Series 1938, No. 19 Issued September 1948

Soil Survey

Jackson County North Carolina

By
E. F. GOLDSTON, in Charge, W. A. DAVIS, and C. W. CROOM
North Carolina Agricultural Experiment Station

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
Bureau of Plant Industry, Soils, and Agricultural Engineering
In cooperation with the
NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION
and the
TENNESSEE VALLEY AUTHORITY

HOW TO USE THE SOIL SURVEY REPORT

SOIL SURVEYS provide a foundation for all land use programs. This report and the accompanying map present information both general and specific about the soils, the crops, and the agriculture of the area surveyed. The individual reader may be interested in the whole report or only in some particular part. Ordinarily he will be able to obtain the information he needs without reading the whole. Prepared for both general and detailed use, the report is designed to meet the needs of a wide variety of readers of three general groups: (1) Those interested in the area as a whole; (2) those interested in specific parts of it; and (3) students and teachers of soil science and related agricultural subjects. Attempt has been made to meet the needs of all three groups by making the report comprehensive for purposes of reference.

Readers interested in the area as a whole include those concerned with general land use planning—the placement and development of highways, power lines, urban sites, industries, community cooperatives, resettlement projects, areas for forest and wildlife management and for recreation. The following sections are intended for such users: (1) General Nature of the Area, in which location and extent, physiography, relief and drainage, geology, climate, water supply, vegetation, organization and population, industries, transportation and markets, and cultural development and improvement are discussed; (2) Agriculture, in which a brief history and the present status of the agriculture are described; and (3) Soil Use, Management, and Productivity, in which water control on the land, physical land classification and soil management, agricultural practices, and soil productivity are discussed.

Readers interested chiefly in specific areas—as some particular locality, farm, or field—include farmers, agricultural technicians interested in planning operations in communities or on individual farms, and real estate agents, land appraisers, prospective purchasers and tenants, and farm loan agencies. These readers should (1) locate on the map the tract with which concerned; (2) identify the soils on the tract by locating in the legend on the margin of the map the symbols and colors that represent them; and (3) locate in the table of contents in the section on Soils of Jackson County the page where each type is described in detail and information given as to its suitability for use and its relations to crops and agriculture. They will also find useful specific information relating to the soils in the section on Soil Use, Management, and Productivity.

Students and teachers of soil science and allied subjects—including crop production, forestry, animal husbandry, economics, rural sociology, geography, and geology—will find their special interest in the section on Morphology and Genesis of Soils. They will also find useful information in the section on Soils of Jackson County, in which are presented the general scheme of classification of the soils of the area and a detailed discussion of each type. For those not already familiar with the classification and mapping of soils, these subjects are discussed under Soil Survey Methods. Teachers of other subjects will find the sections on General Nature of the Area; Agriculture; Soil Use, Management, and Productivity; and the first part of the section on Soils of Jackson County of particular value in determining the relations between their special subjects and the soils of the area.

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

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING
ROBERT M. SALTER, *Chief*

Division of Soil Survey
CHARLES E. KELLOGG, *Chief*

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION
L. D. BAVER, *Director*
WM. D. LEE, *in Charge Soil Survey*

TENNESSEE VALLEY AUTHORITY

Series 1938, No. 19 Issued September 1948

SOIL SURVEY OF JACKSON COUNTY, NORTH CAROLINA[1]

By E. F. GOLDSTON, in Charge, W. A. DAVIS, and C. W. CROOM, North Carolina Agricultural Experiment Station

Area inspected by J. W. MOON, Principal Soil Scientist, Division of Soil Survey,[2] Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture

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

CONTENTS

	Page
Summary	2
General nature of the area	3
Location and extent	3
Physiography, relief, and drainage	4
Geology	5
Climate	6
Water supply	8
Vegetation	8
Organization and population	8
Industries	9
Transportation and markets	9
Cultural development and improvement	10
Soil survey methods	10
Soils of Jackson County	11
General nature of the soils	11
Descriptions of soil units	16
Altavista silt loam	16
Ashe loam	17
Eroded phase	17
Severely eroded phase	18
Very steep phase	18
Hilly phase	18
Eroded hilly phase	19
Severely eroded hilly phase	19
Rolling phase	19
Eroded rolling phase	20
Ashe sandy loam	20
Eroded phase	21
Hilly phase	21
Eroded hilly phase	21
Rolling phase	22
Eroded rolling phase	22
Ashe stony loam	22
Very steep phase	22
Burton stony loam	23
Soils of Jackson County—Con.	
Descriptions of soil units—Con.	
Chandler loam	23
Hilly phase	24
Clifton loam, steep phase	24
Clifton clay loam:	
Eroded phase	24
Eroded steep phase	24
Severely eroded steep phase	25
Congaree fine sandy loam	25
Congaree loamy fine sand	25
Congaree silt loam	26
Congaree-Toxaway complex	26
Halewood loam	26
Eroded phase	27
Severely eroded phase	27
Hayesville loam	27
Rolling phase	28
Steep phase	28
Hayesville clay loam:	
Eroded phase	28
Severely eroded phase	28
Eroded rolling phase	29
Eroded steep phase	29
Severely eroded steep phase	29
Hiwassee clay loam	30
Eroded sloping phase	30
Eroded hill phase	31
Severely eroded hill phase	31
Porters loam	31
Eroded phase	32
Severely eroded phase	32
Very steep phase	32
Eroded very steep phase	33

[1] This report was revised by M. G. Cline, R. C. Jurney, and M. J. Edwards, Division of Soil Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering.

[2] The field work was done while the Division was a part of the Bureau of Chemistry and Soils.

	Page
Soils of Jackson County—Con.	
Descriptions of soil units—Con.	
Porters stony loam	33
Very steep phase	33
Rabun clay loam:	
Steep phase	33
Eroded steep phase	33
Severely eroded steep phase	34
Eroded phase	34
Ramsey loam	34
Eroded phase	35
Severely eroded phase	35
Rock outcrop	35
Rough gullied land (Hayesville and Halewood soil materials)	36
Rough stony land (Porters and Ashe soil materials)	36
State loam	36
Sloping phase	37
Stony colluvium (Porters soil material)	37
Talladega silt loam	37
Severely eroded phase	38
Eroded hilly phase	38
Talladega-Porters loams	39
Eroded phases	39
Toxaway silt loam	39
Drained phase	40
Tusquitee loam	40
Eroded phase	41
Gently sloping phase	41
Hilly phase	41
Eroded hilly phase	41
Severely eroded hilly phase	42
Warne fine sandy loam	42
Soil use, management, and productivity	42
Water control on the land	43
Physical land classification and soil management	44
First-class soils	45
Second-class soils	47
Third-class soils	51
Fourth-class soils	55
Fifth-class soils	57
Crop adaptations, rotations, and fertilizer requirements	59
Agricultural practices	60
Soil productivity	61
Agriculture	70
Morphology and genesis of soils	75
Glossary	85
Literature cited	87
Soil map and descriptive legend cover page	3

JACKSON COUNTY, lying in the Blue Ridge Mountains in the extreme western part of North Carolina, has a general relief of low intermountain upland to elevated mountain plateaus and from rolling hills to high rugged mountains. Temperature and rainfall are influenced by the high altitudes. Agriculture, the principal industry, consists largely of corn, wheat, rye, oats, hay, and forage as subsistence crops, and cabbage, potatoes, snap beans, and tobacco as the principal cash crops. Some livestock is sold. Next to the production of crops, the most important enterprise is harvesting and preparing forest products, including timber, tanbark, and pulpwood. To provide a basis for the best agricultural uses of the land a cooperative soil survey was begun in 1938 by the United States Department of Agriculture, in cooperation with the North Carolina Agricultural Experiment Station and the Tennessee Valley Authority. The report here presented may be briefly summarized as follows.

SUMMARY

Jackson County occupies elevations of 1,850 to 6,450 feet above sea level in the Blue Ridge Mountains in the extreme western part of North Carolina. Areas of nearly level first bottoms are along many of the streams, and gently sloping to strongly sloping stream terraces occur in some places. Drainage is excellent, except in some of the level first bottoms, where it is only fair or even poor. The summers are comparatively short and cool; and in the winters, which are not excessively cold, hardy vegetables can be grown.

Seventy-eight soil types, phases, complexes, and miscellaneous land types were identified and described and their extent delineated to scale on a map. These vary from nearly black loams to red clays; from well-developed, stone-free areas to shallow stony lands and even to solid rock outcrop. The soils are grouped according to physical suitability for agricultural use into five groups, or land classes, ranging from soils that are very good to excellent for agriculture (First class) to those suitable only for forest (Fifth class). First-class soils occupy 8,064 acres; Second-class soils, 5,248 acres; Third-class, 19,392 acres; Fourth-class, 160,192 acres; and Fifth-class, 121,344 acres.

Agriculture is divided between subsistence and cash crops. The agriculture depends largely on a few soils. Listed in order of relative importance these are Tusquitee loam; Congaree fine sandy loam and silt loam; State loam; Ashe loam, rolling phase; Ashe sandy loam, rolling phase; Hiwassee clay loam; Warne fine sandy loam; and Altavista silt loam. Most of the corn, wheat, and hay is grown on these soils. Commercial truck crops, however, are produced chiefly on the Ashe soils. Tilled crops are generally grown wherever relief is favorable. Steep land is used largely for pasture and forest but is cultivated in some places. Crop rotations are followed on many farms. Commercial fertilizer is generally used on practically all crops. Lime is applied to pasture and hay land and to truck-crop areas.

