worthwhile where labor is available.

Tusquitee stony loam, eroded undulating phase (3 to 7 percent slopes) (Tr).—Erosion has removed 25 to 75 percent of the original surface soil and left the subsoil within plow depth in some areas. The plow layer is moderate-brown friable loam. External drainage is very slow to slow, internal drainage is moderate, organic content is moderate, and the reaction is strongly acid. Stones on the surface and in the soil are not numerous enough to prevent tillage, although nearly everywhere they interfere with it.

Use and management.—Most of this soil is in pasture and crops, but a small percentage is idle. The range of use suitability is very wide, and most crops common to the county can be grown—especially corn and hay. Removing by hand the stones that interfere with tillage would greatly improve the workability of the soil.

Warne silt loam (0 to 5 percent slopes) (Wa).—This soil occurs in small, widely distributed areas on low stream terraces. It has developed from alluvium composed of materials washed from uplands underlain by igneous and metamorphic rocks. About two-thirds of the soil is nearly level to undulating, and a third, rolling. External drainage is slow to rapid; internal drainage is very slow. The entire profile is strongly to very strongly acid.

Profile description:

0 to 7 inches, brownish-gray friable silt loam; slightly sticky when wet.
7 to 17 inches, light yellowish-brown compact silty clay mottled with moderate yellowish brown; slightly sticky and plastic when wet.
17 to 22 inches +, mottled medium-gray and moderate yellowish-brown sticky and plastic heavy silty clay.

The first layer ranges from 4 to 8 inches in thickness and the second from a few inches to more than 24 inches. In places the third layer is underlain by yellow material consisting almost entirely of sand and gravel. Pebbles and cobblestones are on the surface and in the soil mass in a few areas.

Use and management.—About one-fourth of Warne silt loam is used for crops, chiefly for corn but to some extent for hay. A large part is in pasture, a fairly large acreage is idle, and a fairly small part is in

forest. Largely because of very slow internal drainage, compact subsoil, and low fertility, the soil should be used mainly for small grains, corn, and some hay and pasture plants. Management requirements for increasing productivity include improved internal drainage and improved soil fertility. Areas that are properly limed, fertilized, and seeded produce good pasture, and a large acreage is probably best suited to such use.

Wehadkee silt loam (0 to 3 percent slopes) (WB).—This soil has formed from recent alluvial material derived from upland soils underlain chiefly by light-colored gneiss, schist, or granite. It is associated with soils of the Congaree and Chewacla series. It is nearly level and subject to overflow. External and internal drainage are very slow, and in some areas the soil is ponded part of the winter. The natural vegetation consists largely of water-loving plants. The reaction is very strongly to extremely acid, and the organic-matter content is comparatively high.

Profile description:

0 to 7 inches, mottled moderate-brown and light-brown friable silt loam; contains some partly decomposed organic matter.
7 to 23 inches, mottled brownish-gray and moderate-brown friable silt loam; contains many fine mica flakes.
23 inches +, mottled brownish-gray and light-brown friable silt loam; contains many mica flakes; less mottled than layer above.

The most important variation within the soil is in the degree of poor drainage. In some places the water table may be at or near the surface; in others it may be 18 to 24 inches beneath the surface.

Use and management.—Practically all Wehadkee silt loam has been cleared of forest, but a considerable part is now growing up in alders, reeds, and rushes. The soil is nearly all used for pasture, but cattle can graze only during periods of very dry weather. The soil might be suited to crops if drained, although drainage is very difficult because the soil lies only slightly above the water level of the streams.

LAND USE, MANAGEMENT, AND PRODUCTIVITY [4]

The term "land use" in this report refers to the broad farm uses of soils as for (1) tilled crops (row crops, small grains, and annual hay); (2) permanent pasture; and (3) forest. Soil management refers to such practices as (1) choice and rotation of crops; (2) use of lime, commercial fertilizer, and manure; (3) tillage practices; and (4) engineering methods of water control.

The major uses, the management needs, and the productivity of the soils are here considered in order that their interrelations may be more readily understood.

LAND CLASSES AND MANAGEMENT GROUPS

Soils of this county have been grouped in five land classes on the basis of their suitability for agriculture. In the order of decreasing desirability for present agriculture, they are called First-, Second-, Third-, Fourth-, and Fifth-class soils. On the colored soil map that

[4] Prepared in May 1946 and revised in February 1955 by members of the North Carolina Agricultural Experiment Station.

accompanies this report the twenty management groups into which these five classes are subdivided are represented by color groupings. All the soils in one color need about the same kind of management.

The soils of no one class are ideal for the existing agriculture. First-class soils more nearly approach that ideal than the Second-class soils. Likewise, the soils of each succeeding class are farther from ideal than those of the preceding class.

Three major factors—productivity, workability, and conservability—are evaluated in determining the class for a soil. These three are summations of many soil properties that affect suitability for agriculture.

Productivity refers to the capacity of the soil to produce crops under prevailing farm practices and under intensified management. A soil may be productive of a crop but not well suited to it because of poor workability, poor conservability, or both.

Workability refers to the ease of tillage, harvesting, and other field operations. Texture, structure, consistence, organic-matter content, moisture conditions, stoniness, and slope are important characteristics that affect workability.

Conservability indicates the ease of maintaining the productivity and workability of the soil.

An ideal soil is very productive of a large number of important crops, easily worked, and can be conserved with minimum effort. All soils of Macon County fall short of the ideal, but they differ widely in the degree of shortcoming. For example, a soil may be highly productive and easily conserved but difficult to work. Productivity, workability, and conservability are intricately interrelated, and their effect on the suitability of the soil is complex.

The suitability of the soils for agriculture has been evaluated on the basis of the experience of farmers, extension workers, experiment station personnel, vocational agriculture teachers, soil surveyors, and others who work with soil. For example, a farmer knows that some soils on his farm are more desirable for certain crops than others. By gathering and evaluating information of this kind and making comparisons within farms and among farms, the soils were ranked in the order of their desirability for the agriculture under present conditions. In this county cattle are important on many farms; therefore, suitability of soils for permanent pasture has been considered in determining soil rank. Where information based on experience with a soil was lacking, it was ranked by comparing it with other soils of similar characteristics for which information was available.

In the following pages each of the five land classes are separately discussed. Then, each land class is subdivided into management groups. All the soils in one group need about the same kind of management.

FIRST-CLASS SOILS

First-class soils are good to excellent for crops and very good to excellent for pasture. They differ somewhat in characteristics but have similar suitability for agriculture.

Each is moderately well supplied with plant nutrients and has fairly high fertility as compared with other soils in the county. Even the most fertile soil, however, will respond to fertilizer.

All First-class soils are well drained, yet their properties are such that they tend to retain an even and adequate supply of water for plant growth. Good tilth is easily maintained, and the moisture range suitable for tillage is comparatively wide.

The soils are moderately well supplied with organic matter. Their physical properties favor the movement of air and moisture in the solum and the free penetration of roots into all parts of the subsoil.

None of these soils has any adverse condition or property, as stoniness, poor tilth, or unfavorable relief; the problem of conserving fertility and soil material is relatively simple; and each is capable of intensive use under special management practices. The First-class soils of Macon County are listed by management groups in table 4.

TABLE 4.—*First-class soils of Macon County, N. C., arranged by management groups, and the estimated percentage of each soil in crops, idle cropland, pasture, and forest in 1946*

Management group and soil	Crops	Idle cropland	Open pasture	Forest
Group 1–A:	*Percent*	*Percent*	*Percent*	*Percent*
Congaree fine sandy loam	95	5		
Congaree silt loam	95	5		
Group 1–B:				
Altavista loam, undulating phase	95	5		
Hiwassee clay loam, eroded undulating phase	90	10		
Masada loam, eroded undulating phase	90	5	5	
State loam:				
Undulating phase	95	5		
Eroded undulating phase	90	10		
Tate loam:				
Rolling phase	10	5		85
Undulating phase	20	5		75
Eroded undulating phase	95	5		
Tusquitee loam:				
Rolling phase	10	5		85
Undulating phase	20	5		75
Eroded undulating phase	95	5		

MANAGEMENT GROUP 1–A

The soils of group 1–A are alluvial in origin. They occupy first bottoms along streams and are very similar except in texture. They are well drained and nearly level. Control of runoff is not a problem. The surface layers are very friable, and the subsoils are friable and open. Nevertheless, the soils retain sufficient moisture and plant nutrients for growth of any of the common crops.

The soils are strongly acid in areas that have not been limed recently. They are naturally better supplied with nitrogen, phosphorus, and potash than the soils on the uplands because they receive new soil material during occasional floods. Their management requirements are relatively simple.

Soils of this group are used for crops—mostly corn and small grains. The minor crops are rye, oats, lespedeza, and tobacco. The soils are especially well suited to corn, grass meadow, pasture, and truck crops. No particular crop rotation is in general use. Corn frequently follows corn, or a small grain or crimson clover is grown on the cornland. In some sections rye and oats may be cut for hay; in others, these crops are grazed, turned under, and followed by corn. Crimson clover is rather frequently followed by corn. The crimson clover is turned under to benefit the corn. On a very few farms, potatoes, an all-season crop, are followed by rye and lespedeza or clover. The legume is kept on the land for 2 years, and then corn is planted.

Only small quantities of amendments are used for corn and crimson clover. Potatoes and truck crops are heavily fertilized, usually with 500 to 800 pounds of 6–12–6 [5] or 8–8–8 an acre.

Lime is used for truck crops. Generally it is not applied for potatoes, as liming increases the risk of potato diseases. In most places small grains receive 300 to 400 pounds of 0–16–0 an acre.

No special tillage practices are followed. The land is generally broken late in winter or early in spring. Light implements can be used, and deep plowing is not essential.

The average farm in this county has only a small area of group 1–A soils, but this can produce much of the corn, market vegetables, or other row crops needed. These soils are well suited to corn for grain or silage and are desirable for vegetables and for grasses for pasture or hay. When possible, however, soils of the uplands should be used for sod-forming crops and these 1–A soils reserved for row crops. Crops such as crimson clover and lespedeza respond readily to a ton of limestone an acre applied either at intervals of 4 to 6 years or once within the crop rotation. It is better to have a soil test made before applying lime.

Farmers who obtain favorable yields of corn, small grains, and hay apply some phosphate and a little potash before planting the grain crops. They add nitrogen as a topdressing. By turning under legumes grown in the rotation, nitrogen is added to the soil and benefits the corn that follows. Manure is used in small quantities, but it should be saved for the soils on the uplands because they need it more.

MANAGEMENT GROUP 1–B

The members of group 1–B occur on either colluvial slopes or terraces. They are all loams or clay loams, undulating to rolling, well drained, and practically free of stones. They range from light brown or yellowish brown to dark brown or brownish red.

Corn, small grain, hay, and vegetables are the principal crops. Because of their favorable physical properties, the soils are well suited to intensive row cropping, especially to potatoes, vegetables, tobacco, and corn. Commercial truck crops are produced to a limited extent.

Rotations are not generally practiced. Sometimes row crops are alternated, but frequently the same crop is grown for 2 or 3 years in succession. Rotations used are: (1) Potatoes, rye or wheat, lespe-

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

deza or clover for 2 years; (2) tobacco, rye, lespedeza or clover, and corn; (3) corn, rye, corn; and (4) corn, crimson clover, and corn. A legume in the rotation helps to maintain high crop yields, especially if it is turned under.

Land for corn is treated with 200 to 300 pounds of 0–16–0 fertilizer an acre and manure is added when available. Vegetable crops are fertilized with 600 to 800 pounds of 8–8–8 or 6–12–6 an acre. Truck crops, except potatoes, receive 1,000 to 2,000 pounds of lime an acre as indicated by soil tests. In general very little lime is used for the other crops.

No special tillage practices are followed. Land usually is broken in spring for row crops that are tilled. The crop rows are laid out across the fields in the most convenient way.

The soils of group 1–B, like those of group 1–A, can be cropped intensely if suitable rotations are followed. The Altavista, State, and Tate soils are well suited to silage corn, garden vegetables, truck crops, and small grains. The Tusquitee soils are well suited to garden vegetables, commercial truck crops, legumes, and corn, and are moderately well suited to wheat, alfalfa, and clover. All the soils are excellent for pasture, but because of the scarcity of good cropland, they should be used for intensive cropping wherever feasible.

Lime gives favorable results on these acid soils. For alfalfa, an initial application of about 2 tons of ground limestone an acre is generally needed. Soil tests should be made to determine the proper quantity of lime.

All the soils have a favorable ratio of nitrogen, phosphorus, and potash, but the total content of these nutrients is not very high. Addition of commercial fertilizer will produce favorable yields.

Except for contour tillage, no special tillage practices are necessary. These soils are easily plowed and cultivated and only light to moderately heavy implements are required.

SECOND-CLASS SOILS

Second-class soils are fair to good for crops and good to excellent for pasture. They are not so much alike as the First-class soils, but all Second-class soils are similar in their suitability for agriculture. Within a limited range, they differ in productivity, workability, and conservability. Each soil is moderately deficient in one or more of these, and therefore less suitable for agriculture than any of the First-class soils.

The Second-class soils are listed by management groups in table 5.

MANAGEMENT GROUP 2–A

Although inextensive, the soils of this group are locally important to agriculture. All areas have been cleared and are cultivated, lying idle, or pastured. The soils are similar in physical characteristics; they have brownish to reddish-brown clay loam or loam surface soils, reddish-brown to brown clay loam or clay subsoils, and rolling surface relief. The management requirements therefore are practically the same for all soils in the group. The Hayesville, Hiwassee, and Rabun soils are more difficult to handle than the other soils. They are sticky

TABLE 5.—*Second-class soils of Macon County, N. C., arranged by management groups, and the estimated percentage of each soil in crops, idle cropland, pasture, and forest in 1946*

Management group and soil	Crops	Idle cropland	Open pasture	Forest
Group 2–A:	*Percent*	*Percent*	*Percent*	*Percent*
Hayesville clay loam, eroded rolling phase	75	15	10	
Hiwassee clay loam, eroded rolling phase	80	20		
Masada loam, eroded rolling phase	90	5	5	
Rabun clay loam, eroded rolling phase	75	15	10	
Tusquitee loam, eroded rolling phase	60	10	30	
Group 2–B:				
Hayesville stony clay loam, eroded rolling phase	75	10	15	
Hiwassee gravelly clay loam:				
Eroded undulating phase	75	10	15	
Eroded rolling phase	70	20	10	
Masada gravelly loam:				
Eroded undulating phase	75	15	10	
Eroded rolling phase	75	15	10	
Group 2–C:				
Ashe loam:				
Rolling phase	10		10	80
Eroded rolling phase	60	20	20	
Tate loam, eroded rolling phase	70	10	20	
Group 2–D:				
State gravelly loam, undulating phase	70	10	20	
Tusquitee stony loam:				
Rolling phase	10		10	80
Eroded rolling phase	30	10	60	
Undulating phase	10		20	70
Eroded undulating phase	40	10	50	
Group 2–E:				
Chewacla silt loam	95	5		
Chewacla loam, overwash phase	90	10		
Toxaway silt loam	20	10	60	10

when wet, and if worked when too moist, tend to bake and become hard or cloddy on drying.

Soils of group 2–A are used for general farming. Corn, small grains, and lespedeza are the principal crops. Systematic crop rotations are not commonly used. On some farms, however, corn is followed by a small grain and lespedeza. In this rotation the first crop of lespedeza is cut for hay and the second is harvested for seed and then turned under. On a few farms a shorter rotation—corn, crimson clover, corn—is used.

Corn commonly receives 200 to 400 pounds an acre of 4–8–12 or a similar mixture. When available, manure is added to cornland in spring. Small grains receive about 300 pounds of 16-percent phosphate an acre. On some farms a small quantity of lime is applied to cropland.

Farmers usually break the land in spring and run the rows in the most convenient way; only a few plow and till along the contour.

Group 2–A soils are suitable for alfalfa, wheat, barley, clover, and grass. Corn gives fairly high yields if it follows a turned-under legume crop and rainfall is sufficient. Apple orchards would probably bring good returns, judging from the growth and yields on small farm orchards on similar soils in this and nearby counties.

A rotation of corn, small grain, and 2 years of lespedeza usually meets the requirements of the average farm that has Hayesville, Rabun, Tusquitee, and Hiwassee soils. A rotation that gives excellent results on the Rabun soil consists of 4 years of alfalfa followed by corn, a small grain, and 1 year of lespedeza. Alfalfa does well on the Hayesville and Hiwassee soils. The alfalfa is very useful on dairy or beef cattle farms for it assures enough high-quality feed each year. Only a few farms, however, have enough acreage of these soils to allow using the long crop rotation needed to accommodate alfalfa. In spite of this, it is advisable to grow some alfalfa.

Land for alfalfa should receive approximately 2 tons of ground limestone an acre before the first seeding. A similar quantity probably will be needed during each rotation. Phosphate, potash, and small quantities of boron should be added as needed.

Moderately heavy farm implements and tractors or strong draft horses are needed to break the land or turn under the sod. Fields should be prepared for crops as early in spring as possible. The Hayesville, Rabun, and Hiwassee soils, in particular, must be tilled within a narrow range of moisture content. If plowed or cultivated when too wet, they tend to puddle and bake. The addition of organic matter will help prevent puddling. Deep plowing of group 2–A soils is not necessary if sod-forming crops are grown in the rotation and are turned under.

These soils may lose large amounts of soil material and water if used continuously for row crops or if crop rows do not run across the slope. The control of water is of first importance. Losses from the larger fields can be controlled effectively through the use of crop rotations in a system of contour strips; that is, plant row crops between strips of close-growing crops, and rotate the crops on each strip. Terraces may be needed. Permanent guide rows should be made in unterraced fields.

MANAGEMENT GROUP 2–B

The soils of group 2–B are not extensive but are important locally. All areas are cleared and cultivated or to some extent used for pasture. Some areas are idle. The soils have reddish-brown clay loam or loam surface layers and reddish-brown clay loam subsoils. In each soil the gravel and stones interfere somewhat with tillage. Owing to similar physical characteristics and slope, management requirements for the soils of this group are much the same. The Hayesville and Hiwassee soils are more difficult to handle under a wide range of moisture conditions than the Masada soil. They are sticky when wet, and if worked when too moist, tend to puddle and become hard or cloddy on drying.

The soils of this group are used for general farming. Corn, small grains, and lespedeza are the principal crops. Systematic crop rotations are not commonly used. On some farms, corn is followed by a

small grain and lespedeza. In this last-mentioned rotation the first crop of lespedeza is cut for hay; the second is saved for seed or for turning under, or for both. On a few farms a shorter rotation consisting of corn, crimson clover, and corn is followed.

Land for corn is generally treated with 200 to 400 pounds of 6–12–6 or a similar fertilizer. When available, manure is added to cornland in spring. Small grains receive about 300 pounds of 16-percent phosphate an acre. On some farms cropland receives a small quantity of lime.