The control of runoff is the major problem in soil management. The necessary changes in land use for this control are (1) cropping systems that will provide for a maximum of protective cover throughout the year, (2) reduction in the acreage planted to row crops, (3) use of less sloping lands for the row crops, (4) increase in acreage of hay and forage crops, (5) improvement of pasture sod, and (6) improved management of woodland. A definite plan for control of surface runoff by any mechanical means, as contour tillage, terracing, and establishing hillside or diversion channels, should go along with vegetal cover.

The parent materials of the soils of Jackson County are (1) material residual from the weathering of rocks in place and (2) material transported by water or gravity and laid down as unconsolidated deposits of clay, silt, sand, and rock fragments. The differences in climate have contributed to differences among the soils. In general, the climatic conditions of the valleys are those that commonly give rise to soils of the Red or Yellow Podzolic great soil group; those of the mountains to Gray-Brown Podzolic soils. All gradations between these two conditions of soil formation may be found.

GENERAL NATURE OF THE AREA

LOCATION AND EXTENT

Jackson County, in the western part of North Carolina (fig. 1), is bounded on the south by South Carolina and separated from Tennessee by Swain County to the northwest. It covers an area of 491 square miles, or 314,240 acres. Sylva, the county seat, is 40 miles southwest of Asheville and 135 miles northwest of Charlotte. The county line follows the crests of winding mountain ridges in most places, with only a few straight courses.

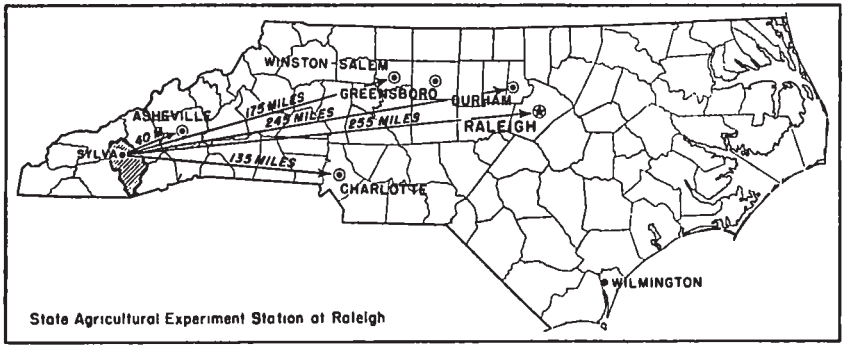


FIGURE 1.—Location of Jackson County in North Carolina.

PHYSIOGRAPHY, RELIEF, AND DRAINAGE

The county lies in the Blue Ridge physiographic province, a division of the Appalachian Highlands (fig. 2). The Cowee Mountains and Plott Balsams are the principal mountain ranges, spurs of which extend in all directions. The mountains, in general, have rather sharp crests and steep slopes. In a few narrow areas of high plateau near Cashiers and Glenville and in coves and some places near the base of mountains the relief is comparatively smooth. The rolling topography of the foothills in the central part along Tuckasegee River Valley between the Cowee Mountains and Plott Balsams forms a striking contrast to that of the surrounding rough mountainous country.

Along the streams are strips or small bodies of almost level bottom land a few feet to more than a fourth of a mile wide, most of which are subject to periodic overflow. A few remnants of old terraces along Tuckasegee River lie about 200 feet above the river channel and are most extensive at Webster and Cullowhee.

Elevations above sea level vary widely; the highest point is 6,450 feet, on Richland Balsam; and the lowest 1,850 feet, at Whittier post office. The elevations [3] of some of the better known mountains are Waterrock Knob, 6,400 feet; Jones Knob on the Jackson-Haywood County line, 6,400; Black, 6,275; Yellow, 5,145; Cowee Bald, 5,085; Shortoff, 5,054; Chimneytop, 4,625; and Whiteside, 4,390. Nine mountains are more than 6,000 feet above sea level and 51 range between 5,000 and 6,000 feet. Elevations of towns are Cashiers, 3,478 feet; Glenville, 3,456; Balsam, 3,338; Willits, 2,544; Tuckasegee, 2,200; Webster, 2,156; Sylva, 2,039; Dillsboro, 2,000; and Whittier, 1,850.

Because of the rolling, hilly, and steep topography, natural drainage is excellent, except in some small nearly level places in first bottoms, where it is only fair or even poor. Creeks, branches, and smaller drainageways extend to all parts of the county, giving the upland complete surface drainage. The part of the county west of the Blue Ridge is drained by the Tuckasegee River and its tributaries, and the part east of the Blue Ridge by the Horsepasture, Whitewater, and Chattooga Rivers and their tributaries. The Tuckasegee River

[3] Data obtained from Coast and Geodetic Survey, U. S. Department of Commerce.

flows northward, its waters eventually reaching the Mississippi River; the other rivers flow southeastward, and eventually into the Atlantic Ocean.

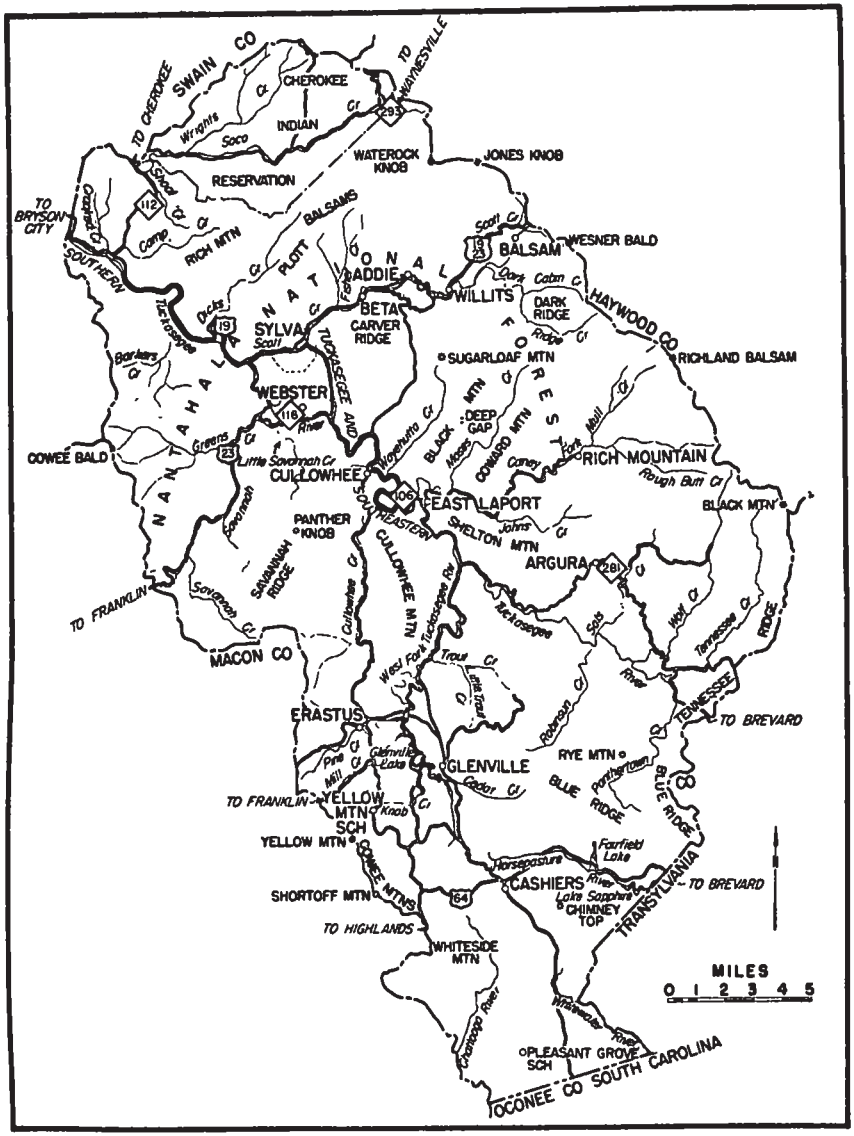


FIGURE 2.—Map of Jackson County, showing the principal mountains, drainage system, and cultural features.

GEOLOGY

All the upland soils have developed through soil-forming processes from the weathered products of the underlying rocks. The geologic formations consist principally of crystalline rocks, some of them highly metamorphosed.

Carolina gneiss, occurring chiefly in the eastern and western parts of the county, consists (*7*)[4] of an immense series of interbedded mica schist, garnet schist, mica gneiss, cyanite gneiss, and fine granitoid layers. Most of these are light or dark gray, weathering to dull gray and greenish gray.

Roan gneiss, found chiefly in the central part of the county, consists of a series of interbedded mica schist and mica gneiss. The hornblendic beds are dark green or black and the micaceous beds are dark gray.

Whiteside granite occurs on Whiteside Mountain and in the vicinity of Cashiers, Glenville, Wolf Mountain, and to the east. It is medium gray, becoming lighter on weathering. Porphyritic crystals of orthoclase feldspar are prominent features of the rock.

Mica and kaolin are the chief minerals in Jackson County. Mica occurs at several places along Wayehutta Creek, on Sugarloaf Mountain and Wesner Bald, near Deep Gap on Black Mountain, on Tennessee Ridge, along Moses Creek, along the west side of Wolf Creek, near Panther Knob, and in several other localities (*3*). Most of these are sites where there has been no mining, but mica is mined at other points in the county. Several deposits of kaolin of commercial value occur along Tuckasegee River and Scott Creek. A high-grade garnet schist is found near Willits. Corundum occurs in loose fragments at Addie and Glenville, and on Caney Fork and Johns Creek. A very promising deposit of chromite is near Webster, and another near the Dark Ridge trestle of the Murphy branch of the Southern Railway. In addition, a belt in which chalcopyrite, an ore of copper, is present extends northward from the headwaters of the Tuckasegee River to Scott Creek. Copper and nickel ores, feldspar, and garnet have been mined at some time. The mineral olivine occurs near Balsam Gap, near Webster, and at points in between, but not in extensive areas. The deposits at Balsam Gap are being worked.

CLIMATE

The climate of Jackson County is influenced by high altitudes. During the rather short summer the nights are cool, and the days are never sultry or very hot. The winter is not generally cold, although short, erratic spells of very cold weather may be expected. Rainfall is plentiful and well distributed throughout the growing season as well as over the entire year. Locally, wide variations exist in the mean annual temperature and precipitation, because of the great differences in elevation. On the higher mountains the precipitation is much heavier and the temperature considerably lower than in the valley areas. Snow remains on some of the higher northern slopes during much of midwinter. The average frost-free period (*6*) is 175 days (April 26 to October 18) at Cullowhee, and 167 days (April 29 to October 13) near Highlands, Macon County, near the Jackson County line. Killing frosts have occurred as late as May 24 and as early as September 26 at Cullowhee, and as late as May 26 and as early as September 13 near Highlands.

[4] Italic numbers in parentheses refer to Literature Cited, p. 87.

The normal monthly, seasonal, and annual temperature and precipitation at Cullowhee, representative of the valley parts of the county; and near Highlands, representative of the higher elevations, as compiled from United States Weather Bureau records, are given in table 1.

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

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total for the driest year	Total for the wettest year	Average snowfall
	CULLOWHEE, ELEVATION 2,100 FEET						
	°F.	°F.	°F	*Inches*	*Inches*	*Inches*	*Inches*
December	40.3	77	−11	4.20	0.77	11.93	2.1
January	40.4	79	−9	3.90	4.57	5.51	2.7
February	41.6	79	−9	3.20	2.39	5.64	2.4
Winter	40.8	79	−11	11.30	7.73	23.08	7.2
March	47.6	87	4	5.20	2.67	6.09	2.1
April	55.5	91	17	3.60	1.43	4.46	.1
May	63.2	92	28	3.60	1.63	3.03	(2)
Spring	55.4	92	4	12.40	5.73	13.58	2.2
June	70.4	97	36	4.00	1.49	3.71	0
July	73.5	99	43	4.20	2.80	4.35	0
August	72.7	96	38	4.00	.74	4.32	0
Summer	72.2	99	36	12.20	5.03	12.38	0
September	68.5	92	31	3.50	.67	2.90	0
October	57.5	88	15	2.70	3.35	6.14	(2)
November	46.3	79	5	2.20	2.85	2.92	.8
Fall	57.4	92	5	8.40	6.87	11.96	.8
Year	56.5	[3] 99	[4] −11	44.30	[5] 25.36	[6] 61.00	10.2
	NEAR HIGHLANDS, ELEVATION 3,350 FEET						
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	[7] 87	[8] −19	84.90	[5] 53.44	[9] 111.20	18.1

[1] From U. S. Weather Bureau records.
[2] Trace.
[3] In July 1930.
[4] In December 1917.
[5] In 1925.
[6] In 1932.
[7] In July 1918.
[8] In February 1895.
[9] In 1915.

WATER SUPPLY

The many streams furnish an abundant supply of water for livestock. Excellent spring water for domestic use is available on nearly every farm, and well water is obtainable at a depth of 80 feet or less. Several artificial lakes supply recreational features, and many streams are stocked with game fish. A large hydroelectric power development is at Glenville, a smaller one at Dillsboro, and there are other potential sites at several points in the county.

VEGETATION

The original vegetation consisted of chestnut, oak, hemlock, balsam, tuliptree, beech, birch, hickory, black walnut, sourwood, and dogwood trees, with an undergrowth of shrubs and other small plants, chiefly rhododendron, mountain-laurel, huckleberry, and buckberry. Galax and trailing-arbutus were and still are common plants on the mountains. A few small balds or other open or sparsely wooded areas supported a good growth of grass.

A large part of the original tree growth has been cut for timber, and the present stand consists of second- and third-growth tuliptree (yellow-poplar), various oaks, maple, black locust, pine, birch, and hickory, with much more pine and black locust than in the original forest.

Cultivated lands not used and those abandoned soon grow up in weeds, broomsedge, and briers, and within 3 or 4 years white and shortleaf pines, or black locust or tuliptree (yellow-poplar) appear. Except on severely eroded areas, the tree growth is rather rapid, making a good stand within a few years. Since 1935 much of the land, especially severely eroded and gullied areas, has been reforested.

ORGANIZATION AND POPULATION

The Cherokee Indians were in possession of the territory in which Jackson County lies when De Soto passed through in 1540. The first white settlement was made on Scott Creek, where a trading post was established about 1790 by a man named Foster.[5] The first school was built near the present site of Cullowhee, then known as East Laport.

Jackson County was formed from Macon and Haywood Counties in 1851 and named in honor of Andrew Jackson. The county seat was at Webster until 1913, when it was moved to Sylva. Several changes have been made in the boundaries of the county since its establishment. A part of the area was taken to form Swain County in 1871; other changes were made in 1861, 1882, and 1887.

The present inhabitatnts are mostly descendants of the original settlers, who came from Virginia and South Carolina and from other parts of North Carolina. There are very few foreign-born and Negro residents. Some Indians live on the Cherokee Reservation, part of which is located in the northern tip of the county.

In 1940 the total population was 19,366, all of which was classed as rural, the average density being 38.8 persons a square mile. It is very unevenly distributed and is densest in the central part along

[5] Historical information furnished by T. Cox, engineer-surveyor, Cullowhee, N C, and by other local citizens.

Tuckasegee River. Other thickly populated sections are scattered, mainly in parts of the valleys that are occupied by small bodies of agricultural land. Sylva, the county seat and near the geographical center of the county, had a population of 1,409 in 1940; Cashiers, 353; Dillsboro, 290; and Webster, 84. Other towns, not incorporated, are Cullowhee, Balsam, and Glenville.

INDUSTRIES

Next to the production of crops, the most important enterprise in the county is harvesting and preparing forest products, which include timber, tanbark, pulpwood, and acid wood (*3*). Of the total forest area in 1939, 84,238 acres were in farm woodland, according to the Federal census.

In 1939, 10 manufacturing establishments furnished employment for 367 people, and the value of manufactured products was $2,624,362 (*4*). In addition to this sum, it is estimated that the stumpage value of timber cut annually exceeds $180,000. For many families, income received from the sale of timber or from work in manufacturing plants supplements that obtained from the farm.

Paperboard is manufactured at Sylva (pl. 1), tanning solutions are prepared, and leather is tanned. Lumber is produced at East Laport. Small local gristmills grind corn and other grains for the rural communities, and flour mills at Beta and near Webster grind the wheat grown in the county.

TRANSPORTATION AND MARKETS

One railroad, the Asheville and Murphy branch of the Southern Railway system, passes through the county. This connects with a main line of the Southern at Asheville and a branch of the Louisville and Nashville Railroad at Murphy. The Tuckasegee and Southeastern Railway, extending from East Laport to Sylva, is used mostly for hauling timber and lumber to the Southern Railway.

Five main highways serve the county and provide an excellent means for transporting farm products to outside markets. One highway, extending from Asheville, N. C., to Atlanta, Ga., passes through the county in a northeast-southwest direction; another leads westward from Dillsboro to Knoxville, Tenn., and a branch runs to Murphy and thence to Chattanooga, Tenn.; one leading southward from Sylva into South Carolina crosses another at Cashiers, which extends from Franklin to Hendersonville. All these routes are open for travel throughout the winter, except the one to Knoxville, which may be impassable at times because of ice and snow.

Roads or trails extend into all sections of the county. The public roads are good in summer, but many are impassable in places in winter to all methods of travel except by light cars and horse-drawn vehicles.

The towns are local distributing points for supplies, but Sylva affords the only local market for the agricultural products of the county. Most of the produce is brought in by farmers or by hucksters who gather it on trade routes. Many farm products are marketed in Asheville, Waynesville, and points nearby, and livestock is shipped to outside markets. Milk is collected at farms and hauled to cream-

eries in nearby counties. Tanbark, pulpwood, and acid wood are sold at Sylva, but lumber and some other forest products are shipped to outside markets.