Among the common tillage practices are plowing the land in spring and running the rows the most convenient way. Only a few farmers till on the contour.

Soils of this group are suitable for wheat, barley, clover, and grass. Corn produces fairly high yields if rainfall is sufficient and it follows a legume that has been turned under. Apples probably would do well.

A rotation of corn, a small grain, and 2 years of lespedeza will usually meet the needs of average farms having some of these soils. Few farmers, however, have large enough acreages of these soils to allow following the long crop rotations these soils need. Stones often are so numerous they interfere with tillage and reduce yields of corn.

Moderately heavy farm implements and tractors or strong draft animals are needed to plow these soils. Fields should be prepared for crops as early in spring as possible. The Hayesville and Hiwassee soils must be tilled within a narrow range of moisture content. Adding organic matter to these soils will greatly reduce puddling.

Water control is important, as runoff is high and loss of soil material is great where these soils are used continuously for row crops or where the rows are not run on the contour. Erosion losses in large fields can be controlled effectively by crop rotation and contour stripcropping. Contour terraces may be necessary. Permanent guide rows should be established in fields not terraced.

MANAGEMENT GROUP 2–C

The soils of group 2–C are fairly extensive in the southern part of the county and are important in the agriculture of that section. In physical properties, the soils are very similar. They differ mainly in degree of erosion. Most areas of the eroded rolling phases of Ashe loam and Tate loam are cultivated or in pasture; a few are idle. Nearly all areas of Ashe loam, rolling phase, are in forest; only small patches are cleared for crops or pasture.

All soils in group 2–C have brownish-gray loam surface layers and yellowish-brown to light-brown sandy clay subsoils. Because of their similar physical characteristics and comparable slopes, management needs are practically the same for all. The soils can be tilled under a wide range of moisture conditions. They are not particularly susceptible to erosion but tend to leach because of the rather open structure of the subsoil.

Special tillage practices are not necessary. The land is generally broken late in winter or early in spring. Sod crops should be turned under during winter whenever weather permits. Relatively light implements are adequate for tillage. Crop rows should be run along the contour so that runoff and soil loss may be reduced. Nevertheless,

many farmers run the rows the most convenient way. In a few fields terraces may be used to check runoff and to serve as guides for crop rows.

These soils are well suited to grass pasture or to cabbage, potatoes, green beans, sweet corn, or other truck crops. They have relatively mild relief and are friable, porous, and highly absorptive of water. Consequently, if they are tilled on the contour, truck crops can be grown in short rotations without much risk of severe erosion.

From 600 to 1,000 pounds an acre of 8–8–8 or 4–10–6 is applied for cabbage and green beans, and sometimes for potatoes. Some well-rotted manure is applied to land used for cabbage. Corn is not fertilized when grown in rotation, but in some places it is side-dressed with 15 to 25 pounds of nitrogen an acre. When a heavy growth of rye is desired for grazing or turning under, the land is fertilized with 300 to 400 pounds of 16- or 20-percent phosphate an acre. From 1 to 2 tons of ground limestone an acre is used for truck crops other than potatoes. Lime is seldom applied for potatoes.

The common rotations are: Corn, grass and clover for 2 years, and cabbage or potatoes; or (2) corn, a small grain, and grass and clover for 2 years. In some places row crops are grown several years in succession before the land is used again for grass and legumes.

To maintain productivity at a relatively high level, the rotation should be a truck crop, a small grain and then clover and grass for 3 years. A good stand of clover should be turned under before truck crops are planted. Where truck crops are not grown, the rotation may consist of corn, a small grain, and clover and grass. Some areas of the Ashe soils are not producing satisfactorily. If lespedeza were grown for 2 years after small grain and then turned under, it should increase yields on these areas.

MANAGEMENT GROUP 2–D

The soils of group 2–D have gravel or stones that interfere materially with tillage. They are not extensive but are important in the agriculture of the county because much of their acreage is cleared and used for crops and pasture. These soils are similar and need about the same management. They can be worked under a wide range of moisture content.

Corn, hay, and grass for pasture are the principal crops. If the stones were removed, the soils would be suitable for intensive row cropping. Vegetables, corn, tobacco, and small grains would do well.

Crop rotation generally is not practiced. Sometimes one row crop will follow another; often the same row crop will be grown on the same field year after year. In some rotations, potatoes are followed by rye or wheat, which is followed by lespedeza or clover 2 years. Tobacco may be followed by rye, lespedeza, or clover, and then by corn. The rotation may consist of corn, crimson clover, and corn. Legumes grown in the rotation help to maintain high crop yields, especially if they are turned under.

Land for corn is generally treated with about 200 pounds of 0–16–0 or 0–18–0 an acre; manure is added where available. Vegetables are fertilized with 500 to 800 pounds an acre of 8–8–8 or 6–12–6.

No special tillage practices are followed. Usually the land is broken in spring for row crops; the rows are laid out the most convenient way.

These stony or gravelly soils are best suited to pasture and corn because tillage must be done nearly everywhere with hand implements. It might be feasible to remove the larger stones so that the soils could be used more intensively and the crops properly rotated. Plowing and cultivating would be fairly easy if the large stones were cleared away.

MANAGEMENT GROUP 2–E

The level or nearly level soils of group 2–E occur in first bottoms and are subject to flooding. Their imperfect or poor drainage is a problem. The Chewacla soils are brown and mottled, particularly below the upper layer. The Toxaway soil is almost black in the top layer, which contains much organic matter and overlies a brownish-gray layer. The surface soils are very friable; the subsoils are moderately friable. Areas of group 2–E soils that have not been limed in recent years are acid.

These soils are not so deficient in nitrogen, phosphorus, and potash as many soils on the uplands. New soil material deposited during floods tends to keep the soils fairly well supplied with plant nutrients.

Tillage is relatively simple, but every reasonable effort should be made to avoid cultivating when the soils are too wet or too dry. Light farm implements and small work animals are sufficient for tilling. The land is usually broken late in winter or early in spring.

For best yields, the soils should be drained with open or covered ditches. Boxed drains made of boards, split logs, stones, or combinations of these, are commonly used. Tile is used in several areas. Some stream channels have been deepened by dredging or by ditching; this lowered the streams, and then drainage was improved by digging lateral ditches or laying tile drains.

Where drainage is adequate, soils of this group are excellent for corn and truck crops; where drainage is unfavorable, grass and clover are probably the best crops.

Only small quantities of amendments are generally added. About 200 pounds an acre of 16-percent phosphate is applied to land for corn and small grains. Some farmers treat the land every 3 to 5 years with 1,000 to 2,000 pounds an acre of ground limestone. Although manure would be beneficial, it should be used where the need is much greater—on eroded soils of the uplands.

The common rotations used are: (1) Corn, crimson clover, corn; and (2) corn, rye or other small grain, and corn. Corn is grown in many places for several successive years without an intervening crop. Some fields lie idle for a year or two, especially after a very wet year when the corn crop is largely ruined by excessive water.

Two rotations that give excellent results in nearby counties on similar soils should be suitable for this group. The first, for use on general farms where labor is scarce, is corn, followed by grass-and-clover meadow for 3 or 4 years. The second, for use on farms where labor is adequate, is a truck crop such as green beans, cabbage, peppers, or potatoes, followed by a small grain, corn, and meadow.

Good drainage is essential for successful management. It can be gained most effectively by using a combination of broad V-type ditches and tiles. In many places the stream channel should be lowered and straightened so that drainage outlets can be made. Such drainage measures are rather expensive and require much care after they are installed.

THIRD-CLASS SOILS

Third-class soils are poor to fair for crops and fair to very good for pasture. Under prevailing or even more intensive farming practices, they have limited suitability for commonly grown crops. Some of their undesirable features are steep slope; low plant-nutrient and organic-matter contents; unfavorable texture, structure, or consistence; eroded condition; and inadequate drainage.

Third-class soils are listed by management groups in table 6.

TABLE 6.—*Third-class soils of Macon County, N. C., arranged by management groups, and estimated percentage of each soil in crops, idle cropland, pasture, and forest in 1946*

Management group and soil	Crops	Idle cropland	Open pasture	Forest
Group 3–A:	*Percent*	*Percent*	*Percent*	*Percent*
Clifton clay loam, eroded hilly phase	60	10	30	
Hayesville loam, hilly phase				100
Hiwassee clay loam, eroded hilly phase	60	10	30	
Rabun clay loam:				
Hilly phase				100
Eroded hilly phase	65	5	30	
Group 3–B:				
Hayesville stony loam, hilly phase				100
Rabun stony clay loam, eroded rolling phase	70	5	25	
Group 3–C:				
Porters loam, hilly phase				100
Group 3–D:				
Ashe loam, hilly phase				100
Tate loam:				
Hilly phase				100
Eroded hilly phase	50	10	40	
Group 3–E:				
Buncombe loamy fine sand	80	20		
Group 3–F:				
Augusta loam	25	20	40	15
Warne silt loam	25	20	40	15

MANAGEMENT GROUP 3–A

The soils of group 3–A have similar properties and require about the same management. They have moderate-brown to reddish-brown loam or clay loam surface soils and reddish-brown clay loam subsoils. They have about the same relief and susceptibility to erosion.

No special tillage practices are employed. The land is generally broken late in winter or early in spring. Crop rows are run along the contour in a few fields, but generally they are run the most con-

venient way. On some farms, hillside ditches of sharp decline are made across the fields. The range of moisture content suitable for tillage is somewhat narrow. If plowed when too wet, the soils tend to puddle, bake, and form clods. If plowed when too dry, they are difficult to till. Land plowed in spring is probably more suitable for corn than land plowed in fall, unless the fall plowing is left in a rough condition through the winter.

These soils are ordinarily used for general farm crops such as corn, small grains, lespedeza, clover, and grass. No particular attention is given to the suitability of the soils for any special crop; but their rather high clay content and comparatively good water-holding capacity make them especially suitable for alfalfa, clover, and wheat. These crops help check runoff, conserve water and soil material, and are highly useful in adequate soil management. Apples and other tree fruits give good yields.

Superphosphate, the amendment most used, is applied at the rate of 200 to 300 pounds an acre for corn and 300 to 400 pounds for small grains. Corn is side-dressed with 10 to 15 pounds of nitrogen an acre in many places. Manure is applied to galled spots in the fields and to cornland in general. Very little lime is used, except for alfalfa. Alfalfa receives about 2 tons of lime at seeding.

Systematic rotations are not in general use. A rotation of corn, a small grain, and lespedeza is used on several farms. Some alternating of crops is practiced on nearly all farms. Suitable rotations are (1) corn, small grain, and clover-and-grass meadow, and (2) alfalfa 3 or 4 years, corn, a small grain, and lespedeza.

Unless precautions are taken, erosion soon becomes a major problem. The more organic matter there is added by crop rotations, including that added by legumes, the more moisture the soils hold. Row crops should not be planted more than 1 year in every 5. It may be preferable to substitute barley for corn, because corn should be restricted to soils of the first bottoms and to soils in smooth areas on stream terraces and uplands. A rotation system that employs contour stripcropping is often desirable if row crops must be grown on soils of this group. Terraces should be used where possible.

MANAGEMENT GROUP 3–B

The soils of group 3–B are similar to those of group 3–A except that stones interfere with tillage. These soils have reddish-brown stony loam or stony clay loam surface layers and reddish-brown clay loam or clay subsoils. They are about equally susceptible to erosion and have about the same management requirements.

No special tillage practices are employed. Plowing is done in winter or early in spring, and the crop rows are generally run on the contour. On some farms hillside ditches of sharp decline are run across the fields; many of them have become menacing gullies. These group 3–B soils must be tilled under a narrow range of moisture content. If plowed when too wet, they tend to puddle, and then to bake and form clods. If too dry, they are difficult to plow with the implements and work animals available. Spring plowing is better for corn than fall plowing, unless the land is left in a rough condition throughout the winter.

These soils are used for general farm crops such as corn, small grains, lespedeza, and grass. No particular consideration is given to their suitability for special crops. Their relatively high clay content and medium water-holding capacity make them desirable for small grains, clover, and lespedeza. These close-growing crops help in the conservation of water and soil material. The stony condition of the soils, however, tends to make them somewhat droughty if the organic content is not kept at a high level. Apple and other fruit trees give good yields.

Superphosphate is applied at the rate of 200 to 300 pounds an acre for corn and 300 to 400 pounds an acre for small grains. In places corn is side-dressed with 10 to 15 pounds of nitrogen an acre. Manure is applied to galled spots in the fields and to cornland. Little lime is used.

The farmers generally do not follow any systematic rotation. A few use a rotation of corn, a small grain, and lespedeza. Crops are alternated on nearly all farms.

Unless precautions are taken, erosion soon becomes a major problem. The more organic matter added through crop rotations that include legumes, the more retentive of moisture the soils become. Row crops should not be planted more than 1 year in every 5. It may be best to substitute barley for corn in the rotation, because it is better to grow corn on soils of the first bottoms and smooth areas of the stream terraces and uplands than on these soils. Contour stripcropping is often desirable, particularly if row crops must be grown. In such a system, terraces would be beneficial as a means of laying out guide rows. Removing the larger stones would facilitate tillage.

MANAGEMENT GROUP 3–C

The one soil in this group is on mountain uplands and is in forest. It has a dark-brown loam surface soil and a moderate-brown loam to clay loam subsoil. Both external and internal drainage are moderate.

If this soil were cleared of forest it would be suitable for crops and very good for pasture, but precautions would have to be taken to prevent erosion. It should not be planted to row crops more than once in 5 years, and small grains would be preferable to corn. A rotation system employing contour stripcropping would be advisable for areas cleared for crops.

MANAGEMENT GROUP 3–D

The soils of group 3–D are closely associated; they occupy similar positions in mountainous areas and respond about equally to the same kind of management. The Ashe soil is derived from material weathered from granites and gneisses; the Tate soils are derived from colluvial material that washed or rolled chiefly from Ashe and Chandler soils.

The Ashe loam, hilly phase, and Tate loam, hilly phase, are mostly under forest cover. Tate loam, eroded hilly phase, is chiefly in crops and pasture. No special tillage practices are used. Most of the land is plowed late in winter or early in spring. No particular care is

taken to control water; the crop rows are not always on the contour. Few farmers practice stripcropping.

The principal crops are corn, cabbage, green beans, potatoes, rye, and clover and grasses for meadow and pasture. All the soils are suited to these crops. Most areas lie at rather high elevations where the summers are cool; consequently, truck crops mature when prices usually are favorable. In nearby counties soils similar to these are excellent for apples and other tree fruits.

Areas used for truck crops other than potatoes generally receive lime and 800 to 1,000 pounds of 8–8–8 or 6–12–6 an acre. Manure is added to cornland. Thin or galled spots in fields receive the first applications. Some well-rotted manure is applied for cabbage, but only occasionally for potatoes. When grown in rotation with truck crops, corn receives a very light application of fertilizer or none at all. Little lime or fertilizer is used on pasture.

Because they are open and porous, these soils leach readily and need rather large quantities of lime. The Ashe soil is especially subject to leaching. Applications of 1½ tons of lime an acre each rotation period give good results. Land for potatoes should not be limed heavily because potato diseases are more prevalent on limed soils. When a heavily fertilized truck crop follows sod, leaching is retarded. Split applications of fertilizer are highly recommended.

Some pastured areas may require potash. Manure should be added first to galled areas, or to thin eroded spots in cultivated fields or pastures, and then to cornland.

On group 3–D soils, the general rotations used are: (1) Corn, grasses and clover for 2 years or longer, and cabbage or potatoes; (2) green beans, a small grain followed by clover for 2 years, cabbage, and corn; and (3) corn, a small grain followed by grass and clover for 2 years, potatoes, and cabbage or beans. Variations of these rotations are practiced by some farmers.

If water is to be controlled adequately, row crops should not be grown in succession. Contour tillage and stripcropping are essential for the successful management of the larger fields. Rotating crops in the strips will prove satisfactory; the lines for strips should be laid out by instrument. The smaller fields, where stripcropping is not feasible, should be tilled on the contour to check runoff. The areas now in forest will probably be brought into crop production gradually; the newly cleared land would benefit from the management here suggested.

MANAGEMENT GROUP 3–E

Buncombe loamy fine sand is the only member of group 3–E. It occurs on first bottoms near streams and differs from the other soils of the county in that it is very loose and open and is subject to severe leaching. It is low in plant nutrients and organic matter and is strongly acid. The areas are relatively small; they are used principally for corn and truck crops.

No crop rotation is in general use. The soil is poorly to moderately well suited to corn and most truck crops, certain hay crops, and crops for winter grazing. For good yields it requires heavy fertilization, addition of organic matter, and some lime. Manure and legume cover

crops turned under help to reduce leaching and to improve the capacity of the soil to hold moisture and plant nutrients. Fertilizers should be applied frequently in small quantities in order to keep leaching to a minimum. Where the fertility is kept high, a short crop rotation or continuous row cropping is practical. The soil is less well suited to permanent clover-and-grass pasture than many of the finer textured soils. In dry weather, the sod does not establish itself so well and dies early.

Tillage is easy, and weed control is much less difficult than on more productive soils. Erosion is not a problem, but scouring occurs during overflows. Flooding is a hazard, and crops commonly are seriously damaged 1 year out of 4 or 5.

MANAGEMENT GROUP 3–F

The soils of group 3–F have predominantly brownish-gray friable surface soils and mottled firm or compact subsoils. They occur on low stream terraces and are nearly level to undulating. Internal drainage is very slow. The soils are strongly acid and low in plant nutrients. Much of their acreage is used for pasture; corn and forage crops are dominant on the tilled areas.

The compact subsoils cause unfavorable moisture relations, and the low fertility greatly limits the range of crop suitability and productivity. During wet weather the soils have an excess of moisture, but during drier periods they rapidly lose moisture that is needed by plants. Improved internal drainage, increased fertility, and lime and organic matter are needed to bring productivity to a high level. Where drainage is not improved, hay crops such as redtop, timothy, lespedeza, and some clovers are suited. Where drainage is improved, a moderately short rotation consisting of a row crop such as corn, a small grain, and hay can be used if proper liming and fertilizing are practiced. Open ditches are the most practical means of draining the soils, as the subsoils are too tight for effective tile drainage. Alfalfa, tobacco, truck crops, and tree fruits are not suited, even on drained areas, because the subsoil is so compact.

Excess water and unfavorable consistence of these soils greatly limit the periods during which cultivation or other field work can be done. The soils puddle or become cloddy readily if tilled when too wet, yet cultivation is extremely difficult when they are entirely dry.

The soils are productive of pasture if properly limed and fertilized. Artificial drainage is not so necessary as on areas used for cultivated crops.