CULTURAL DEVELOPMENT AND IMPROVEMENT

Churches, in general, are conveniently located in the rural communities. The Western Carolina Teachers College is located at Cullowhee. All sections are served by school busses, which take the pupils to and from consolidated schools. In sections where families live some distance from public roads, the children walk to points where busses make stops. Many schools are located in towns. Both school buildings and churches are available for agricultural meetings and social gatherings. The county has 19 post offices, and rural mail service extends to all communities.

Telephone service and electricity are available in some parts of the county, especially in the more densely populated sections. The Federal census reported 59 farms having telephones on April 1, 1940, and 636 farms with electric distribution lines within a fourth mile of the dwellings. Of this number, 352 farms reported obtaining current from the power lines and 83 from home plants.

SOIL SURVEY METHODS

In making a soil survey the soils are examined, classified, and mapped in the field and their characteristics reported. The soils and the underlying formations are examined systematically in many locations. Test pits are dug, borings made, and highway, railroad, and other cuts studied. Each exposes a series of distinct soil layers, or horizons, termed collectively the soil profile. Each horizon, as well as the underlying parent material, is studied in detail, and the color, structure, porosity, consistence, texture, and content of organic matter, roots, gravel, and stone are noted. The chemical reaction of the soil and its content of lime and salts are determined by simple tests.[6] Other features taken into consideration are the drainage, both internal and external, the relief, or lay of the land, and the interrelations of soil and vegetation.

The soils are classified according to their characteristics, both internal and external, with special emphasis upon the features that influence the adaptation of the land to the production of crop plants, grasses, and trees. On the basis of these characteristics the soils are grouped into classification units, the principal three of which are (1) series, (2) type, and (3) phase. In some places two or more of these units may be in such intimate or mixed pattern that they cannot be clearly separated on a small-scale map but must be mapped as (4) a complex. Some areas that have no true soil—as Rock outcrop and Rough stony land (Porters and Ashe soil materials)—are termed (5) miscellaneous land types.

The series (*1*) is a group of soils having the same genetic horizons, similar in their important characteristics and arrangement in the profile and having similar parent material. Thus, the series comprises

[6] The reaction of the soil is its degree of acidity or alkalinity expressed mathemetically as the pH value A pH value of 7 indicates precise neutrality, higher values, alkalinity, and lower values, acidity. Indicator solutions are used to determine the chemical reaction. The presence of lime is detected by the use of a dilute solution of hydrochloric acid.

soils having essentially the same color, structure, natural drainage, and other important internal characteristics and the same range in relief. The texture of the upper part of the soil, including that commonly plowed, may vary within a series. The series are given geographic names taken from localities near which they were first identified. Hayesville, Porters, Ashe, and Congaree are names of important soil series in Jackson County.

Within a soil series are one or more types, defined according to the texture of the upper part of the soil. Thus, the class name of this texture—sand, loamy sand, sandy loam, silt loam, clay loam, silty clay loam, or clay—is added to the series designation to give a complete name to the soil type. Except for the texture of the surface soil, these soil types have approximately the same internal and external characteristics. The soil type is the principal unit of mapping, and it or its subdivision, the phase, is usually the unit to which agronomic data are definitely related. In comparisons of the type and phases of that type, to avoid the repetition of their complete names, the type is sometimes referred to as the normal phase. Congaree silt loam and Congaree fine sandy loam are soil types within the Congaree series.

A soil phase is a variation within the type, differing from it in some minor feature, generally external, that may be of special practical significance. For example, within the normal range of relief of a soil type some areas may be adapted to the use of machinery and the growth of cultivated crops and others may not. Differences in relief, stoniness, and degree of accelerated erosion may be shown as phases. The more sloping parts of the soil type may be segregated on the map as a sloping or hilly phase. Similarly, some soils having differences in stoniness may be mapped as phases, even though these differences are not reflected in the character of the soil or in the growth of native plants.

Among the phases of a soil type, one is generally more common than the rest. No phase name is used for that unit, and it is known as the normal phase. Thus, State loam, the normal phase, in this county is understood to have gently sloping relief in contradistinction to the sloping relief of State loam, slope phase.

Examples of soil complexes are found in Congaree-Toxaway complex and Talladega-Porters loams, in which the soils are so intimately associated that they cannot be separated on a map of the scale used.

The soil surveyor makes a map of the county, showing the location of each of the soil types, phases, complexes, and miscellaneous land types in relation to roads, houses, streams, lakes, and other cultural and natural features of the landscape.

A glossary (p. 85) gives the definitions of many unfamiliar soil terms used in the report.

SOILS OF JACKSON COUNTY

GENERAL NATURE OF THE SOILS

The soils of Jackson County have been classified in 17 series and mapped as 20 types, 3 complexes, 51 phases, and 4 miscellaneous land types. The external and internal characteristics and related features of the soil series are given in table 2.

TABLE 2.—*External and internal characteristics of the soil series of Jackson County, N. C.*

Soil series	Relief	Drainage	Surface soil (A horizon)	Subsoil (B horizon)	Substratum (C horizon)
MOUNTAIN UPLANDS					
Ashe	Steep	Good to excessive	Gray loam or sandy loam	Pale-yellow loose loam	Granite and gneiss.
Porters			Brown to dark-brown loam	Brown to yellowish-brown clay loam or loam	Do.
Chandler			Gray or grayish-brown mellow loam.	Yellow to brownish-yellow micaceous loam.	Mica schist.
Talladega			Brown silt loam	Light-red to yellowish-red very micaceous clay loam or loam.	Do.
Ramsey			Grayish-yellow loam	Brownish-yellow clay loam or loam	Highly siliceous rock.
Ashe	Hilly	do	Gray loam or sandy loam	Pale-yellow loose loam	Granite and gneiss.
Porters			Brown to dark-brown loam	Brown to yellowish-brown clay loam or loam.	Do
Chandler			Gray or grayish-brown mellow loam	Yellow to brownish-yellow micaceous clay loam or loam.	Mica schist
Clifton			Brown or reddish-brown clay loam	Dark-brown to reddish-brown firm clay	Dark basic igneous and metamorphic rocks
Burton			Very dark-gray or almost black stony loam.	Yellowish-brown friable clay loam	Granite and gneiss.
Tusquitee			Brown loam	do	Colluvium from igneous and metamorphic rocks
Ashe	Rolling or sloping	Good	Gray loam or sandy loam	Pale-yellow loose loam	Granite or gneiss
Burton			Very dark-gray or almost black stony loam	Yellowish-brown friable clay loam	Do
Tusquitee			Brown loam	do	Colluvium from igneous or metamorphic rocks
INTERMOUNTAIN UPLANDS					
Hayesville	Steep	Good to excessive	Gray to brownish-yellow loam or fine sandy loam.	Red or brownish-red compact brittle clay	Granite, gneiss, and schist.
Halewood			Light-brown loam	Yellowish-brown to red friable clay	Do.
Talladega			Brown silt loam	Light-red to yellowish-red very micaceous clay loam or loam.	Mica schist
Clifton			Brown or reddish-brown clay loam	Dark-brown to reddish-brown firm clay	Dark basic igneous and metamorphic rocks
Rabun			Dark-brown clay loam	Dark-red or maroon-red sticky clay	Do
Hayesville	Hilly	do	Light-brown or yellowish-brown loam.	Brownish-red compact brittle clay	Granite, gneiss, and schist
Halewood			Light-brown loam	Yellowish-brown to red friable clay	Do
Clifton			Brown or reddish-brown clay loam	Dark-brown or reddish-brown firm clay	Dark basic igneous and metamorphic rocks
Rabun			do	Dark-red or maroon-red sticky clay	Do
Tusquitee			Brown loam	Yellowish-brown friable clay loam	Colluvium from igneous and metamorphic rocks

Hayesville	Rolling or sloping	Good	Light-brown or yellowish-brown loam	Brownish-red compact brittle clay	Granite, gneiss, and schist
Tusquitee			Brown loam	Yellowish-brown friable clay loam	Colluvium from igneous and metamorphic rocks.
HIGH STREAM TERRACES					
Hiwassee	Gently to strongly sloping.	Good	Dark-brown or reddish-brown clay loam	Brownish-red or red stiff clay	Old alluvium from granite, gneiss, and schist.
LOW STREAM TERRACES					
State	Gently sloping to sloping	Good	Brown loam	Reddish-brown friable clay loam	Moderately young alluvium from igneous and metamorphic rocks.
Altavista	Level to gently sloping	Slow to moderately good.	Yellowish-gray silt loam	Yellow moderately compact sandy clay to silty clay	Do.
Warne			Yellowish-gray fine sandy loam	Mottled yellow, gray, and brown sticky fine sandy clay	Do.
FIRST BOTTOMS					
Congaree	Nearly level	Good	Brown loamy fine sand to silt loam.	Yellowish-brown loamy fine sand to fine sandy clay.	Young alluvium from granite, gneiss, and schist.
Toxaway	do	Poor	Dark-gray to almost black silt loam	Medium-gray sticky silty clay, mottled below 30 inches.	Do.

As shown in table 2, eight soil series are common to the mountain uplands. Three of these are also common to the intermountain uplands. (Mountain uplands are landscapes of high elevation, long steep slopes, and narrow valleys; intermountain uplands are landscapes of relatively low elevation and a less steep but nevertheless strongly rolling to hilly relief with somewhat more open valleys.)