FOURTH-CLASS SOILS

Fourth-class soils are poorly suited to crops that require tillage but are at least moderately productive of pasture. Each soil is so difficult to work or conserve, or both, that cultivation is seldom practical. On the other hand, each soil is sufficiently fertile and holds enough moisture to maintain a moderately good to very good sod cover.

Although Fourth-class soils are only poor to fair for general agriculture, a considerable part of their acreage is tilled. This is done because many parts of the county have only small areas of soils in the

better classes. When large enough areas of soils suitable for crops are available, most of the Fourth-class soils should be used for pasture or forest. The Fourth-class soils are listed by management groups in table 7.

TABLE 7.—*Fourth-class soils of Macon County, N. C., arranged by management groups, and estimated percentage of each soil in crops, idle cropland, pasture, and forest in 1946*

Management group and soil	Crops	Idle cropland	Open pasture	Forest
Group 4–A:	*Percent*	*Percent*	*Percent*	*Percent*
Clifton stony loam, hilly phase				100
Fannin stony loam, hilly phase				100
Halewood loam, steep phase				100
Halewood stony loam:				
Hilly phase				100
Steep phase				100
Hayesville loam, steep phase				100
Hayesville stony loam, steep phase				100
Rabun clay loam, steep phase				100
Rabun stony clay loam:				
Hilly phase				100
Steep phase				100
Stony colluvium (Tusquitee and Tate soil materials)	20		35	45
Tusquitee stony loam, hilly phase				100
Group 4–B:				
Clifton stony clay loam, eroded hilly phase	30	20	50	
Fannin stony clay loam, eroded hilly phase	40	20	40	
Halewood loam:				
Eroded hilly phase	40	20	40	
Eroded steep phase	10	20	70	
Halewood stony loam, eroded hilly phase	30	20	50	
Hayesville clay loam:				
Eroded hilly phase	50	20	30	
Eroded steep phase	30	20	50	
Hayesville stony clay loam:				
Eroded hilly phase	30	20	50	
Eroded steep phase	20	20	60	
Hiwassee gravelly clay loam, eroded hilly phase	40	20	40	
Masada gravelly loam, eroded hilly phase	60	20	20	
Rabun clay loam, eroded steep phase	60	10	30	
Rabun stony clay loam:				
Eroded hilly phase	40	30	30	
Severely eroded hilly phase	20	50	30	
Eroded steep phase	20	30	50	
Tusquitee stony loam, eroded hilly phase	30	20	50	
Group 4–C:				
Hayesville clay loam, severely eroded hilly phase	10	30	60	
Rabun clay loam, severely eroded hilly phase	10	30	60	
Group 4–D:				
Wehadkee silt loam			100	

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TABLE 7.—*Fourth-class soils of Macon County, N. C., arranged by management groups, and estimated percentage of each soil in crops, idle cropland, pasture, and forest in 1946*—Continued

Management group and soil	Crops	Idle cropland	Open pasture	Forest
Group 4–E:	*Percent*	*Percent*	*Percent*	*Percent*
Ashe loam, steep phase				100
Ashe stony loam, hilly phase				100
Burton stony loam, hilly phase [1]				100
Porters loam, steep phase				100
Porters stony loam, hilly phase				100
Group 4–F:				
Ashe loam:				
Eroded steep phase	20	10	70	
Eroded hilly phase	50	10	40	
Ashe stony loam, eroded hilly phase	20	10	70	
Chandler stony loam:				
Hilly phase				100
Eroded hilly phase	30	5	65	
Porters loam, eroded steep phase	30	5	65	

[1] The vegetation on this soil is principally mountain oatgrass (*Danthonia Compressa*), locally called baldgrass, and rhododendron. A few areas are used for grazing but there is no improved pasture.

MANAGEMENT GROUP 4–A

The soils of group 4–A are somewhat unlike in color, texture, consistence, and structure. They are almost entirely in forest and are not eroded to any appreciable extent. They are hilly to steep and occupy relatively similar positions on the landscape. All except the Tusquitee soil have developed from rock weathered in place. The Tusquitee soil is derived from colluvial material.

The soils of group 4–A are characterized by moderate-brown or reddish-brown loam or clay loam surface soils and reddish-brown clay loam or clay subsoils. In most areas stones on the surface or mixed with the soil interfere with tillage.

Because of slope, susceptibility to erosion, or relatively high stone content, these soils are not suited to tilled crops unless very carefully managed. The best use appears to be forest or, if cleared, permanent sod crops for pasture. When row crops such as corn need to be grown, they should be followed by wheat or rye and then by a grass-legume mixture. Sod-forming crops should be on the land 5 out of every 6 years in the rotation. If the soils are managed by contour stripcrop rotations, only a narrow strip should be broken and cultivated each year. This method holds most of the soil in place under sod. Any galled or severely eroded spots should be fertilized or manured and, if possible, seeded to sod-forming crops.

MANAGEMENT GROUP 4–B

The soils of group 4–B are somewhat unlike in color, texture, consistence, and structure. They are hilly or steep and are moderately eroded. Stoniness interferes with tillage on some of the soils. The

surface soils are moderate-brown to reddish-brown loam or clay loam. The subsoils are reddish-brown or strong-brown loam or clay loam. All areas have been cleared; those not producing crops are in pasture or lying idle.

The common tillage practices are followed. The land is generally plowed in spring. In some stony areas much of the tillage must be done with hand implements. Hillside ditches are used on many fields, but in places they are so steep that many have become gullies. A few farmers have controlled runoff fairly successfully by laying out strips of 20 to 50 feet in width, more or less on the contour, across the fields.

Some farmers add lime to cropland at the rate of 1 ton an acre every fourth or fifth year. Hayland and pastures are limed in a few places. Manure is added to these soils not only to increase crop yields but also to help control water.

No definite crop rotation is in general use, but some farmers alternate corn and small grains and a few include lespedeza so as to have a 4- or 5-year rotation.

The eroded condition of these soils indicates improper use. They are not suited to intertilled crops; therefore, the most feasible use is pasture or forest. A few of the less steep areas are suitable for apples and other tree fruits. Orchards do well in adjoining counties on similar soils.

If acreage is needed for corn or some other row crop, the row crop should be followed by wheat or rye and then the land should be planted to a grass-legume mixture. Sod-forming crops should occupy the fields 5 out of every 6 years. Contour stripcropping should be used on all fields that have a row crop in the rotation. Only a narrow band should be plowed and cultivated each year. Manure is beneficial to galled spots. As much organic matter as possible should be kept in these soils to increase their capacity to absorb and hold water. So far as practical, the soils should be kept in pasture. The main requirements for pasture are proper liming and fertilizing and restricted grazing.

MANAGEMENT GROUP 4–C

The two soils of group 4–C are much the same in physical characteristics. They have reddish-brown clay loam surface soils and strong-brown to strong reddish-brown clay subsoils. Because they are sticky, tillage is best done within a narrow moisture range. If tilled when too moist, the soils tend to puddle and then bake when they dry. If tilled when too dry, they break into large clods that are very difficult to work down with light implements and work stock. A fairly large acreage lies idle because of severe erosion.

Common tillage practices are employed. The land is generally plowed in spring and seeded as soon as all danger of frost is past. In an attempt to control runoff, hillside ditches, generally of steep gradient, are used on some fields. Many ditches have become active gullies. A few farmers have laid out strips of sod, 20 to 50 feet wide and more or less on the contour, across the fields and by this means have controlled runoff fairly well.

Cornland usually receives manure and 200 to 400 pounds an acre of 4–10–6 or a similar mixture. Corn is followed by a small grain and then by a grass mixture.

Improper land use caused the severe erosion of these soils. They are not suited to tilled crops and are best used for pasture or forest. Pasture would be fair to good if grazing were controlled and organic matter were added to aid the soils in absorbing moisture and plant nutrients. Gullies should be checked with brush dams and seeded to grass and legumes. To obtain a good sod cover, a mulch of straw, brush, or other material would be helpful in many places.

MANAGEMENT GROUP 4–D

Wehadkee silt loam is the only soil in group 4–D. It has a mottled moderate-brown and light-brown friable silt loam surface soil and a mottled brownish-gray and moderate-brown friable silt loam subsoil that passes into gray, heavier material. This is an alluvial soil on first bottoms; it has nearly level relief, is subject to overflow, and is very poorly drained. Its suitability range is narrow.

The high water table and shallow stream channels make for poor drainage. Open ditches would afford fair surface drainage. This would give forage grasses a better chance and help check the growth of undesirable reedlike grasses.

The soil is very strongly acid; about 2 tons of lime an acre is needed when grass mixtures are seeded. Application of superphosphate to pasture has given good results.

MANAGEMENT GROUP 4–E

The soils of group 4–E are hilly or steep. They have friable loam or stony loam surface soils and friable loam to clay loam subsoils. They are somewhat shallow to bedrock, only moderately productive, and susceptible to severe accelerated erosion under poor management. Practically all areas are in forest.

These soils should not be cleared for crops, but the less steep ones would make fair to good pasture if properly managed. As soon as possible after clearing, 2 tons of ground limestone an acre should be applied, and thereafter 1 ton every fourth or fifth year. From 75 to 100 pounds of superphosphate an acre at seeding, and a like application every 3 years, is necessary for the development of desirable sod.

MANAGEMENT GROUP 4–F

The soils of this group are fairly uniform in color and texture. The surface soils range from yellowish-brown to dark-brown friable loam, and the subsoils from strong yellowish-brown to moderate-brown sandy clay loam to clay loam. All the soils are rather shallow to bedrock, and all but one have been moderately eroded.

Largely because of strong surface relief and the risk of more severe erosion, these soils are not suited to tilled crops. Under good management they would grow fair to good pasture. Overgrazing must be avoided, as it would cause further sheet erosion and some gullying.

These soils are only moderately productive of pasture in their present state of erosion. About 2 tons of ground limestone should be applied an acre when grass mixtures are sown, or as long before seeding as possible. Thereafter, 1 ton of ground limestone should be applied every fifth or sixth year. An application of 100 to 125 pounds

of superphosphate an acre is necessary at or just before seeding, and like applications at intervals of 3 or 4 years. Similar treatment with lime and phosphate should be given established pasture that is in poor condition. Any manure available should be applied to the thinner spots. Areas where erosion remains active should not be grazed until the sod has become firmly established.

FIFTH-CLASS SOILS

Fifth-class soils are poorly suited to cultivated crops or pasture under most conditions. They are steep, stony, shallow, poor in moisture relations, or low in plant-nutrient content. Tillage is impractical or impossible, and use even for pasture is not feasible.

The lack of better soils on some farms may require the use of some Fifth-class soils for pasture or crops. Conservability, workability, or both, are very difficult. Yields usually are very low. Hand implements must be used in most places for preparing the seedbed and for cultivation.

These soils are used mainly for forest. As they are not suitable for crops requiring tillage and are poorly to very poorly suited to pasture, it is assumed that most of their acreage will remain in forest for a long time. Because little can be said about soil management for forest production, particularly for the farmer, the Fifth-class soils have not been subdivided into groups according to soil management requirements and responses. They are all listed in management group 5A (see table 8).

TABLE 8.—*Fifth-class soils of Macon County, N. C., arranged by management groups, and estimated percentage of each soil in crops, idle cropland, pasture, and forest in 1946*

Management group and soil	Crops	Idle cropland	Open pasture	Forest
Group 5–A:				
Ashe stony loam:	*Percent*	*Percent*	*Percent*	*Percent*
Steep phase				100
Eroded steep phase	20	20	60	
Severely eroded steep phase	10	40	50	
Chandler stony loam:				
Steep phase				100
Eroded steep phase	30	20	50	
Clifton stony clay loam:				
Severely eroded hilly phase	10	40	50	
Eroded steep phase	30	30	40	
Severely eroded steep phase	20	40	40	
Clifton stony loam, steep phase				100
Fannin stony clay loam:				
Severely eroded hilly phase	10	40	50	
Eroded steep phase	20	30	50	
Severely eroded steep phase		40	60	
Fannin stony loam, steep phase				100
Halewood clay loam, severely eroded steep phase		30	70	
Halewood stony clay loam, severely eroded steep phase		20	80	
Halewood stony loam, eroded steep phase	10	20	70	

TABLE 8.—*Fifth-class soils of Macon County, N. C., arranged by management groups, and estimated percentage of each soil in crops, idle cropland, pasture, and forest in 1946*—Continued

Management group and soil	Crops	Idle cropland	Open pasture	Forest
	Percent	*Percent*	*Percent*	*Percent*
Hayesville clay loam, severely eroded steep phase	20	20	60	
Hayesville stony clay loam:				
Severely eroded hilly phase	10	30	60	
Severely eroded steep phase	10	30	60	
Mines, pits, and dumps				
Porters stony loam:				
Steep phase				100
Eroded steep phase		10	90	
Very steep phase				100
Rabun clay loam, severely eroded steep phase	10	30	60	
Rabun stony clay loam, severely eroded steep phase	10	30	60	
Ramsey stony loam:				
Steep phase				100
Eroded steep phase	10	10	80	
Severely eroded steep phase	10	20	70	
Very steep phase				100
Rock outcrop				100
Rough gullied land (Fannin and Clifton soil materials)		50	50	
Stony rough land (Porters and Ashe soil materials)				100
Talladega shaly loam, steep phase	15	5	15	65

MANAGEMENT GROUP 5–A.

Although Fifth-class soils are not suitable for crops and pasture, small areas are so used. These areas are principally on Ashe, Clifton, Fannin, Halewood, Hayesville, Porters, and Rabun soils that are not very steep, stony, or severely eroded. Usually these are on farms that do not possess sufficient acreage of better soils.

The fertility of the Clifton and Rabun soils may be better than that of other soils in this group, and their management requirements may be different. Further experience with these soils is needed before conclusions can be drawn. Even so, these better Fifth-class soils have steep slopes, are eroded in many places, and are low to moderate in fertility. It is very expensive, if not impractical, to maintain satisfactory yields of crops that require tillage.

Where the growing of tilled crops is attempted on steep slopes, adequate lime, fertilizer, and every possible practice for water control are needed. The use of amendments and the careful selection and rotation of crops are especially needed to encourage heavy vegetation. Stripcropping is usually required if productivity is to be maintained for many seasons.

Applications of lime and fertilizers, particularly phosphorus, and other good management practices are required for pasture maintenance. Legumes should make up a considerable part of the pasture

sod, and 1 to 1½ tons of ground limestone and 75 to 100 pounds of phosphoric acid should be applied an acre every fourth to sixth year. Because of steep slopes, it is often difficult to apply these materials and to control weeds.

Rough gullied land (Fannin and Clifton soil materials) requires special attention if vegetation is to be reestablished. Most farmers will do this, however, for economic reasons. Ditches, terraces, or other means of diverting the water from the gullied areas should be employed. After diverting the water, it may be advisable to mulch the land and seed mixtures of lespedeza and suitable grasses. Kudzu might be used, or black locust and white pine seedlings might follow lespedeza to provide a more permanent cover. The less sloping areas can be prepared gradually for pasture production.

The other Fifth-class soils—members of the Chandler, Ramsey, and Talladega series and the rest of the miscellaneous land types—are mostly steep, very steep, stony, and in many places severely eroded. They are used mostly for forest. Some very small scattered areas are put to other agricultural uses for short periods or are mining areas. For these soils, management is restricted to controlling fire, trampling by livestock, and excessive runoff.

CROP ADAPTATIONS, ROTATIONS, AND FERTILIZER REQUIREMENTS

Suitable crops and crop rotations and required supplementary practices for control of water on the land are given by soil management groups in table 9.

In table 10 fertilizer requirements are listed by crop rotations and management groups, and dates for planting crops and applying fertilizer are given. The amounts of fertilizer are recommended on the basis of the amount required for a given rotation within a particular management group. The following general rules should be followed in applying plant nutrients to crop rotations.

1. *Nitrogen.* Because corn, small grains, and truck crops give the best returns from direct applications, most of the nitrogen for the rotation should be used for these crops.
2. *Phosphoric acid.* The best response to phosphate is usually obtained by applying it to truck crops, small grains, and legumes such as clover and alfalfa. Most of the phosphate for the rotation should be used on these crops.
3. *Potash.* Potash generally gives the largest returns when used for truck crops, small grains, legumes, and sometimes corn. It should be used, however, for most crops in the rotation.
4. *Limestone.* Legumes such as lespedeza, clover, and alfalfa, are usually most responsive to lime, especially if it is applied before seeding the legume, preferable to the crop just preceding it in the rotation. For example, where lespedeza or clover is to be seeded in a small grain, apply the lime for the rotation when preparing the land for the small grain.

The fertilization recommended in table 10 can be obtained in many ways. Table 11 shows how mixed fertilizer can be applied to reach the levels of fertilization recommended in table 10 for rotations 1 and 2. Other methods can be followed. Straight phosphate or potash fertilizer can be applied when available, and its use taken into account in applying complete fertilizer to other crops in the rotation.