The Tusquitee soils, common to both mountain and intermountain uplands, are developed on colluvium or local alluvium washed from adjacent areas of the other seven series. They are brown, fertile, and among the most desirable soils of the county for agriculture. Soils of the other seven series are developed in place, over their parent rock, and differences among them arise chiefly from differences in the parent rock.

The Ashe soils are developed over light-colored granites and gneisses and have a gray surface soil and yellow relatively open or permeable subsoil. The relief is rolling to very steep and natural fertility low, but the less steep areas suitable for agriculture respond to good management.

The Porters soils, developed over dark-colored granites and gneisses, have a brown surface soil and a yellowish-brown relatively open or permeable subsoil. The slope is predominantly steep to very steep and natural fertility moderately high. Owing chiefly to their strong slope, these soils are used principally for pasture and forest. They are the most extensive soils in the county.

Common to both mountain and intermountain uplands, the Clifton soils are developed over dark basic igneous and metamorphic rocks, chiefly hornblende gneiss and dark-colored schist, and have a brown to reddish-brown surface soil and a dark-brown to reddish-brown firm clay subsoil, considerably less permeable than that of the Ashe and Porters soils. The relief is hilly to steep and the natural fertility moderate. Owing to the steep slope and generally eroded condition, these soils are not suited to crops.

The Chandler soils are developed over highly micaceous rock, chiefly schist and gneiss, and are shallow to bedrock. They have a gray silt loam surface soil and a yellow to brownish-yellow clay loam or loam subsoil, with a large quantity of mica throughout the soil mass. Because of the hilly to steep relief and low natural fertility, they are poorly suited to agricultural use, but the less steep areas are fairly well suited to grazing when properly managed.

Like the Chandler soils, the Talladega soils are developed over highly micaceous rock but differ in having a redder subsoil and a slightly greater depth to bedrock. On account of steep relief they are poorly suited to crops or pasture.

The Ramsey soils, developed over highly siliceous rock, have a grayish-yellow loam surface soil and a brownish-yellow clay loam or loam subsoil that is shallow to bedrock. Owing to steep relief and low fertility, they are poorly suited to agriculture, although under proper management the more favorable areas are capable of making pasture.

The Burton soil is distinguished by its dark organic surface layer. The surface soil is very dark-gray or almost black stony loam, containing a large quantity of organic matter, and the subsoil is yellowish-brown, brown, or gray-brown friable clay loam, or loam. Most

areas are in coves or on north-facing slopes, practically all in association with the Ashe and Porters soils. The relief is mostly strongly sloping or hilly, and the soil is not well suited to crops but does support a good grazing cover.

Six soil series are common to the intermountain uplands. Three of these—Clifton, Talladega, and Tusquitee—also common to the mountain uplands are briefly described with that group.

The Hayesville soils, developed over light-colored granite, gneiss, and schist, have a gray to brownish-yellow surface soil and a red or brownish-red brittle clay subsoil. These soils are rolling to steep and moderately fertile. Much of the less sloping part is suited to crops.

Also developed over light-colored granite, gneiss, and schist, the Halewood soils resemble the Hayesville in many respects, differing essentially in having a less red more friable subsoil.

Developed over dark basic igneous and metamorphic rocks, as olivine and schist, the Rabun soils resemble the Clifton, differing chiefly in having a darker surface soil and a redder, heavier subsoil. Although soils of the Rabun series are in general more fertile than corresponding types and phases of the other soil series of the uplands, their generally steep slope and eroded condition make them poorly suited to crops. Under proper management, however, some areas are capable of affording good pasture.

The four soil series on stream terraces consist of a mixture of materials washed chiefly from soils of the uplands. Practically all are in intermountain landscapes.

The Hiwassee soils, on the oldest and highest terraces, have dark-brown or reddish-brown surface soils where not eroded (brownish red where eroded) and brownish-red or red stiff brittle clay subsoils. These soils are fertile and well drained, and most of their area is well suited to crops.

The Altavista soil, on low to moderately low stream terraces, has a yellowish-gray surface soil and a yellow moderately compact sandy clay to silty clay subsoil underlain by mottled compact material. The surface is smooth, and the soil is generally well drained, moderately productive, and well suited to many crops.

The State soils, on low stream terraces, have a brown surface soil and a reddish-brown friable clay loam subsoil. They are among the most desirable and productive soils in the county.

Occurring on low to moderately low stream terraces, the Warne soil is characterized by a mottled yellow, gray, and brown sticky fine sandy clay to clay subsoil and very slow surface and internal drainage. Suitability to crops and productivity are limited by the unfavorable nature of the subsoil.

The Congaree and Toxaway series, comprising the soils of the first bottoms, are nearly level, fertile, and subject to overflow. They consist of material washed from soils of the surrounding uplands. The well-drained Congaree soils have a brown surface soil and yellowish-brown loamy fine sand to fine sandy clay subsoil. These soils are productive of both crops and pasture. The poorly drained Toxaway are recognized especially by their dark-gray to almost black surface soil and medium-gray sticky subsoil. They are unproductive in their natural state but very productive when properly drained and fertilized.

DESCRIPTIONS OF SOIL UNITS

In the following pages the soils are described in detail and their agricultural relations discussed. Their location and distribution are shown on the accompanying map, and their acreage and proportionate extent are given in table 3. Their use suitability, present management, management requirements, estimated average crop yields, crop adaptations, and fertilizer requirements are discussed in the section on Soil Use, Management, and Productivity (p.42).

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

Soil type	Acres	Percent	Soil type	Acres	Percent
Altavista silt loam	128	(1)	Porters loam	61,376	19.5
Ashe loam	42,368	13.5	Eroded phase	11,328	3.6
Eroded phase	5,312	1.7	Eroded very steep phase	384	.1
Eroded hilly phase	4,160	1.3	Very steep phase	8,448	2.7
Eroded rolling phase	704	.2	Severely eroded phase	4,544	1.4
Hilly phase	5,888	1.9	Porters stony loam	2,816	.9
Rolling phase	576	.2	Very steep phase	13,184	4.2
Severely eroded phase	2,368	.8	Rabun clay loam [2]		
Severely eroded hilly phase	1,216	.4	Eroded phase	320	.1
Very steep phase	576	.2	Eroded steep phase	128	(1)
Ashe sandy loam	5,888	1.9	Severely eroded steep phase	640	.2
Eroded phase	384	.1	Steep phase	320	.1
Eroded hilly phase	1,088	.3	Ramsey loam	12,736	4.1
Eroded rolling phase	256	.1	Eroded phase	7,296	2.3
Hilly phase	2,944	.9	Severely eroded phase	4,032	1.3
Rolling phase	960	.3	Rock outcrop	1,664	.5
Ashe stony loam	4,544	1.4	Rough gullied land (Hayesville and Halewood soil materials)	256	.1
Very steep phase	6,208	2.0	Rough stony land (Porters and Ashe soil materials)	59,520	19.0
Burton stony loam	128	(1)	State loam	384	.1
Chandler loam	1,856	.6	Sloping phase	320	.1
Hilly phase	256	.1	Stony colluvium (Porters soil material)	1,920	.6
Clifton clay loam [2]			Talladega-Porters loams	192	.1
Eroded phase	192	.1	Eroded phases	256	.1
Eroded steep phase	896	.3	Talladega silt loam	576	.2
Severely eroded steep phase	640	.2	Eroded hilly phase	128	(1)
Clifton loam, [2] steep phase	832	.3	Severely eroded phase	256	.1
Congaree fine sandy loam	2,560	.8	Toxaway silt loam	384	.1
Congaree loamy fine sand	896	.3	Drained phase	384	.1
Congaree silt loam	704	.2	Tusquitee loam	2,560	.8
Congaree-Toxaway complex	1,472	.5	Eroded phase	1,088	.3
Halewood loam	576	.2	Eroded hilly phase	1,792	.6
Eroded phase	1,600	.5	Gently sloping phase	192	.1
Severely eroded phase	512	.2	Hilly phase	2,112	.7
Hayesville clay loam [2]			Severely eroded hilly phase	256	.1
Eroded phase	1,216	.4	Warne fine sandy loam	384	.1
Eroded rolling phase	256	.1			
Eroded steep phase	256	.1	Total	314,240	100.0
Severely eroded phase	2,304	.7			
Severely eroded steep phase	6,336	2.0			
Hayesville loam	384	.1			
Rolling phase	128	(1)			
Steep phase	1,472	.5			
Hiwassee clay loam	128	(1)			
Eroded hill phase	256	.1			
Eroded sloping phase	512	.2			
Severely eroded hill phase	128	(1)			

[1] Less than 0.1 percent.

[2] Type not mapped in this county.

Altavista silt loam.—Mostly in small, scattered bodies associated with the State, Warne, and Congaree soils, this light-colored soil, with a yellow friable subsoil, is on low stream terraces. The parent material was derived from uplands overlying igneous and metamorphic rocks. The relief is nearly level to sloping, and internal drainage is fair to good. On the flattest areas surface drainage is slow. Much

of this soil is in the vicinity of Soco and Liberty Schools, Barkers Creek, and about a mile southwest of Fairfield Lake.