TABLE 9.—*Suitable crops and crop rotations and required supplementary water-control practices for soil management groups of Macon County, N. C.*

Management group and soil	Suitable crops	Rotations [1]	Supplementary water control practices	Remarks
Group 1-A:				
Congaree fine sandy loam	Corn, small grains, truck crops, hay.	3. Cabbage or potatoes, corn, crimson clover 6. Green beans, corn, crimson clover 9. Corn, crimson clover	None	
Congaree silt loam				
Group 1-B:				
Altavista loam, undulating phase	Corn, small grains, truck crops, tobacco, hay.	1. Tobacco, corn 4. Cabbage or potatoes, small grain, and hay for 2 years 7. Green beans, small grain, and hay for 2 years 9. Corn, crimson clover 10. Corn, small grain, and hay for 2 years 11. Corn, crimson clover, and alfalfa for 4 years 15. Tobacco, small grain, and Ladino clover, orchard grass, fescue pasture for 2 years.	Contour tillage	Most forested areas could be cleared and used for crops.
Hiwassee clay loam, eroded undulating phase.				
Masada loam, eroded undulating phase				
State loam:				
Undulating phase				
Eroded undulating phase				
Tate loam:				
Rolling phase				
Undulating phase				
Eroded undulating phase				
Tusquitee loam:				
Rolling phase				
Undulating phase				
Eroded undulating phase				
Group 2-A:				
Hayesville clay loam, eroded rolling phase	Small grains, grass, clover, alfalfa, corn.	7. Green beans, small grain, and hay for 2 years 10. Corn, small grain, and hay for 2 years 11. Corn, crimson clover, and alfalfa for 4 years 12. Corn, small grain, and alfalfa for 3 years 15. Tobacco, small grain, and Ladino clover, orchard grass, fescue pasture for 2 years.	Contour tillage	Same.
Hiwassee clay loam, eroded rolling phase				
Masada loam, eroded rolling phase				
Rabun clay loam, eroded rolling phase				
Tusquitee loam, eroded rolling phase				
Group 2-B:				
Hayesville stony clay loam, eroded rolling phase.	Small grains, hay, pasture.	2. Tobacco, small grain, and hay for 2 years 7. Green beans, small grain, and hay for 2 years 10. Corn, small grain, and hay for 2 years 11. Corn, crimson clover, and alfalfa for 4 years 15. Tobacco, small grain, and Ladino clover, orchard grass, fescue pasture for 2 years.	Contour tillage	Stones and gravel interfere with tillage; larger stones could be removed from some areas.
Hiwassee gravelly clay loam:				
Eroded undulating phase				
Eroded rolling phase				
Masada gravelly loam:				
Eroded undulating phase				
Eroded rolling phase				

Group 2–C: Ashe loam: Rolling phase Eroded rolling phase Tate loam, eroded rolling phase	Truck crops, pasture, hay, corn, small grains, apples.	2. Tobacco, small grain, and hay for 2 years 3. Cabbage or potatoes, corn, crimson clover 4. Cabbage or potatoes, small grain, and hay for 2 years 5. Cabbage or potatoes, hay for 2 years, and pasture for 2 years. 6. Green beans, corn, crimson clover 7. Green beans, small grain, and hay for 2 years 10. Corn, small grain, and hay for 2 years 12. Corn, small grain, and alfalfa for 3 years 16. Orchards, Ladino clover, orchard grass, fescue	Contour tillage	Green beans, potatoes, sweet corn, cabbage, onions, and other truck crops are well suited. Orchards should be laid out on the contour and may be cultivated, in Rotation 10, by tree rows, for a few years. Most of the rotations for this group are well suited to a system of stripcropping.
Group 2–D: State gravelly loam, undulating phase Tusquitee stony loam: Rolling phase Eroded rolling phase Undulating phase Eroded undulating phase	Corn, small grains, grass, clover, pasture, apples.	2. Tobacco, small grain, and hay for 2 years 3. Cabbage or potatoes, corn, crimson clover 5. Cabbage or potatoes, hay for 2 years, and pasture for 2 years. 6. Green beans, corn, crimson clover 9. Corn, crimson clover 10. Corn, small grain, and hay for 2 years 11. Corn, crimson clover, and alfalfa for 4 years 12. Corn, small grain, and alfalfa for 3 years 15. Tobacco, small grain, and Ladino clover, orchard grass, fescue pasture for 2 years.	Contour tillage	Orchards should be laid on the contour and may be cultivated in Rotation 10, by tree rows, for a few years. Most of the rotations for this group lend themselves readily to stripcropping.
Group 2–E: Chewacla loam, overwash phase Chewacla silt loam Toxaway silt loam	Corn, truck crops, grass.	6. Green beans, corn, crimson clover 7. Green beans, small grain, and hay for 2 years 9. Corn, crimson clover 10. Corn, small grain, and hay for 2 years	Artificial drainage generally improves these soils.	
Group 3–A: Clifton clay loam, eroded hilly phase Hayesville loam, hilly phase Hiwassee clay loam, eroded hilly phase Rabun clay loam: Hilly phase Eroded hilly phase	Orchards, alfalfa, clover, small grains.	2. Tobacco, small grain, and hay for 2 years 6. Green beans, corn, crimson clover 10. Corn, small grain, and hay for 2 years 11. Corn, crimson clover, and alfalfa for 4 years 12. Corn, small grain, and alfalfa for 3 years 16. Orchards, Ladino clover, orchard grass, fescue	Contour tillage and stripcropping.	It is necessary to keep these soils in grass crops as much of the time as possible to prevent further damage by erosion. Plant orchards and treat as for group 2–D. Stripcrop if it is necessary to till often; make soil tests to determine fertilization and liming for alfalfa.
Group 3–B: Hayesville stony loam, hilly phase Rabun stony clay loam, eroded rolling phase	Orchards, clover, small grains.	2. Tobacco, small grain, and hay for 2 years 10. Corn, small grain, and hay for 2 years 11. Corn, crimson clover, and alfalfa for 4 years 12. Corn, small grain, and alfalfa for 3 years 13. Continuous hay 14. Continuous pasture 16. Orchards, Ladino clover, orchard grass, fescue	Contour tillage and stripcropping.	Same.

See footnotes at end of table.

TABLE 9.—*Suitable crops and crop rotations and required supplementary water-control practices for soil management groups of Macon County, N. C.*—Continued

Management group and soil	Suitable crops	Rotations [1]	Supplementary water control practices	Remarks
Group 3-C: Porters loam, hilly phase	Small grains, clover, orchards.	2. Tobacco, small grain, and hay for 2 years 5. Cabbage or potatoes, hay for 2 years, and pasture for 2 years. 8. Green beans or corn, hay for 2 years, and pasture for 2 years. 10. Corn, small grain, and hay for 2 years 11. Corn, crimson clover, and alfalfa for 4 years 13. Continuous hay 14. Continuous pasture 16. Orchards, Ladino clover, orchardgrass, fescue	Contour tillage and stripcropping.	The soil could be cleared of forest and used for crops and pasture. Use same treatment as given in this column for group 3-A.
Group 3-D: Ashe loam, hilly phase Tate loam: Hilly phase Eroded hilly phase	Orchards, truck crops, small grains, clover.	5. Cabbage or potatoes, hay for 2 years, and pasture for 2 years. 8. Green beans or corn, hay for 2 years, and pasture for 2 years. 10. Corn, small grain, and hay for 2 years 13. Continuous hay 14. Continuous pasture 16. Orchards, Ladino clover, orchardgrass, fescue	Contour tillage and stripcropping.	Same.
Group 3-E: Buncombe loamy fine sand	Corn, small grains, hay, pasture.	6. Green beans, corn, crimson clover 7. Green beans, small grain, and hay for 2 years 8. Green beans or corn, hay for 2 years, and pasture for 2 years. 13. Continuous hay 14. Continuous pasture	None	The fertilizer should be added in two or more applications rather than in only one. Organic matter is especially needed; seedbeds should be packed.
Group 3-F: Augusta loam Warne silt loam	Corn, small grains, hay, pasture.	6. Green beans, corn, crimson clover 7. Green beans, small grain, and hay for 2 years 8. Green beans or corn, hay for 2 years, and pasture for 2 years. 13. Continuous hay 14. Continuous pasture.	Drainage by ditches should improve these soils.	
Group 4-A: Clifton stony loam, hilly phase Fannin stony loam, hilly phase Halewood loam, steep phase Halewood stony loam: Hilly phase Steep phase Hayesville loam, steep phase Hayesville stony loam, steep phase Rabun clay loam, steep phase Rabun stony clay loam: Hilly phase Steep phase Stony colluvium (Tusquitee and Tate soil materials). Tusquitee stony loam, hilly phase	Forest, pasture and meadow grasses, apples.	5. Cabbage or potatoes, hay for 2 years, and pasture for 2 years.[3] 8. Green beans or corn, hay for 2 years, and pasture for 2 years.[3] 10. Corn, small grain, hay for 2 years [3] 12. Corn, small grain, alfalfa for 3 years [3] 13. Continuous hay 14. Continuous pasture 16. Orchards, Ladino clover, orchardgrass, fescue	Contour tillage and stripcropping.	If necessary to clear these soils, they should be used for pasture and orchards. Any tillage should be on the contour, and crops should be stripcropped. Care should be taken to control erosion.

Group 4–B:				
Clifton stony clay loam, eroded hilly phase Fannin stony clay loam, eroded hilly phase Halewood loam: Eroded hilly phase Eroded steep phase Halewood stony loam, eroded hilly phase Hayesville clay loam: Eroded hilly phase Eroded steep phase Hayesville stony clay loam: Eroded hilly phase Eroded steep phase Hiwassee gravelly clay loam, eroded hilly phase. Masada gravelly loam, eroded hilly phase Rabun clay loam, eroded steep phase Rabun stony clay loam: Eroded hilly phase Severely eroded hilly phase Eroded steep phase Tusquitee stony loam, eroded hilly phase	Pasture and meadow grasses, apples.	3. Cabbage or potatoes, corn, crimson clover [2] 7. Green beans, small grain, hay for 2 years [2] 10. Corn, small grain, hay for 2 years [2] 13. Continuous hay 14. Continuous pasture 16. Orchards, Ladino clover and orchardgrass; orchardgrass and fescue; or all three.	Contour tillage and stripcropping.	Same.
Group 4–C:				
Hayesville clay loam, severely eroded hilly phase. Rabun clay loam, severely eroded hilly phase.	Pasture, meadow grasses.	13. Continuous hay 14. Continuous pasture	Contour tillage and stripcropping.	These soils should remain in permanent sod crops or be returned to forest; they should not be tilled.
Group 4–D:				
Wehadkee silt loam	Pasture grasses	13. Continuous hay 14. Continuous pasture	Artificial drainage	
Group 4–E:				
Ashe loam, steep phase Ashe stony loam, hilly phase Burton stony loam, hilly phase Porters loam, steep phase Porters stony loam, hilly phase	Pasture and meadow grasses, orchards, forest.	5. Cabbage or potatoes, hay for 2 years, and pasture for 2 years. [2] 10. Corn, small grain, and hay for 2 years [2] 13. Continuous hay 14. Continuous pasture	Contour tillage and stripcropping.	If necessary to clear the forest, the soils should be used for pasture and orchards. Cultivated areas should be tilled on the contour and stripcropped. Care should be observed to prevent erosion.
Group 4–F:				
Ashe loam: Eroded steep phase Eroded hilly phase Ashe stony loam, eroded hilly phase Chandler stony loam: Hilly phase Eroded hilly phase Porters loam, eroded steep phase	Pasture and meadow grasses, orchards, forest.	5. Cabbage or potatoes, hay for 2 years, and pasture for 2 years. [2] 10. Corn, small grain, and hay for 2 years [2] 13. Continuous hay 14. Continuous pasture	Contour tillage and stripcropping.	These soils should remain in permanent sod crops. If necessary to cultivate, till on the contour and stripcrop. Soils should be in sod crops at least 3 out of 5 years. Care must be observed to control runoff and to check erosion.

See footnotes at end of table.

TABLE 9.—*Suitable crops and crop rotations and required supplementary water-control practices for soil management groups of Macon County, N. C.*—Continued

Management group and soil	Suitable crops	Rotations [1]	Supplementary water control practices	Remarks
Group 5–A:				
Ashe stony loam:				
Steep phase				
Eroded steep phase				
Severely eroded steep phase				
Chandler stony loam:				
Steep phase				
Eroded steep phase				
Clifton stony clay loam:				
Severely eroded hilly phase				
Eroded steep phase				
Severely eroded steep phase				
Clifton stony loam, steep phase				
Fannin stony clay loam:				
Severely eroded hilly phase				
Eroded steep phase				
Severely eroded steep phase				
Fannin stony loam, steep phase				
Halewood clay loam, severely eroded steep phase.				
Halewood stony clay loam, severely eroded steep phase.				
Halewood stony loam, eroded steep phase				
Hayesville clay loam, severely eroded steep phase.	Forest		Maintain permanent forest cover.	Areas in forest should remain in forest. Areas cleared for agriculture should be returned to forest by planting to pine, locust, or other suitable tree seedlings. To obtain a stand on severely eroded and gullied areas, it may be necessary to mulch the land and dam the gullies. If it is necessary to retain some areas for pasture, proper fertilization, liming, seeding, and establishing and maintaining a good sod over the entire area are necessary. Overgrazing should be avoided.
Hayesville stony clay loam:				
Severely eroded hilly phase				
Severely eroded steep phase				
Mines, pits, and dumps				
Porters stony loam:				
Steep phase				
Eroded steep phase				
Very steep phase				
Rabun clay loam, severely eroded steep phase.				
Rabun stony clay loam, severely eroded steep phase.				

Ramsey stony loam:				
Steep phase				
Eroded steep phase				
Severely eroded steep phase				
Very steep phase				
Rock outcrop				
Rough gullied land (Fannin and Clifton soil materials).				
Stony rough land (Porters and Ashe soil materials).				
Talladega shaly loam, steep phase				

[1] Rotations are numbered 1 to 16 and are listed by order of intensity of use rather than recommended preference for good management.

[2] These rotations are not well suited to the Fourth-class soils, but if these soils must be used for row crops the rotations indicated here are believed to be least hazardous.

TABLE 10.—*Fertilizer requirements by crop rotations and soil management groups and dates for planting crops and applying fertilizer in Macon County, N. C.*

Crop rotation and soil management groups [1]	Planting date	Fertilizing date	Fertilizer elements required [2]			Remarks
			Nitrogen (N)	Phosphorus (P_2O_5)	Potash (K_2O)	
			Lb. per acre	*Lb. per acre*	*Lb. per acre*	
ROTATION 1 (for group 1-B):						
Tobacco (burley)	May 15 to 30	May 1 to 15	96	96	96	If soil is run-down, heavier applications of fertilizer may be needed.
Corn	May 1 to June 1	May 1 to June 1	20	40	40	
		6 to 8 weeks after planting.	60	0	0	
Total			176	136	136	
ROTATION 2 (for groups 2-B, 2-C, 2-D, 3-A, 3-B, 3-C):						
Tobacco	May 15 to 30	May 1 to 15	96	96	96	If hay yields are low, apply more phosphoric acid and potash for the rotation.
Small grain	Sept. 20 to Oct. 10	Mar. 15 to Apr. 1	30	0	0	
Hay [4]	Mar. 15 to Apr. 15	Mar. 15 to Apr. 15	0	60	60	
Hay			0	0	0	
Total			126	156	156	
ROTATION: 3 (for groups 1-A, 2-C, 2-D, 4-B):						
Cabbage [5]	Mar. 15 to May 1	At setting	80	80	80	Corn and cabbage respond well to lime, but potato scab is often increased by its use. Soils of group 2-D may require less nitrogen and more potash than is normal for the rotation.
		3 weeks after setting	30	0	0	
Or potatoes	Mar. 20 to Apr. 15	Mar. 20 to Apr. 15	120	120	120	
Corn	May 1 to June 1	May 1 to June 1	20	40	40	
		6 to 8 weeks after planting.	60	0	0	
Crimson clover	At last cultivation of corn.		0	0	0	
Total			[6] 190 or 200	240	240	
ROTATION 4 (for groups 1-B, 2-C):						
Cabbage [5]	Mar. 15 to May 1	At setting	80	80	80	Heavier applications of lime may be used when cabbage is grown instead of potatoes. When this rotation is used for soils having a steeper slope or an eroded condition, as those of groups 3-A, 3-B, 3-C, and 3-D, continue the hay crop for 1 or 2 years longer and increase the amounts of the phosphoric acid and potash.
		3 weeks after setting	30	0	0	
Or potatoes	Mar. 20 to Apr. 15	At planting	120	120	120	
Small grain	Sept. 20 to Oct. 10	Mar. 15 to Apr. 1	30	0	0	
Hay	Mar. 15 to Apr. 15	Mar. 15 to Apr. 15	0	50	50	
Hay			0	0	0	
Total			[6] 140 or 150	130 or 170	130 or 170	

ROTATION 5 (for groups 2-C, 2-D, 3-C, 3-D, 4-A, 4-E, 4-F):						
Cabbage [5]	Mar. 15 to May 1	At setting	80	80	80	If this rotation is used for soils having a steeper slope or an eroded condition, as those of groups 4-A, 4-B, 4-C, and 4-D, continue hay or pasture for 1 to 3 years longer and apply additional phosphoric acid and potash.
		3 weeks after setting	40	0	0	
Or potatoes	Mar. 20 to Apr. 15	At planting	120	120	120	
Hay	Aug. 15 to Sept. 15		0	0	0	
Hay			0	0	0	
Pasture		Mar. 15 to Apr. 15	0	60	60	
Pasture			0	0	0	
Total			[6] 120 or 120	140 or 180	140 or 180	
ROTATION 6 (for groups 1-A, 2-C, 2-D, 2-E, 3-A, 3-E, 3-F):						
Green beans	Apr. 1 to June 15	At planting	48	96	48	
		At flowering	12	0	0	
Corn	May 1 to June 1	At planting	20	40	40	
		6 to 8 weeks after planting.	40	0	0	
Crimson clover	At last cultivation of corn.		0	0	0	
Total			120	136	88	
ROTATION 7 (for groups 1-B, 2-A, 2-B, 2-C, 2-E, 3-E, 3-F, 4-B):						
Green beans	Apr. 1 to June 15	At planting	48	96	48	For soils having steeper slope or an eroded condition, as those in groups 3-A, 3-B, 3-C, and 3-D, continue hay crop for 1 or 2 years longer and apply additional phosphoric acid and potash.
		At flowering	12	0	0	
Small grain	Sept. 20 to Oct. 10		0	0	0	
Hay	Mar. 15 to Apr. 15	At seeding	20	120	120	
Hay			0	0	0	
Total			80	216	168	
ROTATION 8 (for groups 3-C, 3-D, 3-E, 3-F, 4-A):						
Green beans [7]	Apr. 1 to June 15	At planting	48	96	48	For soils of steeper slope or in an eroded condition, as those of groups 4-A, 4-E, and 4-F, hay and pasture should be continued for 1 or 2 years longer in each rotation.
		At flowering	20	0	0	
Or Corn	May 1 to June 1	At planting	20	40	40	
		6 to 8 weeks after planting.	60	0	0	
Hay	Aug. 15 to Sept. 15	At seeding	20	120	120	
		Mar. 15 to Apr. 15	0	30	30	
Hay			0	0	0	
Pasture			0	0	0	
Pasture			0	0	0	
Total			[8] 88 or 100	[8] 190 or 216	[8] 190 or 198	
ROTATION 9 (for groups 1-A, 1-B, 2-D, 2-E):						
Corn	May 1 to June 1	At planting	20	40	60	Higher yields can be obtained by increasing the amount of fertilizer in the applications, particularly nitrogen and sometimes potash.
		6 to 8 weeks after planting.	40	0	0	
Crimson clover	At last cultivation of corn.		0	0	0	
Total			60	40	60	

See footnotes at end of table.