Following is a profile description in a cultivated area:

0 to 10 inches, gray to yellowish-gray friable silt loam.
10 to 30 inches, yellow friable to moderately compact fine sandy clay to silty clay.
30 inches+, mottled yellow and gray compact slightly plastic silty clay.

In places a few water-worn rocks or cobbles occur throughout the soil. The reaction is medium to strongly acid, and the plant-nutrient content is not high. The soil is permeable to roots and moisture to a depth of about 30 inches, and moisture relations in general are favorable to crops. On the flattest parts, however, the slow surface drainage is a detriment to most crops and field operations during periods of excessive rainfall.

A large part of this soil is cleared and most of it used for crops and pasture, principally corn and potatoes. The smooth surface, good moisture relations, and ability to respond to good management make it a desirable soil for agriculture.

Ashe loam.—This soil occupies high positions in the mountains and has slopes of 30 to 60 percent. It has formed chiefly from granite and light-colored gneiss and in most places the rock is less than 4 feet below the surface. It occurs chiefly in large bodies widely distributed throughout the southern and extreme northern parts of the county, most of it in landscapes consisting principally of soils not suited to crops. The native vegetation of predominantly deciduous hardwood trees, chiefly oak, red maple, sourwood, and dogwood, constitutes the present forest on most of this type.

Following is a profile description:

0 to 10 inches, light-brown to gray mellow loam. Medium to strongly acid.
10 to 30 inches, brownish-yellow to pale-yellow friable loam, firmer or more compact than the surface layer. Strongly acid.
30 to 36 inches, pale brownish-yellow mottled with brown gritty loam, more friable than the layer above. Strongly acid.
36 inches+, mottled and streaked yellow, brown, and gray weathered rock.

The soil is of moderate to low fertility, low in organic matter, and permeable to roots and moisture. It varies from 18 to 48 inches in depth to bedrock, and has a few rock outcrops.

Practically all of this soil is in forest. Chiefly because of its steep slope it is not well suited to crops requiring tillage, but where properly fertilized and limed it is capable of affording good grazing.

A few areas of sandy loam texture too small to delineate are included with this soil as mapped. In limited areas on concave slopes where the soil material has been fairly stable, the subsoil is more nearly sandy clay than loam.

Ashe loam, eroded phase.—This light-colored steep soil of the mountainous areas, formed from granite or gneiss, differs from the normal phase chiefly in having lost 25 to 75 percent of the surface soil by erosion. The quantity lost varies greatly, but in average areas the plow layer is light-brown to yellowish-gray mellow loam (a mixture of surface soil and subsoil materials). Below a depth of about 5 inches is yellow firm but friable loam, which grades at a depth of

663933—48——2

about 25 inches to pale brownish-yellow mottled with brown gritty less firm loam. Weathered rock lies about 30 inches below the surface. A few gullies, mostly relatively shallow, may be present. The soil is medium to strongly acid and permeable to roots. The slope is steep (30 to 60 percent), and internal drainage good. A large part of this phase is in the vicinity of Glenville and a small part in the mountainous southern part of the county.

All this soil has been cleared, mostly for pasture. Chiefly because of its steep slope, it is poorly suited to crops requiring tillage. Pasture vegetation may respond well to amendments, especially lime and phosphorus. Areas required for crops should be used in long rotations consisting chiefly of close-growing crops.

Ashe loam, severely eroded phase.—This light-colored soil differs from the normal phase chiefly in having lost most of the surface soil and, in places, part of the subsoil as a result of erosion. The quantity of material lost varies greatly, but in average areas the 3- or 5-inch surface layer is light-brown to brownish-yellow friable loam, grading to pale brownish-yellow mottled with brown gritty less firm loam. Weathered rock lies at a depth of about 20 inches. Gullies are common, but only a few are large. The soil is low in fertility and medium to strongly acid. It is permeable to roots and moisture but somewhat less so than the less eroded type and phase. The relief is steep (30 to 60 percent). Practically all the acreage is in the vicinity of Glenville Lake and northeast of Cashiers.

All this soil has been cleared and farmed, but practically all of it is now either idle or in open pasture. Its strong slope and severely eroded condition make it poorly suited either to crops or to pasture. Areas to be used for pasture require substantial applications of amendments, especially lime and phosphorus, and good management to obtain and hold a good grass cover.

Ashe loam, very steep phase.—This phase differs from the normal phase chiefly in having a steeper slope (exceeding 60 percent). The depth to rock is more variable and, in general, shallower. The 6- to 8-inch surface layer of light-brown friable loam is underlain by yellow friable gritty loam, grading at a depth of 12 to 24 inches to pale brownish-yellow mottled with brown gritty less firm loam. Weathered rock lies at a depth of 20 to 30 inches. The organic content is low and the reaction medium to strongly acid. Internal drainage is good and runoff very rapid.

Large areas of this phase are in the vicinity of Double Spring Church and School and east of Fallcliff. All of it is under forest and, chiefly because of its very steep slope, none is physically suited to crops and its value as pasture is very low.

Ashe loam, hilly phase.—This soil differs from the normal phase chiefly in having a less steep slope (15 to 30 percent). The 10-inch surface layer is light-brown to gray mellow loam, below which is brownish-yellow to pale-yellow firm but friable loam, grading at a depth of about 30 inches to pale brownish-yellow mottled with brown gritty loam. Weathered rock lies at a depth of about 36 inches. The entire soil is medium to strongly acid and low in fertility but permeable and less subject to runoff hazards than is the normal phase

of the type. Most of it is in the vicinity of Norton, Yellow Mountain School, Double Knob Mountain, and Fairfield, Lupton, and Hurricane Lakes, with smaller areas elsewhere in the county.

A large part of this phase is in forest. The small part that is cleared is suited to most crops commonly grown, but the hilly relief makes frequent growing of row crops inadvisable. Fertilizer and lime requirements are high and, where tillage is practiced regularly, careful management is required to prevent material losses by runoff.

Ashe loam, eroded hilly phase.—This soil represents areas of the type having a slope of 15 to 30 percent that have lost 25 to 75 percent of the surface soil by erosion. The quantity of soil material lost varies greatly. In average areas, the plow layer is light-brown mellow loam (a mixture of surface and subsoil materials). Below a depth of 5 or 6 inches is yellow firm but friable loam, grading to pale brownish-yellow mottled with brown gritty less firm loam below a depth of about 25 inches. Weathered rock lies at a depth of about 30 inches. Most of the gullies too deep to be obliterated by tillage are crossable by farm machinery. The entire soil is medium to strongly acid and low in fertility but permeable and less subject to runoff hazards than is the normal phase. Most of it is in the vicinity of Glenville.

All this phase is cleared; about one-third is used for general farm crops and the rest is either idle or in pasture. Corn, some truck crops, small grains, and lespedeza occupy most of the tilled acreage. Good management requires substantial applications of fertilizer and lime, relatively long rotations, and tillage practices that will minimize runoff losses.

Ashe loam, severely eroded hilly phase.—This differs from the normal phase in having a less steep slope (15 to 30 percent) and in having lost practically all of the surface soil and, in places, part of the subsoil by erosion. The quantity of material lost varies, but in average areas the 4- or 6-inch surface layer is yellow friable loam, grading at this depth to pale brownish-yellow mottled with brown gritty less firm loam. Weathered rock lies at a depth of about 20 inches. Gullies are common but mostly shallow. The entire soil is medium to strongly acid and, chiefly because of the loss of the original surface soil, is less productive than the less eroded hilly phases. This phase is widely distributed in association with the other hilly phases of Ashe loam.

All this soil has been cleared, but only a small part is used for crops. Its productivity is low and, when cultivated, losses by erosion are generally large. Permanent pasture or very long rotations under good management are feasible, if substantial applications of amendments are made.

Ashe loam, rolling phase.—This soil differs from the normal phase chiefly in having a smoother relief (7 to 15 percent) and, in general, a more uniform depth to bedrock. The 10-inch surface layer of light-brown to gray mellow loam is underlain to a depth of about 30 inches by a yellow firm but friable loam subsoil (in some areas almost sandy clay). Below this the material is mottled with brown and is less firm and more nearly loam. Weathered rock lies at a depth of 35 to 40 inches. The entire soil is medium to strongly acid and moder-

ately low in fertility but permeable and much less subject to runoff hazards and more easily worked than are the more strongly sloping Ashe soils. The larger areas are north and east of Shortoff Mountain, near the source of Little Trout Creek, north of Norton, northeast of Sheep Cliffs, and near Hurricane Lake.

About two-thirds of this phase is in forest, and most of the rest is in crops and pasture. The soil is well suited to a wide variety of crops (pl. 2, *A*), easily worked, and where properly managed, especially in regard to fertilizer and lime requirements, moderately productive. Runoff, though much less of a hazard than on the more sloping Ashe soils, requires some consideration in order to avoid undue erosion.

Ashe loam, eroded rolling phase.—From 25 to 75 percent of the surface soil of this phase has been lost by erosion. The quantity of material lost varies, but in average areas the plow, or surface layer, is light-brown loam (a mixture of surface and subsoil materials). Below this is yellow firm but friable loam or sandy clay loam, grading at a depth of 25 inches to pale brownish-yellow mottled with brown friable loam. Weathered rock lies at a depth of about 30 inches. The reaction is moderately to strongly acid and the plant-nutrient content moderate. The soil is permeable to moisture and roots, easily worked, and suited to a wide variety of the crops commonly grown. Most of it is northeast of Glenville, near Robinson Creek, Norton, Glenville, and east of Coldside Mountain.

All the soil has been cleared, and nearly half of it is used for crops requiring tillage. Where fertilized, especially with phosphorus and lime, moderately good crop yields are obtained. Fairly long rotations are suited to the soil, but some care is required to avoid soil losses by runoff.

Mapped with this phase is a small severely eroded acreage where the plow layer consists almost wholly of subsoil material.

Ashe sandy loam.—This soil differs from Ashe loam essentially in having a more sandy texture and accordingly a more open or porous nature. It occupies steep slopes of high mountains (30 to about 60 percent), most of it at an elevation of 3,500 feet or more, but only a small acreage has a gradient of more than 60 percent. The larger areas are north of Toxaway Mountain, near the source of Frolictown Creek, Fairfield and Hurricane Lakes, Nix Mountain, Grimshawes, Ocala, and Black Rock.

Following is a profile description:

0 to 8 inches, brownish-yellow mellow sandy loam.
8 to 18 inches, brownish-yellow to yellow firm but friable and crumbly sandy loam.
18 inches+, light-gray and yellow partly decomposed rock.

The soil is strongly acid and low in organic matter, and natural fertility is not high. It is permeable to roots and internal drainage is good. The subsoil in places has a sandy clay loam rather than sandy loam texture. The depth to bedrock varies greatly; in places it is as much as 40 inches below the surface, whereas in others there are a few bedrock outcrops.

Practically all of this soil is under hardwood forest. Chiefly because of its steep slope, it is not well suited to crops requiring tillage, but with careful management it is suitable for pasture. Areas that must

be cultivated should be limed and fertilized well and used in a rotation consisting chiefly of close-growing crops.

Ashe sandy loam, eroded phase.—This phase differs from the normal phase chiefly in having lost 25 to 75 percent of the surface soil by erosion. The quantity of material lost varies greatly. In average areas, the plow layer is brownish-yellow sandy loam (a mixture of surface and subsoil materials). The subsoil is brownish-yellow to yellow firm but friable sandy loam. Light-gray and yellow partly decomposed rock lies below a depth of about 18 inches. A few mostly shallow gullies are present.

This phase has a steep slope (30 to 60 percent), is strongly acid, low in organic matter, and not high in natural fertility. It is permeable to roots, and internal drainage is good. Most of it is in the mountainous areas south of Glenville, west of Cashiers, and southwest of Grimshawes.

All this soil has been cleared, and about a third of it is being cropped. Chiefly because of its steep slope, it is not well suited to crops requiring tillage, but with careful management it is suitable for pasture. Areas that must be cultivated should be well fertilized and used in a rotation consisting chiefly of close-growing crops.

Included with this soil are a few severely eroded areas. Here the plow layer consists mostly of subsoil material, and gullies are more common.

Ashe sandy loam, hilly phase.—This soil differs from the normal phase only in milder relief (15 to 30 percent) and in being less susceptible to erosion. Both external and internal drainage are medium to rapid. The larger areas are in the vicinity of Lupton Lake, Chimneytop, Cashiers, Fairfield and Hurricane Lakes, near the source of Nix Creek, and near Cove Creek, and smaller ones in the vicinity of Grimshawes, Hurricane Lakes, Cashiers, and Glenville, east of Little Terrapin Mountain, north of Shortoff Mountain, near Hunter Jim, Frolictown, and Panthertown Creeks, Camp Toxaway, and elsewhere in the same general region. About 550 included acres cleared of the hardwood forest have become slightly eroded; the rest of the soil is still in forest.

Ashe sandy loam, eroded hilly phase.—This soil differs from the normal phase chiefly because of the milder slope (15 to 30 percent) and in the loss of 25 to 75 percent of its surface soil by accelerated erosion. It is less susceptible to erosion, however, than is the eroded phase of the type. The quantity of material lost varies greatly, but in average areas the plow layer is light-gray or grayish-yellow sandy loam (a mixture of surface soil and subsoil materials). A few gullies may be present. Both internal and external drainage are good to excellent. Large areas of this soil are in the vicinity of Glenville and Cashiers, and many small areas occur in the general region of the other Ashe soils.

All areas are cleared and about equally divided between pasture and cropland. Uncontrolled runoff has resulted in considerable soil loss in places. The soil is better suited to pasture and meadow than corn or small grain and permanent sod should be the eventual use.

Mapped with this soil and indicated on the soil map by symbols are some severely eroded areas from which more than 75 percent of

the surface soil and in a few places some of the subsoil have been removed.

Ashe sandy loam, rolling phase.—This phase differs from the normal phase and the hilly phase chiefly in having milder relief (7 to 15 percent) and lower susceptibility to erosion, and in some places the soil profile is somewhat better developed. Both internal and external drainage are good to very good. Relatively large areas of this phase are north of High Hampton and near Panthertown Creek, smaller ones are in the same general region of other Ashe soils.

Mapped with this phase are a few areas with a 2- to 7-percent slope and some areas that have been cleared of forest and tilled with the resulting loss of a small part of the surface soil by erosion. These eroded areas occur on both slope classes.

Ashe sandy loam, eroded rolling phase.—This soil differs from the normal phase chiefly in relief, in the loss of 25 to 75 percent of the surface soil by accelerated erosion, and in color of the surface soil. The quantity of material removed varies greatly, but in average areas the plow layer is grayish yellow instead of light to dark gray. The 7- to 15-percent slope is milder, and the susceptibility to further erosion is less than in the eroded hilly and eroded phases of the type. A few gullies may be present. External and internal drainage are medium to rapid. This soil occurs south of Onion Falls and Glenville, east of Lupton Lake and Black Rock, west of Fairfield Lake, and in the vicinity of Cashiers and Cashiers Lake.

This is a desirable soil for the production of cabbage, snap beans, and, to a lesser degree, white potatoes. It is easily worked and can be handled with light implements and work animals. Because of the mild slope it has been used for row crops to such an extent that erosion is becoming a problem. Rotations that keep the soil in close-growing vegetation for 2 years out of 3, or a strip rotation system, will help control further serious loss of soil.

Mapped with this phase are a few small severely eroded areas from which more than 75 percent of the surface soil has been removed and a few areas having a milder slope (2 to 7 percent).

Ashe stony loam.—Except in degree of stoniness, this soil is similar to Ashe loam. Quantities of rock, varying from gravel to large boulders occur on the surface and throughout the profile, and bedrock outcrops in places. This soil occupies the same steep relief as Ashe loam, and external drainage is medium to very rapid, and internal drainage medium to very good. Areas are along the Jackson-Haywood County line south of Balsam Gap, on Bald Mountain, near Mill Creek, and in the vicinity of Thunder Struck Mountain.

Mapped with this soil are some areas practically free of stone, which are not large enough to be mapped separately. Also included are a few small areas cleared for agriculture, which are slightly, moderately, or severely eroded. The moderately and severely eroded areas are shown on the soil map by symbols.

Ashe stony loam, very steep phase.—This phase differs from Ashe loam and stony loam in having a steeper slope (more than 60 percent) and in consequent susceptibility to erosion, and from the loam in degree of stoniness. A considerable quantity of rock, varying from gravel

to huge boulders, is on the surface and throughout the profile, and in places bedrock outcrops. External drainage is very rapid and internal drainage excellent.

This soil is closely associated with Ashe loam and stony loam, Porters loam and stony loam, and Rough stony land (Porters and Ashe soil materials), and areas occur west and northeast of Tennessee Gap, in the vicinity of Lickstone Mountain, along Tilley Creek, south of Soco Creek, and on Hogback Mountain. All this land is in forest and should remain so.

Burton stony loam.—This dark-colored soil of the upper elevations in mountainous areas is high in organic content and moist most of the time. It is underlain chiefly by granite and gneiss. The relief is hilly or very strongly sloping (15 to 30 percent), and both external and internal drainage are medium to rapid, except in coves where internal drainage is slow. This soil occurs along the Jackson-Swain County line from Bunches Bald nearly to Big Witch Gap, east and south of Jones Knob, and in the vicinity of Walnut Gap, and at the corner of Jackson, Swain, and Macon Counties. The elevations of some areas are too high for the best tree growth, except balsam, while at lower elevations the vegetation consists chiefly of oak, ash, and maple trees, mountain-laurel, and rhododendron.

Following is a description of a profile in a forested and grassed area:

0 to 20 inches, very dark-gray or almost black friable stony loam, containing a large quantity of decayed vegetable matter.
20 to 30 inches, yellowish-brown to grayish-brown very friable loam or clay loam, stained dark by organic matter in the upper part.
30 inches+, brownish-yellow to grayish-yellow loam or friable clay loam mixed with slightly weathered angular granitic rock fragments.

Angular rock fragments, up to 10 inches in diameter, are strewn over the surface and mixed with the soil mass. Bedrock outcrops here and there. Boulders also are on the surface. Variations in the profile are in the thickness from place to place of the first two layers, ranging from 10 to 20 inches in the first and from 4 to 20 inches in the second.