TABLE 10.—*Fertilizer requirements by crop rotations and soil management groups and dates for planting crops and applying fertilizer in Macon County, N. C.*—Continued

Crop rotation and soil management groups [1]	Planting date	Fertilizing date	Fertilizer elements required [2]			Remarks
			Nitrogen (N)	Phosphorus (P_2O_5)	Potash (K_2O)	
			Lb. per acre	*Lb. per acre*	*Lb. per acre*	
ROTATION 10 (for groups 1-B, 2-A, 2-B, 2-C, 2-D, 2-E, 3-A, 3-B, 3-C, 3-D, 4-A, 4-B, 4-E, 4-F):						
Corn	May 1 to June 1	At planting	20	40	80	This rotation can be used on soils of groups 3-A, 3-B, 3-C, and 3-D by adding 1 or 2 years of hay or pasture and by applying more fertilizer when needed.
		6 to 8 weeks after planting	60	0	0	
Small grain	Sept. 20 to Oct. 10	Mar. 15 to Apr. 1	30	0	0	
Hay	Mar. 15 to Apr. 15	At seeding	20	120	120	
Hay			0	0	0	
Total			130	160	200	
ROTATION 11 (for groups 1-B, 2-A, 2-B, 2-D, 3-A, 3-B, 3-C):						
Corn	May 1 to June 1	At planting	20	40	80	Plow under the crimson clover for planting alfalfa. Heavy applications of lime are needed for alfalfa, and agricultural borax should be applied at seeding (20 to 30 pounds an acre) and to maintain the stand if necessary. Apply more phosphoric acid and potash if alfalfa yields are low.
		6 to 8 weeks after planting	40	0	0	
Crimson clover	At last cultivation of corn.		0	0	0	
Alfalfa	Aug. 1 to Sept. 1	At seeding	20	120	120	
Alfalfa		Apr. 1 to 15	0	0	75	
Alfalfa		Apr. 1 to 15	0	60	60	
Alfalfa		Apr. 1 to 15	0	0	75	
Total			80	220	410	
ROTATION 12 (for groups 2-A, 2-C, 2-D, 3-A, 3-B, 4-A):						
Corn	May 1 to June 1	At planting	20	40	80	Cut small grain early for hay and prepare ground for seeding alfalfa. Apply more phosphoric acid and potash if yields are somewhat low. Agricultural borax should be applied for alfalfa at seeding (20 to 30 pounds an acre) and to maintain the stand if necessary.
		6 to 8 weeks after planting	40	0	0	
Small grain	Sept. 20 to Oct. 10	Mar. 15 to Apr. 1	30	0	0	
Alfalfa	Aug. 1 to Sept. 1	At seeding	20	120	120	
Alfalfa		Apr. 1 to 15	0	0	75	
Alfalfa		Apr. 1 to 15	0	60	60	
Total			110	220	335	
ROTATION 13 (for groups 3-B, 3-C, 3-D, 3-E, 3-F, 4-A, 4-B, 4-C, 4-D, 4-E, 4-F):						
Hay (continuous)	Aug. 1 to Sept. 1	At seeding	20	120	120	When seeding or reseeding, sow in small grain, corn, or other clean-cultivated crop. Clover in the hay mixture can be maintained best by proper use of lime.
		In alternate years	0	80	80	
Total			20	200	200	

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ROTATION 14 (for groups 3-B, 3-C, 3-D, 3-E, 3-F, 4-A, 4-B, 4-C, 4-D, 4-E, 4-F):						
Pasture (continuous)	Aug. 1 to Sept. 1	At seeding In alternate years	20 0	120 80	120 80	In a grass-clover mixture the clover can be maintained best by proper use of lime.
Total			20	200	200	
ROTATION 15 (for groups 1-B, 2-A, 2-B, 2-D):						
Tobacco (burley)	May 15 to June 10	May 1 to 25	96	96	96	
Small grain	Sept. 20 to Oct. 10	Mar. 15 to Apr. 1	30	0	0	
Ladino clover, orchardgrass, fescue pasture.	Feb. 15 to Mar. 30	Mar. 15 to Apr. 15	20	120	120	
Ladino clover, orchardgrass, fescue pasture.			0	0	0	
Total			146	216	216	
ROTATION 16 (for groups 2-C, 3-A, 3-B, 3-C, 3-D, 4-A, 4-B):						
Orchards (apple, cherry, or other suitable trees).		Jan. 1 to Mar. 1	(9)	0	0	
Orchardgrass, fescue (for cover)	Feb. 15 to Mar. 30	Mar. 15 to Apr. 15	0	0	0	

[1] Other rotations than those given may be used with the management groups. A good rotation should be well suited to the farming system and should provide best protection for the soil and maintain or improve its fertility.

[2] Each soil should be tested for lime requirements. The lime applications should be most suitable for the crops grown and the type of rotation followed.

[3] Manure preferably should be applied to thin or galled spots, especially on soils of the uplands. When manure is applied uniformly to a field, the best returns are usually made by tobacco, corn, and alfalfa. Fertilizer applications may be decreased by 12 pounds of nitrogen, 6 pounds of phosphoric acid, and 12 pounds of potash an acre for each ton of manure used.

[4] Hay in all the rotations refers to a legume-grass mixture.

[5] Either cabbage or potatoes for the rotation.

[6] Total depends on whether cabbage or potatoes are grown.

[7] Either green beans or corn for the rotation.

[8] Total depends on whether green beans or corn is grown.

[9] 1.6 ounces per year of age of tree.

TABLE 11.—*Fertilizer recommendations for two crop rotations in management group 1–B, Macon County, N. C.*

ROTATION 1

Crops	Fertilizer mixture	Nitrogen	Phosphoric acid	Potash
	Pounds per acre	*Pounds per acre*	*Pounds per acre*	*Pounds per acre*
Tobacco (burley)	1,200 of 8–8–8	96	96	96
Corn	400 of 5–10–5	20	40	40
	300 of 20–0–0 [1]	60	0	0
Total		176	136	136

ROTATION 4

Cabbage [2]	1,000 of 8–8–8	80	80	80
	150 of 20–0–0 [3]	30	0	0
Or potatoes	1,500 of 8–8–8	120	120	120
Small grain	150 of 20–0–0	30	0	0
Hay	415 of 0–12–12	0	50	50
Hay		0	0	0
Total		[4] 150 or 150	130 or 170	130 or 170

[1] Apply 6 to 8 weeks after planting.
[2] Either cabbage or potatoes for the rotation.
[3] Apply 3 weeks after cabbage plants are set in field.
[4] Total depends on whether cabbage or potatoes are grown.

ESTIMATED YIELDS

Estimated average acre yields of principal crops on the soils of Macon County are listed in table 12 under two levels of management. In columns A are yields to be expected under the prevailing (common) management; in columns B, yields to be expected under good management.

Prevailing management is not the same on all soils nor in all parts of the county. To learn the management prevailingly practiced on a given soil, turn to the section, Soil Types and Phases, find the description of the soil in question, and read under the subheading, Use and Management.

The yields in columns A are based on observations made by the soil survey field party; on interviews with farmers and other agricultural workers familiar with the soils and crops of the area; and on comparisons with yields on similar soils in other counties in North Carolina. The estimates for pasture are supported by some information from farmers. Only a few farmers on each soil could supply information about grazing capacity.

Good management—that defined as necessary to obtain yields listed in columns B of table 12—generally involves selection of suitable crops and rotations; correct use of commercial fertilizer, lime, and manure; return of organic matter to the soil; proper tillage; and use of engineering measures for control of water on the land. All of these prac-

tices are used as needed to maintain or increase soil productivity within practical limits.

It is not known exactly what good soil management should be for all the soils; complete information is lacking. However, the management practices listed in the section, Land Classes and Management Groups, are of proven value and are suggested on the basis of known deficiencies of the soils. They are therefore used to define the management necessary to achieve the yields listed in columns B of table 12.

For example, table 12 lists Altavista loam, undulating phase, as having an estimated yield of 62 bushels of corn under good management. What practices are necessary to obtain this yield? Refer to the third column in table 12, which gives the Management group of the soils. Altavista loam, undulating phase, is in management group 1–B. Then turn to Management group 1–B in the section, Land Classes and Management Groups, and read about this management group and the practices it requires. What is said about management group 1–B soils applies to Altavista loam, undulating phase. Refer also to tables 9 and 10 for a summary of information on suitable crops, crop rotations, and fertilization of this soil.

The yields in column B of table 12 may be considered as production goals. The advisability of reaching the production goals will depend on the farm as a business. On one farm it may be practical to manage the soil so as to exceed yields in columns B; on another it may be practical not to reach them.

It should be remembered that the yields in columns B can be reached by several different combinations of management practices. The practices recommended in the section, Land Classes and Management Groups, should be used as guides; they are not the only practices by which good management can be achieved.

THE AGRICULTURE OF MACON COUNTY

EARLY AGRICULTURE

The area now within Macon County was originally held by Cherokee Indians, who lived mainly by hunting and fishing but also grew some corn and other crops on the bottom lands.

The white settlers felled the forest and farmed the small clearings until the natural fertility was practically exhausted. Other areas were then cleared, and the abandoned fields were left to grow up in trees. The agriculture of the early white settlers was somewhat like that of the Indians. They planted only enough to supply themselves with food; they depended on livestock, hunting, and Indian trade for other necessities.

Cattle raising became important early in the history of the area. Later, when grazing land became scarce because of increased population, cattle were replaced to some extent by cash crops. The early crops were corn, wheat, rye, oats, hay, and some potatoes and sweetpotatoes. As roads were built that allowed access to markets, most of the land suitable for cultivation was cleared and planted to crops. A considerable area too steep for cultivation was left in forest.

TABLE 12.—*Estimated average acre yields of principal crops to be expected on the soils of Macon County, N. C., under two levels of management*

[Yields in columns A are to be expected under common management; yields in columns B, under the management recommended in the subsection, Land Classes and Management Groups. Blank spaces indicate crop is not commonly grown or is not well suited to the soil under the management level specified]

Soil	Map symbol	Management group	Corn		Wheat		Clover and grass hay		Lespedeza hay		Potatoes		Cabbage		Permanent pasture	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B
			Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Altavista loam, undulating phase	AA	1-B	30	62	14	22	1.3	1.9	1.0	1.9	110	190	9.5	13.0	60	115
Ashe loam:																
Steep phase	AG	4-E	14	28			.6	1.9	.3	.8					30	65
Eroded steep phase	AD	4-F	12	26			.5	1.0	.3	.8					25	65
Hilly phase	AE	3-D	16	30	10	18	.8	1.6	.5	1.2	75	170	6.0	9.5	35	75
Eroded hilly phase	AR	4-F	14	30	9	17	.7	1.4	.4	1.1	70	165	5.5	9.5	30	75
Rolling phase	AF	2-C	20	40	11	19	.9	1.7	.6	1.4	70	170	7.5	11.0	45	90
Eroded rolling phase	AC	2-C	17	36	10	18	.8	1.6	.5	1.3	65	160	7.0	11.0	40	90
Ashe stony loam:																
Steep phase	AN	5-A													20	55
Eroded steep phase [2]	AW	5-A													20	55
Severely eroded steep phase [2]	AM	5-A														
Hilly phase	AL	4-E													35	65
Eroded hilly phase	AH	4-F	13	28			.6	1.2	.3	.9					30	65
Augusta loam	AO	3-F	18	40		20	.7	2.0	.6	1.8		175		12.0	60	105
Buncombe loamy fine sand [2]	BA	3-E	12	25	5	10	1.2	1.8	.9	1.6	70	140			20	45
Burton stony loam, hilly phase	BR	4-E													65	95
Chandler stony loam:																
Steep phase	CD	5-A														
Eroded steep phase [2]	CR	5-A														
Hilly phase	CC	4-F													25	55
Eroded hilly phase	CA	4-F													20	45
Chewacla loam, [3] [4] overwash phase	CE	2-E	32	62		20	.8	2.0	.7	1.8		190		13.0	70	110
Chewacla silt loam [3] [4]	CF	2-E	32	62		20	.7	2.0	.6	1.8		180		13.0	65	110
Clifton clay loam, eroded hilly phase	CG	3-A	16	36	11	20	1.0	1.7	.6	1.4	70	125	6.0	9.0	45	90
Clifton stony loam:																
Hilly phase	CN	4-A	16	24			.9	1.7	.6	1.4	65	120	6.0	9.0	45	85
Steep phase	CO	5-A													35	80
Clifton stony clay loam:																
Eroded hilly phase	CH	4-B	12	30			.8	1.6	.6	1.4	60	115	5.5	8.5	40	85
Severely eroded hilly phase [2]	CL	5-A													20	70
Eroded steep phase [2]	CK	5-A													30	75
Severely eroded steep phase [2]	CM	5-A													15	60
Congaree fine sandy loam [2]	CP	1-A	38	60	12	20	1.5	2.3	1.1	2.0	110	220	10.0	13.0	80	115
Congaree silt loam [2]	CR	1-A	45	75	14	22	1.6	2.4	1.2	2.1	120	220	11.0	14.0	95	125

Fannin stony loam:																
Hilly phase	FE	4-A	14	30	----	----	.7	1.4	.5	1.2	65	155	5.5	8.5	35	70
Steep phase	FF	5-A	----	----	----	----	----	----	----	----	----	----	----	----	25	60
Fannin stony clay loam:																
Eroded hilly phase	FA	4-B	10	28	----	----	.6	1.2	.4	1.0	60	150	5.0	8.0	30	65
Severely eroded hilly phase [2]	FC	5-A	----	----	----	----	----	----	----	----	----	----	----	----	15	55
Eroded steep phase [2]	FB	5-A	----	----	----	----	----	----	----	----	----	----	----	----	20	50
Severely eroded steep phase [2]	FD	5-A	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Halewood loam:																
Eroded hilly phase	HA	4-B	15	36	10	18	.8	1.6	.5	1.3	75	165	6.5	9.5	40	80
Steep phase	HC	4-A	----	----	----	----	.7	1.5	.5	1.2	----	----	----	----	40	75
Eroded steep phase	HB	4-B	----	----	----	----	.7	1.4	.4	1.1	----	----	----	----	35	70
Halewood clay loam, severely eroded steep phase [2]	H	5-A	----	----	----	----	----	----	----	----	----	----	----	----	20	60
Halewood stony loam:																
Hilly phase	HG	4-A	15	32	----	----	.8	1.6	.6	1.3	60	150	6.5	9.5	40	80
Eroded hilly phase	HE	4-B	12	30	----	----	.7	1.4	.5	1.2	60	150	6.0	9.0	35	75
Steep phase	HH	4-A	----	----	----	----	----	----	----	----	----	----	----	----	35	75
Eroded steep phase [2]	HF	5-A	----	----	----	----	----	----	----	----	----	----	----	----	25	65
Halewood stony clay loam, severely eroded steep phase.[2]	HD	5-A	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hayesville loam:																
Hilly phase	HN	3-A	17	38	11	18	.9	1.7	.6	1.4	80	175	6.5	9.5	45	85
Steep phase	HO	4-A	----	----	----	----	.7	1.5	.5	1.2	----	----	----	----	35	75
Hayesville clay loam:																
Eroded hilly phase	HI	4-B	15	36	10	22	.8	1.6	.5	1.3	75	165	6.0	9.5	40	80
Severely eroded hilly phase	HL	4-C	----	----	5	12	----	1.0	.2	.8	----	----	----	----	20	65
Eroded steep phase	HK	4-B	----	----	----	----	.7	1.4	.4	1.1	----	----	----	----	30	70
Severely eroded steep phase [2]	HM	5-A	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Eroded rolling phase	HJ	2-A	20	40	10	18	1.0	1.8	.7	1.6	85	190	6.5	9.5	50	100
Hayesville stony loam:																
Hilly phase	HU	3-B	15	32	----	----	.8	1.6	.6	1.3	65	155	6.0	9.0	40	80
Steep phase	HV	4-A	----	----	----	----	----	----	----	----	----	----	----	----	30	70
Hayesville stony clay loam:																
Eroded hilly phase	HP	4-B	12	30	----	----	.7	1.4	.5	1.2	60	150	5.5	8.5	35	75
Severely eroded hilly phase [2]	HS	5-A	----	----	----	----	----	1.0	.2	.7	----	----	----	----	15	60
Eroded steep phase [2]	HR	4-B	----	----	----	----	----	----	----	----	----	----	----	----	25	60
Severely eroded steep phase [2]	HT	5-A	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Eroded rolling phase	HQ	2-B	17	35	8	16	.9	1.7	.6	1.4	75	175	6.5	10.0	45	90
Hiwassee clay loam:																
Eroded undulating phase	HY	1-B	32	60	15	24	1.4	2.2	1.0	2.0	100	165	10.0	13.0	75	115
Eroded rolling phase	HX	2-A	25	50	13	22	1.3	2.1	.9	1.9	90	155	8.0	11.0	70	110
Eroded hilly phase	HW	3-A	20	40	11	19	1.1	1.9	.8	1.7	70	160	7.0	10.0	50	100
Hiwassee gravelly clay loam:																
Eroded undulating phase	H3	2-B	27	50	12	22	1.3	2.1	.9	1.9	90	160	8.5	11.5	70	105
Eroded rolling phase	H2	2-B	20	45	10	20	1.1	1.9	.8	1.7	80	150	7.5	10.0	65	100
Eroded hilly phase	HZ	4-B	17	35	9	16	.9	1.7	.6	1.4	65	145	6.5	9.0	60	95
Masada loam:																
Eroded undulating phase	MB	1-B	30	60	13	22	1.3	2.1	.9	1.9	100	175	9.5	12.5	55	110
Eroded rolling phase	MA	2-A	25	50	12	21	1.2	2.0	.8	1.8	90	160	7.5	11.0	50	100

See footnotes at end of table.

TABLE 12.—*Estimated average acre yields of principal crops to be expected on the soils of Macon County, N. C., under two levels of management*—Continued

[Yields in columns A are to be expected under common management; yields in columns B, under the management recommended in the subsection, Land Classes and Management Groups. Blank spaces indicate crop is not commonly grown or is not well suited to the soil under the management level specified]

Soil	Map symbol	Management group	Corn		Wheat		Clover and grass hay		Lespedeza hay		Potatoes		Cabbage		Permanent pasture	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B
			Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Masada gravelly loam:																
Eroded undulating phase	ME	2-B	27	50	12	21	1.2	2.0	0.8	1.8	90	165	8.0	11.0	50	100
Eroded rolling phase	MD	2-B	22	45	10	18	1.0	1.8	.7	1.6	80	155	7.0	10.0	45	90
Eroded hilly phase	MC	4-B	16	33	8	15	.8	1.6	.6	1.2			6.0	9.0	40	85
Mines, pits, and dumps	MF	5-A														
Porters loam:																
Steep phase	PC	4-E					.7	1.4	.4	1.1					50	95
Eroded steep phase	PA	4-F					.8	1.5	.5	1.1					45	90
Hilly phase	PB	3-C	18	40	10	18	1.0	1.7	.7	1.4	80	175	7.0	10.0	55	100
Porters stony loam:																
Steep phase	PF	5-A													45	85
Eroded steep phase	PD	5-A													40	80
Very steep phase	PG	5-A														
Hilly phase	PE	4-E	15	35			.9	1.6	.7	1.4	70	165	6.5	9.0	50	90
Rabun clay loam:																
Hilly phase	RD	3-A	22	42	12	20	1.1	1.9	.8	1.7	75	130	6.5	9.5	55	100
Eroded hilly phase	RA	3-A	18	40	11	19	1.1	1.8	.7	1.6	70	125	7.0	10.0	50	95
Severely eroded hilly phase	RE	4-C			5	13		1.3	.3	1.0					25	75
Steep phase	RO	4-A					.9	1.6	.5	1.2					45	90
Eroded steep phase	RC	4-B					.8	1.5	.4	1.1					35	80
Severely eroded steep phase [2]	RF	5-A													20	65
Eroded rolling phase	RB	2-A	24	45	12	21	1.2	2.0	.8	1.7	80	150	7.5	10.5	65	105
Rabun stony clay loam:																
Hilly phase	RM	4-A	18	38			1.0	1.8	.7	1.6	65	120	6.5	9.5	50	95
Eroded hilly phase	RH	4-B	15	35			.9	1.8	.6	1.5	60	115	6.0	9.0	45	90
Severely eroded hilly phase	RN	4-B							.2	.9					20	70
Steep phase	RP	4-A													40	85
Eroded steep phase	RL	4-B													30	75
Severely eroded steep phase [2]	RO	5-A													20	60
Eroded rolling phase	RR	3-B	20	40	10	19	1.1	1.9	.7	1.6	70	140	7.0	10.0	60	100
Ramsey stony loam:																
Steep phase	RS	5-A														
Eroded steep phase [2]	RR	5-A														
Severely eroded steep phase [2]	RT	5-A														
Very steep phase [2]	RU	5-A														
Rock outcrop	RV	5-A														

Rough gullied and (Fannin and Clifton soil materials).	Rw	5-A														
State loam:																
Undulating phase	Sb	1-B	45	75	15	25	1.5	2.4	1.1	2.1	120	220	11.0	14.0	90	125
Eroded undulating phase	Sa	1-B	45	75	14	25	1.4	2.4	1.0	2.1	115	220	11.0	14.0	85	125
State gravelly loam, undulating phase	Sc	2-D	40	68	12	22	1.3	2.1	1.0	2.0	110	200	10.0	13.0	80	110
Stony colluvium (Tusquitee and Tate soil materials)	Sd	4-A													30	45
Stony rough land (Porters and Ashe soil materials)	Se	5-A														
Talladega shaly loam, steep phase	Ta	5-A														
Tate loam:																
Rolling phase	Tf	1-B	25	50	12	20	1.2	2.1	.9	1.8	90	170	8.5	11.5	60	110
Eroded rolling phase	Tc	2-C	23	48	11	20	1.1	2.1	.8	1.8	80	160	8.0	11.0	55	110
Hilly phase	Te	3-D	20	40	10	18	1.0	2.0	.8	1.7	70	145	7.5	10.5	55	100
Eroded hilly phase	Tb	3-D	18	38	9	18	1.0	2.0	.8	1.7	65	140	7.0	10.0	50	100
Undulating phase	Tg	1-B	32	52	14	23	1.3	2.2	1.0	1.9	95	175	9.5	13.0	65	110
Eroded undulating phase	Td	1-B	30	50	13	22	1.2	2.2	.9	1.9	90	170	9.5	13.0	60	110
Toxaway silt loam	Th	2-E	22	70		16		2.2		2.0		200		14.0	40	125
Tusquitee loam:																
Rolling phase	Tm	1-B	35	62	14	22	1.4	2.4	1.0	2.0	100	200	10.0	13.0	85	120
Eroded rolling phase	Tk	2-A	33	60	13	22	1.3	2.4	.9	2.0	90	200	9.0	12.0	80	120
Undulating phase	Tn	1-B	40	70	15	25	1.5	2.4	1.1	2.1	120	220	11.0	14.0	90	125
Eroded undulating phase	Tl	1-B	38	70	14	25	1.4	2.4	1.0	2.1	115	220	11.0	14.0	85	125
Tusquitee stony loam:																
Rolling phase	Tt	2-D	30	52	12	21	1.3	2.4	.9	2.0	90	190	9.5	12.0	80	115
Eroded rolling phase	Tp	2-D	28	50	11	21	1.2	2.1	.9	1.9	90	190	8.5	11.0	75	115
Hilly phase	Ts	4-A	23	45			1.0	1.9	.8	1.7	85	180	8.0	11.0	75	105
Eroded hilly phase	To	4-B	20	40			.9	1.8	.7	1.5	80	175	7.5	10.0	70	105
Undulating phase	Tu	2-D	33	60	12	22	1.4	2.2	1.0	2.0	110	205	10.0	13.0	85	120
Eroded undulating phase	Tr	2-D	30	60	11	22	1.3	2.2	.9	1.9	105	205	9.0	12.0	80	120
Warne silt loam	Wa	3-F	18	30		17	.7	1.9	.6	1.8					40	75
Wehadkee silt loam [3] [4]	Wb	4-D		55				2.2		2.0		180		13.0	40	125

[1] Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year that animals can be grazed without injury to the pasture. A soil able to support 1 animal per acre for 360 days rates 360; a soil supporting 1 animal on 2 acres for 180 days rates 90.

[2] No attempt was made to get crop yield data on soils of group 5-A; yields of corn average less than 8 bushels an acre.

[3] High water causes damage every third to fifth year; this hazard is not considered in arriving at the yield estimate.

[4] For this soil, yields in columns A are obtained without artificial drainage, and yields in columns B, with adequate drainage.

PRESENT AGRICULTURE

Macon County is mountainous. It has much steep and hilly land, some of it cultivated, and some forested. Agriculture alone would not support the present population under the methods now used. Harvesting of forest products supplements income in the county (pl. 4, B).

Contour tillage is the general practice on most of the cultivated steep land. Stripcropping is becoming more common in some localities. Some of the farmers run contours with a level, but many depend merely on eyesight. Practically none of the land has been terraced and, because of the prevailingly steep slopes, the use of terraces is not recommended. Most of the land has good natural drainage and the little that does not is artificially drained. Open ditches, covered box-type drains made of poles and slabs or rocks, and sometimes tile are used to drain the land. Cropland is broken in spring, usually during March and April. Whenever possible, however, most of the south-sloping land is broken in November and December.

Systematic crop rotations are used. Several rotations are used on soils of the bottom lands, stream terraces, and colluvial slopes. One of these is the following: First year, potatoes followed by rye or another small grain; second year, the grain turned under in spring and followed by corn, and the cornland sown to small grain; third year, lespedeza; and fourth year, potatoes. Another rotation is this: First year, corn followed by a small grain; second year, lespedeza sown and the small grain harvested; third year, lespedeza for hay; and fourth year, corn. A rotation that includes tobacco as a row crop is tobacco followed by a small grain the first year, and corn the second year.

In some communities the rotation consists of corn followed by crimson clover each year; the clover is turned under for the corn that follows. In other localities a small grain is followed by corn, and the corn by a small grain. In some areas it is common practice to grow corn year after year without rotation with other crops.

Rotations used on the Clifton, Rabun, Fannin, Halewood, and Hayesville soils consist of a small grain and lespedeza followed by corn, or of red clover followed by corn. Either way, the legume remains 2 years.

The rotations sometimes used on Ashe and Tate soils are the following: (1) Corn, grass and clover for 2 years, and cabbage or potatoes; (2) snap beans, a small grain and clover for 2 years, and cabbage followed by corn; (3) corn followed by a small grain or grass and clover, and then by potatoes, cabbage, or snap beans.

Rotations for Porters and Tusquitee soils consist of corn for 1 or 2 years and then a grass-clover mixture, which is used the first year for hay and then 3 or 4 years for pasture.

In all parts of the county, grass and clover generally are cut the first year for hay and then grazed 2 to 4 years, or until the next cultivation of the land. Grasses, clovers, and the small grains are seeded in corn late in July or early in August. Lespedeza is seeded in a small grain in the spring.

Commercial fertilizer is used for practically all crops. About 80 to 90 percent of it is applied to feed crops and the rest to truck crops.[6] Truck crops receive the largest applications—from 400 to 1,200 pounds an acre. The chief grades of fertilizer used are 6–12–6, 8–8–8, 4–8–12, 4–10–6, and 0–20–0. Superphosphate is the principal fertilizer used for corn and small grains; it is generally applied in quantities of 200 to 400 pounds an acre for corn and 300 to 400 pounds for small grain. A few farmers apply 200 to 300 pounds of 6–12–6, 8–8–8, or 4–10–6 to corn and wheat. About 300 pounds of 16-percent phosphate fertilizer is used for each acre of pasture.

Manure is applied in the spring at the rate of 5 to 6 tons an acre to eroded places on land to be used for corn, or in the fall, to like areas to be used for small grains. In some sections manure is used for truck crops, but very little is ever used on pasture.

Use of lime has gradually increased in many sections of the county. Much of it is applied to truck crops, some to subsistence crops, and some to smoother areas of pasture. The usual first application is 1 to 2 tons an acre, although soils of the bottom lands may receive as much as 2 to 4 tons. For most soils, subsequent applications are about 1 ton every 4 or 5 years.

LAND USE

In 1950 land in farms totaled 131,712 acres, or 39.8 percent of the county. Of this total, 17,986 acres was cropland harvested in 1949; 6,983 acres, cropland not harvested and not pastured; 5,331 acres, cropland used only for pasture; 25,251 acres, woodland pasture; and 19,216 acres, pastureland other than cropland used only for pasture and woodland pasture. Woodland not pastured covered 51,449 acres. Wasteland, house lots, barnyards, and roads occupied 5,496 acres. The remaining 199,168 acres, or 60.2 percent of the county, consisted mostly of forest land held by the Government and private owners.

As indicated by the large nonagricultural acreage, much of the county is hilly, steep, or mountainous land in forest or in unimproved pasture. The valley of the Little Tennessee River in the central part of the county has relief favorable for cropping. A small area near Highlands also is suitable, but most of it is held by large landowners for use as summer homes or for hunting and fishing. A few other fairly large areas with soil and relief suitable for agriculture are isolated and owned mostly by lumber companies; they have never been cleared for cultivation or pasture.

The agriculture of the county depends on a few soils, listed in relative importance, as members of the Rabun, Tusquitee, Chewacla, Chandler, Congaree, Hiwassee, Ashe, Clifton, Tate, Fannin, Hayesville, State, Porters, Masada, Halewood, Altavista, Warne, and Toxaway series.

Most of the corn is grown on Rabun, Tusquitee, Chewacla, Chandler, Hiwassee, Ashe, Clifton, Tate, Fannin, Hayesville, State, Congaree, and Porters soils. Most of the cabbage and a large part of the string beans are grown on Ashe soils, which have limited suitability for corn

[6] The fertilizer for these uses does not include the phosphate materials supplied by the Tennessee Valley Authority chiefly for improvement of sod crops.

and many other crops because of their high elevation. String beans are grown to some extent on Congaree fine sandy loam and Buncombe loamy fine sand.

The distribution of crops mentioned in the preceding paragraph is only a broad indication of land use in the county. Actually, tilled crops are grown wherever relief is favorable. The general practice is to crop the less steep fields; the rest of the open land on the farm is used for pasture, which is sometimes cultivated to kill weeds. This type of land use reduces the problem of controlling water and erosion. Some farmers, however, have only hilly or steep land; they lose soil material because erosion is difficult to control when such land is cultivated.

CROPS

The principal crops of Macon County are corn, wheat, rye, oats, and hay grown for use on the farm, and potatoes, cabbage, green beans, and tobacco grown for cash sale. Apples, peaches, and other tree fruits are grown for home use. The acreages of important crops and number of bearing fruit trees and grapevines in the county are given in table 13 for stated census years.

Corn.—As shown in table 13, corn occupies a larger acreage than any other crop. Corn is grown on every nonforested soil at all suitable. Yields are frequently low because the soils used have a low content of plant nutrients and organic matter, and because farmers do not apply enough commercial fertilizer or manure to offset these natural shortages. The best yields are generally obtained from the smoother areas of Tusquitee loam lying at or near the base of some of the mountains. The next highest yields probably are harvested from Congaree silt loam, a soil of the first bottoms. The Tusquitee loams and Congaree silt loam have a rather high organic-matter content and normally a favorable supply of moisture. Other good soils for corn are the State, Chewacla, and Rabun.

Practically all of the corn grown in the county is fed to work animals or to cattle and hogs being fattened for market. Some corn is ground into meal for household use. A few farmers grow corn for silage or fodder or to be grazed by cattle or hogs.

Hay.—Clover, alfalfa, lespedeza, timothy, or other hay crops are grown on any of the soils suitable for farming. Hay ranks second to corn in total acreage, and in 1949 showed almost double the acreage reported in 1939. Much of this increase in hay acreage was at the expense of the acreage in corn and small grains. The hay is fed to work stock and to cattle during the winter; none is grown for sale.

Small grains.—The acreage in wheat declined greatly between 1939 and 1949. Fine-textured soils are normally used for wheat. The crop receives about 200 pounds an acre of low-grade fertilizer, or it is not fertilized but planted after a crop that received a heavy application of fertilizer. Yields are low because inferior seed is used, seeding practices are poor, not enough fertilizer is applied, and the stand partly winterkills.

Rye, oats, and barley occupy small acreages. The acreage of oats cut green for hay may equal or exceed that harvested for grain. Rye serves for winter grazing and as a cover crop to be plowed under in spring. Some rye is threshed.

TABLE 13.—*Acreage of principal crops and number [1] of bearing fruit trees and grapevines in Macon County, N. C., for stated years*

Crop	1929	1939	1949
	Acres	*Acres*	*Acres*
Corn:			
For grain	12, 208	12, 389	8, 484
For all other purposes	137	248	237
Small grains threshed or combined:			
Wheat	1, 964	1, 407	197
Rye	549	1, 282	132
Oats	146	265	115
All hay: [2]	2, 803	3, 777	6, 603
Timothy and clover, alone or mixed	1, 297	738	2, 157
Alfalfa	3	19	467
Lespedeza	([3])	986	938
Small grains cut for hay	93	300	1, 050
Other hay cut	1, 410	1, 734	1, 991
Sorghums:			
For all purposes except sirup	68	112	26
For sirup	75	160	24
Soybeans grown alone for all purposes	233	[4] 529	331
Cowpeas grown alone for all purposes	233	[4] 109	64
Tobacco	12	19	59
Potatoes for sale or home use	529	802	[5] 510
Sweetpotatoes for sale or home use	165	230	[5] 38
Vegetables harvested for sale:			
Green beans	110	651	298
Cabbage	107	298	205
All other vegetables	43	121	72
	Number	*Number*	*Number*
Apple trees	42, 190	35, 675	28, 172
Peach trees	16, 140	4, 820	1, 271
Cherry trees	1, 381	1, 824	2, 120
Pear trees	544	449	525
Plum and prune trees	993	535	575
Grapevines	2, 183	2, 869	4, 323

[1] Number of bearing trees and vines in 1930, 1940, and 1950.
[2] Does not include soybeans, cowpeas, or other annual legumes cut for hay.
[3] Not reported.
[4] Does not include acres plowed under for green manure.
[5] Does not include acres for farms with less than 15 bushels harvested.

Truck crops.—A fairly large acreage is planted to truck crops, which normally can be grown profitably in spite of the distance to market. The leading crops are cabbage, green beans, potatoes, sweet corn, and cucumbers. The Ashe, Tate, and Congaree soils are those most used for truck crops. They are favored because they are open, friable, easily tilled, and respond readily to good management. The soils and climate of the Highlands area especially favor truck crops.

Heavy applications of fertilizer are needed to obtain good yields of high quality. At Highlands, the vegetables are grown for late market. In other sections they are grown for midseason sale. Cabbage is marketed in Atlanta, Ga. The beans are sold at Atlanta, in Mountain City, Tenn., or to a local cannery.

PERMANENT PASTURE

Permanent pasture occupies almost all kinds of soils, but the largest pastures are on the Porters, Ashe, Clifton, Rabun, and Fannin soils. On the Halewood, Hayesville, Masada, and Ramsey soils, the areas in pasture generally are smaller. The well-drained soils of the bottom lands and low stream terraces are desirable for pasture but are used mainly for tilled crops.

The pasture mixtures used on the Porters, Clifton, and Ashe soils in 1954–55 include Ladino clover, orchardgrass, and tall fescue. Some Kentucky bluegrass is used. Korean lespedeza may be sown alone on the Halewood, Hayesville, Masada, and Ramsey soils, or a mixture of Korean lespedeza, orchardgrass, and redtop may be used. The usual seeding for the various mixtures is 25 pounds an acre.

Pasture yields are normally good. The pastures on soils of the bottom lands and stream terraces have a much higher carrying capacity than those of the uplands. The grazing season is from about April 15 to about October 15.

LIVESTOCK

Almost every well-established farm has a few hogs, one to three milk cows, one or more beef cattle, and a small flock of chickens. The hogs are raised chiefly to supply meat and lard for the farm household. Few hogs are sold at local markets. The milk, eggs, and poultry are produced mainly for the farm household; the surplus is sold to markets outside the county.

Table 14 gives the number of livestock on farms of the county in stated census years. The number of cattle increased by more than 1,000 head in the period 1939–49. This increase is reflected by a greater acreage in hay (see table 13).

TABLE 14.—*Number of livestock on farms of Macon County, N. C., in stated years*

Livestock	1930	1940	1950
	Number	*Number*	*Number*
Horses	730	[1] 1, 006	1, 379
Mules	1, 108	[1] 657	393
Cattle	6, 476	[1] 6, 140	7, 545
Milk cows	2, 827	3, 492	3, 569
Swine	4, 275	[2] 2, 904	4, 859
Chickens	[1] 37, 228	[3] 46, 779	[4] 75, 850
Beehives	1, 891	1, 792	[4] 2, 811

[1] More than 3 months old.
[2] More than 4 months old.
[3] More than 6 months old.
[4] Number in 1949.

FARM POWER AND EQUIPMENT

Horses and mules are the principal source for farm power. In 1950, there were 2,276 farms in the county, and only 101 of these were reported as having a tractor. In the same year there were 562 automobiles and 527 motortrucks reported on farms.

TYPE, SIZE, AND TENURE OF FARMS

In 1950, there were 2,276 farms in the county divided as follows:

Type of farms:	*Number*
Miscellaneous and unclassified	1,921
Livestock	119
General	88
Vegetable	46
Poultry	46
Dairy	39
Field crop	17

The great number of unclassified farms indicates the lack of specialization that is typical of the farming in this county. The unclassified farms, producing mainly for home use, far outnumber all the other types of farms combined.

The average size of farms in 1950 was 57.9 acres. About 60 percent of the farms contained from less than 10 to 49 acres; about 35 percent from 50 to 179 acres; and about 5 percent from 180 to 1,000 acres or more. In 1950, the farms were distributed by size as follows:

Size range:	*Number*
Less than 10 acres	307
10 to 29 acres	587
30 to 49 acres	480
50 to 69 acres	338
70 to 99 acres	231
100 to 179 acres	229
180 to 259 acres	51
260 to 499 acres	42
500 to 1,000 acres or more	11

According to the 1950 census, 90.2 percent of the farms were operated by owners and part owners, 9.7 percent by tenants, and 0.1 percent by managers. Tenancy has dropped decidedly. In 1930, tenants operated nearly a fourth (23.3 percent) of the farms in the county. In 1950 tenants were divided by type as follows: Cash, 30; share-cash, 8; share, 84; croppers, 27; and all other tenants, 72.

FARM AND HOME IMPROVEMENTS AND SOCIAL FACILITIES

Churches are conveniently located in most rural communities. All sections are served by school busses that take the pupils to and from consolidated schools. School buildings and churches are available for agricultural meetings and social gatherings. Rural mail service extends to all communities.

Telephone service and electricity are available in most parts of the county, especially in those more densely populated. The 1950 census reported telephones on 96 farms and electricity on 1,551.

MORPHOLOGY, GENESIS, AND CLASSIFICATION OF SOILS

FACTORS OF SOIL FORMATION

Soil is the product of forces acting upon parent material deposited or accumulated by geologic agencies. The characteristics of a soil depend on (1) the physical and mineralogical composition of the parent material; (2) the climate under which the soil material has accumulated and has existed since accumulation; (3) the plant and

animal life in and on the soil; (4) the relief, or lay of the land; and (5) the length of time these forces of development have acted on the geological material. The influence of climate on soil and plants is modified by the physical characteristics of the soil or soil material and by relief, which, in turn, strongly influences drainage, aeration, runoff, erosion, and exposure to sun and wind.

PARENT MATERIALS

The parent materials of the soils of Macon County may be considered in two broad classes: (1) Materials residual from the weathering of rocks in place, and (2) materials transported by water or gravity and laid down as unconsolidated deposits of clay, silt, sand, and rock fragments. Materials of the first group are related directly to the underlying rocks from which they were derived; those of the second, to the soils or rocks from which they were transported.

The residual parent materials are weathered products from igneous and metamorphic rocks. These rocks differ a great deal—chemically, mineralogically, and physically—but have not been studied enough to determine how these differences correlate with differences among the soils that have developed from them. It is apparent, however, that most soils developed from material weathered from rock in place reflect the properties of the rock from which they were derived. Thus, different kinds of soil have developed from different kinds of rock.

The correlation of soil properties with parent material is influenced by the other factors of soil formation. Some soil characteristics, especially those of regional significance to soil genesis, cannot be correlated with parent material and must be attributed to climate, relief, or other factors. For example, in several places, differences in relief have been so important in soil genesis that dissimilar soils overlie similar rocks.

CLIMATE

According to Koppen's classification, as given by Trewatha (7), Macon County is in that part of the Humid Mesothermal zone where there is a humid temperate climate having no dry season and cool summers. The climate of the county varies from place to place because of the great range in elevation. The variation in climate has contributed to differences among the soils.

The valley sections have fairly long but only moderately warm summers, relatively short mild winters, and moderately high rainfall. The somewhat warm weather, combined with the moistness of the soil much of the time, favors rapid chemical reactions. The high rainfall promotes complete leaching from the soil of soluble materials such as bases, and the translocation of less soluble materials and colloidal matter downward in the soil. Since the soil is frozen for only short periods and to shallow depths, weathering and translocation of materials are further intensified.

The mountain areas are much colder than the valleys. Chemical reactions in these soils are therefore appreciably slower. The high rainfall here, as in the valleys, tends to leach soluble material from the soil and to translocate the less soluble materials and colloidal matter downward. Leaching is retarded, however, because the soils are frozen a longer time and to greater depths than in the valleys.

The climate for a large part of the county has the characteristics of the climates found in regions where the Red-Yellow Podzolic and Gray-Brown Podzolic soils have developed. In general, the climate in the valleys gives rise to soils of the Red-Yellow Podzolic great soil group; and that of the mountains, to the Gray-Brown Podzolic group. Nevertheless, soils of the two great groups are intimately associated, and all gradations between the two great groups can be found. Differences in parent materials, drainage, and age appear to have been important in determining the great soil group to which many of the soils belong.

VEGETATION

Higher plants, micro-organisms, earthworms, and other forms of life live on and in the soil and contribute to its morphology. The nature of the changes they bring about depends, among other things, on the kinds of life and the life processes peculiar to each. The kinds of plants and animals are determined by many factors, among which are climate, parent material, and relief, age of the soil, and the existence of other organisms. Climate is most apparent but not always most important in determining the kinds of higher plants that grow on the well-developed, well-drained soils. Climate thus exerts a powerful indirect influence on soil morphology. Climate and vegetation together, therefore, are the active factors of soil formation.

According to the classification of natural vegetation in the United States by Shantz and Zon (*6*), Macon County lies partly within three subdivisions of the Eastern forest region: (1) Birch-beech-maple-hemlock; (2) chestnut-chestnut oak-yellow poplar; and (3) spruce-fir.

The whole of Macon County was originally covered by forest consisting principally of deciduous trees. Chestnut, Northern red oak, sugar maple, hemlock, spruce, yellow birch, black cherry, cucumber-tree (magnolia), and beech were dominant in the mountains; and white ash, yellow-poplar (tuliptree), basswood (linden), white and other oaks, chestnut, white pine, hickory, and walnut in the valleys. The undergrowth of the mountain forest included many plants, such as galax, huckleberry, rhododendron, and mountain-laurel, which rarely grew in the valley forests. These differences in vegetation reflect differences in climate and soil.

Many of the trees and shrubs are moderately deep feeders. Most of them shed their leaves annually. The plant-nutrient in the leaves ranges considerably, but in general the quantities of bases and phosphorus returned to the soil by leaves of deciduous trees are high compared with those returned by leaves of coniferous trees. In this transfer of materials, essential plant nutrients are returned to the upper part of the soil from the lower and partly replace materials lost through the action of percolating waters. This transfer of plant nutrients is probably greater in soils of the valleys than in those of the mountains; it offsets to some extent the more rapid weathering of rocks and leaching of soils in the valleys.

Much organic matter is added to the soil through decay of leaves, twigs, roots, and entire plants. Most of this is added to the topmost layer, where it is acted on by micro-organisms, earthworms, and other forms of life and by direct chemical forces. The rate of decomposition

is probably more rapid in the valleys than on the mountains, and partly as a result, some well-drained soils of the higher mountains contain considerably more organic matter than the well-drained soils of the valleys.

The decomposition of organic matter releases organic acids, which increase the rate of solution of slowly soluble constituents and the rate of leaching and translocation of inorganic materials. The intensity of the effect is conditioned by climate, as climate affects the kinds of vegetation and micro-organisms and rates of reaction and leaching.

RELIEF

Relief of the soils, which ranges from almost level to very steep, modifies the effects of climate and vegetation. On some steep areas where runoff is great, geologic erosion is rapid and keeps almost even pace with rock weathering and soil formation. Soil materials are being constantly removed or mixed by slides; hence, they do not remain in place long enough for the formation of a profile consisting of genetically related horizons. The quantity of water that percolates through the soil is small, and the extent of leaching and quantity of translocated materials are correspondingly small. The vegetation is commonly less dense on such soils than on soils with more favorable moisture relations. Soils of steep slope are better developed where the slope is concave than where it is convex, for moisture conditions favor a dense growth of vegetation and geologic erosion is slow. In fact, on many concave slopes soil material is accumulating.

In some nearly level areas where both internal and external drainage are slow, soils developed from materials that have been in place for a long time have, as a result of poorer drainage, characteristics that well-drained soils do not have. The subsoils are commonly mottled yellow and gray and may be very compact. Geologic erosion is usually slow, and the soils may develop a highly leached surface layer and a compact subsoil. The vegetation and the micropopulation differ from those on well-drained soils. Also conditions are less favorable for the rapid decomposition of organic matter.

TIME

Some materials that have been in place for only a short time have not been influenced sufficiently by climate and vegetation to develop well-defined and genetically related profile horizons. Most soils of the first bottoms are composed of such materials. Soils of steep slope, as previously noted, have their materials constantly renewed or removed by geologic erosion and do not develop genetically related horizons. These two broad groups comprise the younger soils of the county.

Soils that have been in place for a long time and have approached equilibrium with their environment are considered mature or old. Some well-drained soils that are almost level and only slightly eroded exhibit more strongly marked profile characteristics than do well-drained, well-developed soils on the gently rolling uplands. Such soils are very old. The soils of Macon County range from very young to very old but are largely young to very young.

CLASSIFICATION OF SOILS

Soils are classified in progressively more inclusive categories. The first three—phase, type, and series—are discussed in the section on Soil Survey Methods. This section classifies the soil series of the county by great soil groups and soil orders and describes representative soils for each. The soils series of the county are grouped as follows:

	Parent rock
Zonal soils:	
Red-Yellow Podzolic soils:	
Red members:	
Hayesville	Granite, gneiss, or schist.
Clifton	Hornblende gneiss and schist.
Fannin	Mica schist or mica gneiss.
Rabun [1]	Dark-colored basic crystalline rocks.
Hiwassee [1]	Old alluvium.
Masada	Old alluvium.
Yellow members:	
Altavista	Moderately recent alluvium.
Tate	Colluvium or local alluvium.
Gray-Brown Podzolic soils:	
Halewood	Granite, gneiss, or schist.
Tusquitee	Colluvium or local alluvium.
State	Moderately recent alluvium.
Porters [2]	Granite, gneiss, or schist.
Ashe [2]	Granite, gneiss, or schist.
Intrazonal soils:	
Brown forest:	
Burton	Granite, gneiss, or schist.
Planosols:	
Warne	Moderately recent alluvium.
Augusta	Moderately recent alluvium.
Azonal soils:	
Lithosols:	
Talladega	Mica schist or mica gneiss.
Chandler	Mica schist or mica gneiss.
Ramsey	Highly siliceous rocks.
Alluvial soils:	
Congaree	Recent alluvium.
Buncombe	Recent alluvium.
Chewacla [3]	Recent alluvium.
Wehadkee [3]	Recent alluvium.
Toxaway [4]	Recent alluvium.

[1] These soils have some characteristics of Reddish Brown Latosolic soils.

[2] These soils have thinner, less distinct subsoils as compared to those of the other soils of this group and are considered to be transitional between this group and the Lithosols. They are commonly described as Lithosolic Gray-Brown Podzolic soils.

[3] These soils represent a gradation toward Low-Humic Gley soils.

[4] These soils have, to large extent, characteristics of Humic Gley soils.

ZONAL SOILS

Zonal soils are defined as any one of the great groups of soils having well-developed characteristics that reflect the influence of the active factors of soil genesis—climate and living organisms (chiefly vegetation) (*8*). In this county the zonal soils are members of the Red-Yellow Podzolic and Gray-Brown Podzolic great soil groups.

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RED-YELLOW PODZOLIC SOILS

The Red members of the Red-Yellow Podzolic great soil group are zonal soils having a thin organic and organic-mineral layers over a yellowish-brown leached layer which rests upon an illuvial red horizon. These soils have developed under deciduous or mixed forest in a warm-temperate moist climate (*8*). The soil-forming processes involved in their development are laterization and podzolization (*3*, *8*).

The soils of the Hayesville, Clifton, Fannin, Rabun, Hiwassee, and Masada series are the Red members of the Red-Yellow Podzolic great soil group. They have many characteristics in common and apparently have developed under relatively similar conditions of climate and vegetation. They are well drained and, although they range somewhat in degree of maturity, all have at least a moderately well developed Red Podzolic soil profile. Relief ranges from gently sloping to steep, but differences among these soils do not appear to be caused primarily by differences in slope but rather by differences in the kinds of parent material.

Red members

The Red members of the Red-Yellow Podzolic soils are mainly in the lower lying parts of the county where temperatures are higher. They occur on the intermountain uplands and lower mountain slopes or on terraces along streams. The materials from which they are derived are generally somewhat higher in bases or have been in place for a longer time than the parent materials of soils of the Gray-Brown Podzolic great soil group, but they may occur at similar elevations. Internal drainage is slightly better than in the associated Yellow members of the Red-Yellow Podzolic great soil group. Soils of the Hayesville series are representative of the Red members of this great soil group.

Hayesville loam, hilly phase, in a forested area has the following profile:

A_0 A thin layer of forest litter or leaf mold.
A_1 0 to 8 inches, light yellowish-brown friable loam of moderately well developed soft crumb structure; contains many fine roots; has a few fragments of quartz gravel and some sand grains on the surface.
B_1 8 to 16 inches, strong-brown friable clay to clay loam with moderately well developed nuciform structure; many openings in material are filled with or coated by organic matter; layer slightly sticky when wet; contains a few pieces of quartz gravel.
B_2 16 to 24 inches, strong reddish-brown heavy firm but somewhat friable clay of nuciform structure; slightly sticky when wet; shows a yellowish hue on cut surfaces; has a few mica flakes.
B_3 24 to 42 inches, strong reddish-brown friable heavy clay; sticky when wet; nuciform structure; contains a few finely divided mica flakes.
C 42 inches +, red, yellow, gray, and brown decayed granite retaining the original structural lines.

The most extensive Red soils of the Red-Yellow Podzolic great soil group in this county belong to the Clifton series. They have developed from weathered products of dark-colored basic igneous or metamorphic rocks. They occupy undulating to steep relief in the intermountain and, to some extent, mountain uplands. Clifton soils are characterized by light-brown to moderate-brown surface soil over

a firm but moderately friable moderate-brown to reddish-brown clay subsoil. They are less red than Hayesville soils and darker brown than Fannin soils. The climate and forest under which they formed are characteristic of sections between Gray-Brown Podzolic and Red-Yellow Podzolic soil regions. The parent rocks weather to a darker residuum under such conditions, and apparently contain less silica and more clay-forming minerals than the rocks underlying Halewood soils. The content of bases in the parent material appears to be higher than that in the parent material of Hayesville, Fannin, or Halewood soils.

Yellow members

The Yellow members of the Red-Yellow Podzolic great soil group have a thin layer of organic matter or organic-mineral over a grayish-yellow leached layer which rests on a yellow horizon. They have developed under deciduous or mixed forest in a warm-temperate moist climate (*8*). The soil development processes involved are podzolization and some laterization (*3*, *8*).

The Altavista and Tate series are the only Yellow members of this great soil group in the county. The Altavista soil has developed on low stream terraces from alluvial materials. The Tate soils have developed on some of the lower slopes of uplands from colluvial materials washed or transported mainly from soils underlain by igneous and metamorphic rocks. These two soil series are characterized by weak-brown or brownish-gray surface layers and moderate yellowish-brown moderately friable subsoils. Internal drainage is moderate but may be slightly restricted in places.

The Altavista soil occurs in narrow areas along streams, where it is associated with State and Tusquitee soils, which are members of the Gray-Brown Podzolic great soil group. Other associates of the Altavista soil are the Congaree, Chewacla, and Wehadkee soils of the Alluvial soils great soil group. The Altavista soil is derived from parent material apparently similar to that which gives rise to State soils; it appears to have developed under similar conditions of climate, relief, and vegetation. Nevertheless, the Altavista soil has an older profile than the State.

The Tate soils are from parent material of lighter color than that which gave rise to the Tusquitee soils, but have developed under similar climate, relief, and vegetation. The Tate soils appear to be younger than the Tusquitee; they may represent a relatively young Gray-Brown Podzolic profile. It is also probable that somewhat slower internal drainage is responsible for the yellow profile of the Altavista soil, as contrasted with the brown profile of the Tusquitee soils.

Profile of Altavista loam, undulating phase, in a cultivated area:

A 0 to 6 inches, weak-brown very friable loam; shows poorly developed crumb structure; contains numerous brier and grass roots and few mica flakes.

B 6 to 22 inches, moderate yellowish-brown friable to very slightly sticky silty clay loam; moderately well developed nuciform structure; slightly sticky when wet; contains some finely divided mica flakes.

C 22 to 30 inches +, dark-yellow, faintly mottled, friable silt loam or silty clay loam of moderately developed nuciform structure; somewhat sticky when wet; contains many finely divided mica flakes.

The surface layer varies somewhat in color, thickness, and texture from place to place. Locally a few small waterworn pieces of gravel occur on the surface and in the profile.

GRAY-BROWN PODZOLIC SOILS

Gray-Brown Podzolic soils are a zonal group of soils having a comparatively thin organic covering and an organic-mineral layer over a grayish-brown leached layer, which rests upon an illuvial brown horizon. They have developed under deciduous forests in a temperate moist climate (*8*). Podzolization is the dominant soil-forming process (*3*, *8*). In Macon County the soils of this group are members of the Halewood, Tusquitee, State, Porters, and Ashe series. The Porters and Ashe, however, are regarded as being lithosolic. Zonal profiles are not characteristic of these two series, and the soils they represent are closely related to the parent material.

Gray-Brown Podzolic soils lie at elevations where the climate is cooler than in most places of similar latitude. They usually occupy higher positions than the Red-Yellow Podzolic soils, but Gray-Brown Podzolic and Red-Yellow Podzolic soils occur side by side in some places. Generally where soils of these two great soil groups are associated, the Red-Yellow Podzolic soils are derived from materials that have a greater supply of bases or are older than the Gray-Brown Podzolic soils. The soils of both groups, however, apparently have developed under similar vegetation and on like relief. The soils of the two groups are well drained.

Differences among the Gray-Brown Podzolic soils appear to be caused mainly by relief or by differences in the parent materials.

The Tusquitee series has formed on colluvial slopes from an accumulation of soil material and rock waste that has washed, rolled, or sloughed from higher land. The relief ranges from very gently rolling to strongly sloping. These soils vary considerably in age, and their character is changed somewhat from time to time by the addition of new materials through colluvial action. Although they belong to the Gray-Brown Podzolic great soil group, these well-drained soils, as mapped, include young soils that should be considered members of the Alluvial soils great soil group because they lack profile development and show very little differentiation in the soil column from the surface downward.

Profile of Tusquitee loam, rolling phase, in a forested area:

- A_0 Thin layer of leaf mold.
- A_1 0 to 12 inches, dark-brown friable porous loam having a coarse weak crumb structure; contains many roots and some gravel.
- B 12 to 38 inches, dark yellowish-brown friable loam or clay loam with a moderate nuciform structure; contains many small roots and some flat-rounded pieces of gravel.
- C 38 inches +, a mixture of strong yellowish-brown loam and partly disintegrated rocks; contains many flat-rounded pieces of gravel, other small stones, and a few mica flakes.

The Porters and Ashe soils of this group may be designated as lithosolic Gray-Brown Podzolic soils to indicate the relatively weak development of their textural profiles. The Porters soils have formed from material weathered from dark-colored granite, gneiss, or schist

on steep relief in a mountainous landscape. These soils are so weakly developed that, on the whole, their profiles cannot be considered as typically zonal. They are characterized by dark-brown to moderate-brown very friable surface soils and moderate-brown very friable subsoils. Generally they are less than 36 inches deep, and outcrops of bedrock are common in places. Their lack of development appears to be related to the generally steep slopes and the consequent lack of the stability needed for development of a mature soil profile.

Porters soils are darker colored and apparently higher in content of plant nutrients than the associated Ashe soils. The Ashe soils have formed under a similar climate but from parent materials that appear to be higher in silica and lower in clay-forming minerals.

Profile of Porters loam, steep phase, 1½ miles west of Cowee Gap:

A_1 0 to 4 inches, dark-brown very friable loam; high organic content; moderately developed fine crumb structure.

A_3 4 to 14 inches, dark-brown very friable loam; contains some organic matter and many roots; has well-developed crumb structure.

C_1 14 to 32 inches, moderate-brown or dark yellowish-brown very friable loam; contains a few finely divided mica flakes and some roots; has moderately well developed medium nuciform structure.

C_2 32 inches +, strong yellowish-brown friable loam intermixed with partly weathered angular rock fragments, 1 to 3 inches or more in diameter.

There is no uniformity in the thickness of the profile layers, but color differences among the various layers are fairly easy to distinguish in most places. The profile is readily permeable to water, air, and roots, and it retains moisture well.

INTRAZONAL SOILS

Intrazonal soils are any of the great groups of soils with well-developed soil characteristics that reflect the dominating influence of some local factor of relief, parent material, or age over the normal effect of climate and vegetation (*8*). In this county the intrazonal soils are members of the Brown Forest and Planosols great soil groups.

BROWN FOREST SOILS

Brown Forest soils (*8*) are an intrazonal group of soils that have very dark-brown surface horizons relatively rich in humus that grade through lighter colored soil into the parent material. They are characterized by slightly acid reaction, little or no illuviation of iron and alumina, and a moderately high content of calcium in the soil colloids. They have developed under deciduous forest in temperate humid regions from parent material relatively rich in bases.

The Burton series belongs to this group. It is represented by Burton stony loam, hilly phase, which has formed on tops of mountains and in high mountain coves. It has developed mainly over granite, gneiss, or schist, which generally lies at a shallow depth. The soil is characterized by a brownish-black or almost black thick highly organic surface layer over moderate-brown to strong yellowish-brown friable clay loam. Outcrops of bedrock are common.

The Burton soil has formed under a cool moist climate. The original vegetation probably consisted of deciduous trees interspersed with coniferous trees, but when the county was first settled some areas

were covered by grasses, sedges, and shrubs. The cool climate favors slow decomposition of organic matter, so climate probably contributed to the accumulation of organic material in the surface layer. Trees and grasses that supply organic matter high in bases may also have been a factor in the formation of the surface layer. It is reasonably certain that the parent material is relatively high in bases, although the soil is moderately to strongly acid.

Profile of Burton stony loam, hilly phase, in a forested area about 1 mile northeast of Highlands:

0 to 2 inches, brownish-black stony loam containing a large quantity of organic matter; peatlike color and structure; friable and porous; contains many large and small roots.
2 to 8 inches, black friable stony loam containing much organic matter that is more thoroughly decomposed than in surface horizon; weakly developed fine crumb structure; contains many roots.
8 to 20 inches, moderate-brown smooth friable loam of moderately developed coarse crumb structure; contains a small quantity of organic matter, which is well combined with the mineral material.
20 to 40 inches, strong yellowish-brown friable clay loam; soft crumb structure.
40 inches +, white, black, gray, and brown soft granitic rock.

Angular rock fragments up to about 12 inches in diameter are strewn over the surface and mixed through the profile. Some boulders are on the surface, and bedrock outcrops in many places. In sheltered coves and on north slopes the profile resembles that of Half Bog soils. These areas have a mucklike surface soil and a gray friable loam or clay loam subsoil.

PLANOSOLS

Planosols (*8*) are an intrazonal group of soils that have eluviated surface horizons underlain by B horizons more strongly illuviated, cemented, or compacted than associated normal soils. They developed on nearly level upland surfaces under grass or forest vegetation in a humid or subhumid climate. Planosols are represented in this county by the Warne and Augusta series.

Warne silt loam, a Planosol on nearly level areas of terrace land, has formed from moderately recent alluvium composed of material washed from uplands underlain by igneous and metamorphic rocks. This soil is closely associated with Altavista and State soils; it is characterized by a light-colored friable surface soil and a mottled firm subsoil. External drainage is slow to rapid, and internal drainage is very slow. Although some characteristics of the soil are associated with slow internal and external drainage, it is uncertain whether slow internal drainage caused the development of the dense B layer or results from its development. The relief is generally of such character that normal erosion is slow, so relief may have contributed to the formation of the dense B horizon. It is possible that relatively dense layers in the original alluvial deposits may have impeded internal drainage, and that this internal drainage, combined with the slow external drainage, may have caused the abnormal compaction in the B horizon.

Profile of Warne silt loam:

A 0 to 7 inches, brownish-gray silt loam; friable when moist but slightly sticky when wet; weakly developed coarse crumb structure.
B_1 7 to 17 inches, light yellowish-brown, mottled with moderate yellowish brown, very firm silty clay; slightly plastic and sticky when wet; moderately developed fine nuciform structure.
B_2 17 to 22 inches, medium-gray, mottled with moderate yellowish brown, very firm heavy silty clay; sticky and plastic when wet.
C 22 inches +, gray sandy clay mixed with gravel.

The Augusta soil, also a Planosol, differs from the Warne soil in that it generally has slightly less relief, has more gray in the B horizon, and possibly has slightly slower internal drainage.

AZONAL SOILS

Azonal soils are any group of soils without well-developed profile characteristics. Their youth, differences of parent material, or relief have prevented the formation of a normal profile (*8*). In this county the Azonal soils are members of the Lithosols and Alluvial great soil groups.

LITHOSOLS

Lithosols are an azonal group of soils having no clearly expressed soil morphology; they consist of a freshly or imperfectly weathered mass of rock fragments, largely confined to steeply sloping land (*8*). Soils that are very shallow over bedrock and that have little development of a genetic profile are included. These soils—and related land types—are generally steep and broken or severely eroded. Geologic erosion almost keeps pace with the weathering of the rocks; or materials slough, slip, or roll down slopes so readily that little true soil can develop. Some closely associated areas of zonal soils are included in the mapping units because of their small extent.

The Lithosols mapped in Macon County are generally steep and shallow soils of the Talladega, Chandler, and Ramsey series. Stony colluvium, stony rough land, and rock outcrop and rough gullied land are also members of this great soil group. In addition, mines, pits, and dumps may be considered as man-made Lithosols.

Soils of the Ramsey series have formed on steep relief in a mountainous landscape. These soils are characterized by weak-brown stony loam surface soils and strong yellowish-brown friable loam or clay loam subsoils. Their depth seldom exceeds 25 inches and averages between 15 and 20 inches. The Ramsey soils have formed over highly siliceous rocks, largely fine-textured quartzite, shale, sandstone, and conglomerate.

Profile of Ramsey stony loam, steep phase, in a forested area:

A_1 0 to 2 inches, moderate-brown very friable stony loam; contains a considerable quantity of organic matter and some shale particles.
A_2 2 to 5 inches, weak-brown friable stony loam or silt loam; contains some shale particles.
C_1 5 to 18 inches, strong yellowish-brown loam or silty clay loam of weak-crumb structure; contains some shale particles.
C_2 18 inches +, partly disintegrated shale.

The Chandler soils differ from the Ramsey mainly in that they have formed over mica schist or mica gneiss and generally are micaceous throughout the profile. The Talladega soil differs from the Ramsey

mainly in that it has formed over mica schist or mica gneiss, is nearly everywhere micaceous in the profile, and has a strong-brown color.

ALLUVIAL SOILS

Alluvial soils are an azonal group of soils developed from transported and relatively recently deposited material (alluvium); they are characterized by a weak modification (or none) of the original material by soil-forming processes (*8*). In Macon County soils of this group are members of the Congaree, Buncombe, Chewacla, Wehadkee, and Toxaway series.

The Congaree soils are well drained; the Buncombe, excessively drained; the Chewacla, imperfectly drained; and the Wehadkee and Toxaway, poorly to very poorly drained. The Chewacla and Wehadkee soils grade toward Low-Humic Gley soils. The Toxaway soil has developed to a minor degree some characteristics of Humic Gley soils. Differences in all these soils arise principally from differences in condition of drainage.

The Congaree soils, young soils of the first bottoms, are derived from alluvial materials washed mainly from uplands underlain by crystalline rocks. These soils are subject to overflow, and periodic deposition of new materials causes them to remain young. Consequently, the profile layers are not very distinct and vary from place to place in kind and arrangement. Colors range from light brown to dark brown in the topmost layers, and from brown to brownish yellow in the underlying layers, which become mottled at 24 inches or more. The texture of the topmost layer is fine sandy loam or silt loam.

Profile of Congaree fine sandy loam in a cultivated area:

0 to 13 inches, weak-brown very friable and porous fine sandy loam; contains some finely divided mica flakes.
13 to 36 inches, moderate yellowish-brown friable porous fine sandy loam; contains many finely divided mica flakes.
36 inches +, pale yellowish-brown loose fine to medium sand and rounded pieces of gravel.

Considerable variation from the above profile occurs. The surface soil ranges from 8 to 18 inches thick and, in places, consists of very fine sandy loam or loam.

The Buncombe soil is considered as a member of the dry-sand group and is mapped as loamy fine sand. It is closely related to the soils of the Congaree series and differs mainly in its sandy profile.

The soils of the Chewacla and Wehadkee series are characterized by degrees of mottling in their profiles and by the condition of drainage. The Toxaway soil is differentiated by its almost black organic top layer and brownish-gray subsoil.

SOIL SURVEY METHODS

Soil surveying consists of the examination, classification, and mapping of soils in the field. The soil scientist walks over the area at intervals not more than one-quarter mile apart and bores into the soil with an auger or digs holes with a spade. Each such boring or hole shows the soil to consist of several distinctly different layers, called horizons, which collectively are known as the soil profile. Each of

these layers is studied carefully for the things about it that affect plant growth.

The color of each layer is noted. The darkness of the topmost layer is usually related to its content of organic matter; streaks and spots of gray, yellow, and brown in lower layers generally indicate poor drainage and poor aeration.

Texture, or the content of sand, silt, and clay in each layer, is determined by the feel and is checked by mechanical analysis in the laboratory. Texture has much to do with the quantity of moisture the soil will hold available to plants, whether plant nutrients or fertilizers will be held by the soil in forms available to plants or will be leached, and how difficult the soil may be to cultivate.

Structure, or the way the soil granulates and the amount of pore or open space between particles, indicates how easily plant roots can penetrate the soil and how easily water enters it.

Consistence, or the tendency of the soil to crumble or to stick together, indicates how difficult it is to keep the soil open and porous under cultivation.

The kind of rocks from which the soil has been developed, or its parent material, affects the quantity and kind of plant nutrients the soil may have naturally. Simple chemical tests show how acid the soil may be. The depth to bedrock or to compact layers is determined. The quantity of gravel or rocks that may interfere with cultivation, the steepness and kind of slope, the quantity of soil lost by erosion, and other external features are observed.

On the basis of all these characteristics, soil areas much alike in the kind, thickness, and arrangement of their layers are mapped as one soil type. Some soil types are separated into two or more phases. For example, if a soil type has slopes that range from 2 to 15 percent, the type may be mapped in two phases, an undulating phase (slopes of 2 to 7 percent) and a rolling phase (slopes of 7 to 15 percent); or a soil that has been eroded in places may be mapped in two or more phases, an uneroded (or normal) phase, an eroded phase, and perhaps a severely eroded phase. A soil type will be broken into phases primarily because of differences in the soil other than those of kind, thickness, and arrangement of layers. The slope of a soil, the frequency of outcropping bedrock, the extent of erosion, or artificial drainage are examples of characteristics that might cause a soil type to be divided into phases.

Two or more soil types may have similar profiles, that is, the soil layers may be nearly the same, except that the texture, especially the texture of the surface layer, will differ. As long as the other characteristics of the soil layers are similar, these soils are considered to belong in the same soil series. A soil series therefore consists of all the soil types that, except for texture, particularly texture of the surface layer, have about the same kind, thickness, and arrangement of layers, whether the number of such soil types be only one or several.

The name of a place near where a soil series was found is chosen as the name of the series. Thus, Halewood is the name of a soil series first mapped near Halewood in Madison County, N. C. Four types of this series are found in Macon County; namely, Halewood loam, Halewood clay loam, Halewood stony loam, and Halewood stony clay

loam. All these types differ in the texture of the surface soil, as their names show. The Halewood soils are divided into nine phases because of differences in slope and erosion. Some of these phases are Halewood loam, eroded hilly phase; Halewood clay loam, severely eroded steep phase; and Halewood stony loam, hilly phase.

Areas such as very stony land and bare rocky mountainsides that have little true soil are not designated with series and type names. They are considered to be land types and are given descriptive names. Rock outcrop, Rough gullied land (Fannin and Clifton soil materials), and Stony colluvium (Tusquitee and Tate soil materials) are land types mapped in Macon County.

The soil type, or where the soil type is subdivided, the soil phase, is the unit of mapping in soil surveys. It is the unit, or the kind, of soil that is most nearly uniform and has the narrowest range of characteristics. For this reason land use and soil management practices can be more definitely specified for it than for broader groups of soils that contain more variation. One can say, for example, that soils of the Hayesville series need lime for alfalfa. In contrast, for Hayesville clay loam, eroded rolling phase, it can be said that it has relatively mild slopes and, in addition to needing lime, is suited to row crops grown in rotation with small grains and hay, or for Hayesville clay loam, eroded steep phase, that it has very strong slopes of 30 to 60 percent, is hard to work with heavy machinery, erodes easily, and should be used principally for long-term hay or pasture. Both phases are in the Hayesville series.

A number of terms used in soil surveying are defined in the Glossary.

GLOSSARY

Acidity. Degree of acidity of the soil mass expressed in pH values or in words as follows:

	pH		*pH*
Extremely acid	below 4.5	Neutral	6.6–7.3
Very strongly acid	4.5–5.0	Mildly alkaline	7.4–7.8
Strongly acid	5.1–5.5	Moderately alkaline	7.9–8.4
Medium acid	5.6–6.0	Strongly alkaline	8.5–9.0
Slightly acid	6.1–6.5	Very strongly alkaline	9.1 and higher

Alluvial soils. Azonal group of soils, developed from transported and relatively recently deposited material (alluvium) characterized by a weak modification (or none) of the original material by soil-forming processes.

Alluvium. Fine material, such as sand, mud, or other sediments, deposited on land by streams.

Bedrock. Solid rock underlying soils.

Colluvium. Deposits of rock fragments and soil material accumulated at the base of slopes through the influence of gravity; includes creep and local wash and frequently consists of somewhat mixed material. Colluvial soils are developed from this material.

Consistence. A soil term expressing degree of cohesion and the resistance opposed to forces tending to deform or rupture the soil aggregate; relative mutual attraction of the particles in the whole mass, or their resistance to separation. Terms commonly used to describe consistence include brittle, compact, firm, friable, plastic, sticky, and stiff.

Brittle. Soil breaks with a sharp, clean fracture; if struck with a sharp blow, it will shatter into cleanly broken hard fragments.

Compact. Dense and firm but without cementation.

Firm. Resistant to forces tending to produce rupture or deformation.

Friable. Readily ruptured and crushed when moderate force is applied.

Plastic. Readily deformed without rupture; pliable but cohesive; readily molded; puttylike.

Sticky. Adhesive rather than cohesive when wet but usually very cohesive when dry. When wet, soil shows a decided tendency to adhere to other materials and objects.

Stiff. Resistant to deformation or rupture; firm and tenacious and tending toward imperviousness. Term is usually applied to condition of the soil in place and moderately wet.

Erosion. Wearing away or removal of soil material by water or wind.

Fertility. Inherent quality of a soil, as measured by its content of compounds needed for proper or balanced growth of plants.

First bottom. Normal flood plain of a stream; land along a stream subject to overflow.

Horizon, soil. A layer or part of the soil profile approximately parallel to the land surface and having well defined characteristics.

Horizon, A. Upper horizon of the soil mass from which material has been removed by percolating waters; the illuviated part of the solum; the surface soil. This horizon is generally divided into two or more subhorizons, of which A_0 is not a part of the mineral soil but the accumulation of organic debris on the surface. Other subhorizons are designated as A_1, A_2, and so on.

Horizon, B. Horizon to which materials have been added by percolating water; the illuviated part of the solum; the subsoil. This horizon also may be divided into several subhorizons, depending on the color, structure, consistence, and character of the material deposited. These subhorizons are designated as B_1, B_2, B_3, and so on.

Horizon, C. Horizon of partly weathered material underlying the B horizon; the substratum; usually the parent material.

Mottled (mottling). Irregularly marked with spots of different colors.

Normal soil. Soil having a profile in equilibrium with the two principal forces of the environment—native vegetation and climate; usually has developed on the gently undulating (but not strictly level) upland that has good drainage; is derived from any parent material, but not of extreme texture or chemical composition, that has been in place long enough for biological forces to exert their full effect.

Permeable. Easily penetrated by water and air.

Phase, soil. Subdivision of the soil type; covers departures from the typical soil characteristics that are not sufficient to justify the establishment of a new type but are worthy of recognition and the forming of a mapping unit. The variations are chiefly in such external characteristics as relief, stoniness, and erosion. (Examples: Porters loam, steep phase, and Porters loam, eroded steep phase.)

Productivity. Capability of a soil to produce specified plants under a given system of management.

Profile, soil. Vertical section of the soil from the surface into the parent material.

Reaction. *See* Acidity.

Series, soil. A group of soils having the same profile characteristics (color, structure, consistence, and sequence of horizons), the same general conditions of relief and drainage, and usually a common or similar origin and mode of formation. A group of soil types closely similar in all respects except the texture of the surface soil.

Soil. An organized natural body on the surface of the earth that supports plants and whose properties result from modification of parent material by physical, chemical, and biological forces through periods of time.

Structure, soil. Arrangement of the individual grains and aggregates that make up the soil mass. May refer to the natural arrangement of the soil when in place and undisturbed or to the soil at any degree of disturbance. Such terms as prismatic, columnar, blocky, subangular blocky, nuciform, platy, crumb, and granular are used to describe soil structure.

Subsoil. Technically, the B horizon; commonly, that part of the profile below plow depth.

Substratum. Material underlying the subsoil.

Surface soil. Technically, the A horizon; commonly, that part of the upper profile usually stirred by plowing.

Terrace (geologic). Old alluvial plain, usually level or smooth, bordering a stream; seldom subject to overflow; frequently a terrace is called a second bottom.

Texture. Size of individual particles making up the soil mass. The various soil separates are classified by the size groups as follows: Sand, silt, and clay. A coarse-textured soil is one with a high sand content; a fine-textured soil has a large proportion of clay.

Type. A subdivision of the soil series based on the texture of the surface soil.

Upland (geologic). Land consisting of material unworked by water in recent geologic time and ordinarily lying at higher elevations than the alluvial plain or stream terrace.

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