All this soil is under a virgin forest, shrub, or grass cover. It is relatively inaccessible for agricultural use and is not very suitable for cultivation, chiefly because of its stoniness, shallow depth to bedrock, and steep slope. Much of it is not suited to tillage but is capable of affording good pasture under proper management.

Chandler loam.—Depth to mica schist, from which this steep soil of the mountainous areas is formed, varies considerably but generally is comparatively shallow. Owing to its predominantly steep slope (30 to 60 percent) and shallow character, it is very susceptible to erosion when cleared of forest. External drainage is medium to very rapid and internal drainage medium to rapid. This soil is associated with the Porters, Talladega, and other soils on the mountain uplands, some areas occurring in the vicinity of Ocala and Heddie Mountain.

Following is a profile description in a virgin area:

0 to 5 inches, gray or grayish-brown mellow friable loam. (When cultivated this layer is grayish-yellow.)
5 to 15 inches, yellow to brownish-yellow friable loam or clay loam, containing numerous finely divided mica flakes that give the material a greasy feel. A few small roots are present.
15 inches+, grayish-yellow friable slick decomposed mica schist.

Throughout the profile the layers vary considerably in thickness. A few small mica schist fragments are generally on and in the soil.

Practically all of this soil is in forest consisting almost entirely of hardwoods. The included moderately eroded and severely eroded areas represent land cleared for agricultural use but now lying idle or reverting to forest.

Mapped with this soil are areas of Chandler stony loam, very steep phase, which are indicated on the soil map by symbols. This stony soil is characterized by a much steeper slope than that of the loam and by numerous rock fragments on the surface and in the soil. A few small areas of moderately eroded and severely eroded Chandler loam are also included.

Chandler loam, hilly phase.—This hilly phase has formed from mica schist and differs from the normal phase only in having a milder slope (15 to 30 percent) and consequent less susceptibility to erosion. External drainage is good to rapid and internal drainage good. This phase occurs in relatively small bodies in the vicinity of Ocala. About half of it has been cleared for agricultural use with resultant slight to moderate erosion. These areas are very susceptible to further erosion.

Clifton loam, steep phase.—This phase occupies hilly and steep (30 to 60 percent) intermountain positions. It has developed from dark igneous and metamorphic rocks that are somewhat basic. Internal drainage is medium, but external drainage is rapid to excessive. Areas of this soil are in comparatively large as well as small bodies, the larger ones near East Laport and Cullowhee.

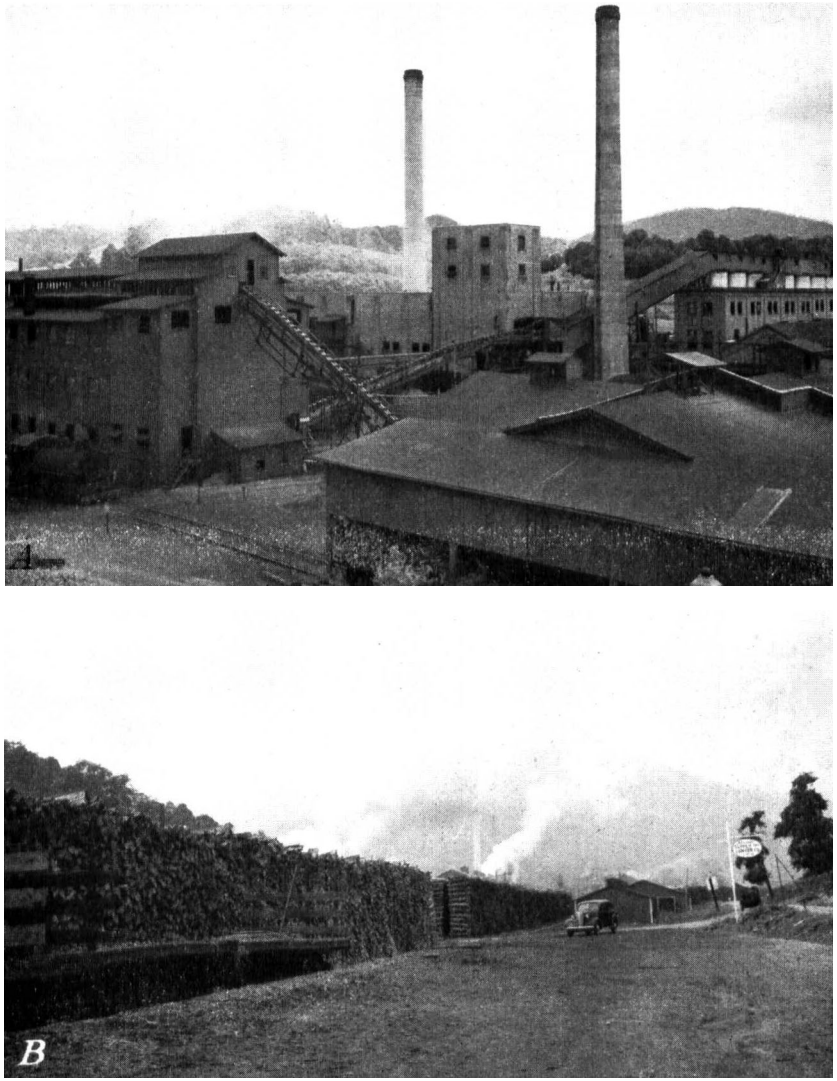
Mapped with this soil are a few areas, cleared for agricultural use, that have become slightly eroded.

Clifton clay loam, eroded phase.—This soil differs from Clifton loam (not mapped in this county) in texture and color of the surface soil and in the loss of 25 to 75 percent of the loam surface soil by accelerated erosion. The quantity of material lost varies greatly, but in average areas the plow layer is brown or reddish-brown clay loam (a mixture of surface soil and subsoil materials). The soil in places may show moderate gullying. Internal drainage is medium and external drainage good to rapid. Areas of this soil are relatively small and are in the vicinity of Ochre Hill Church, Speedwell, Cullowhee, East Laport, and Poplar Cove Knob.

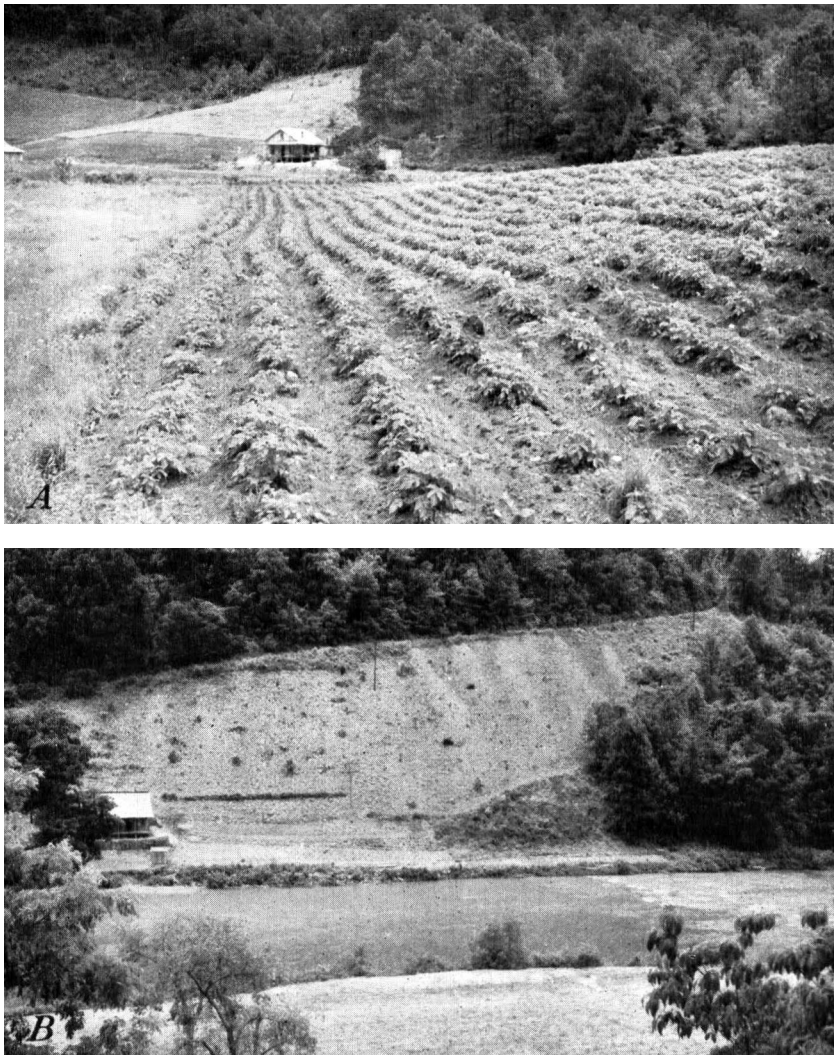
Most of this eroded phase has been cleared and cultivated, although only half of it is now in crops, about one-fifth in pasture, and the rest is idle because of losses from erosion. These idle lands should be planted to hay crops or pasture. Suitable rotations are needed to aid in controlling runoff on tilled land.

Mapped with this phase are a few small uneroded areas, which represent the loam type. These, however, have not yet been put into agricultural use. Other included areas are either slightly or severely eroded.

Clifton clay loam, eroded steep phase.—Owing to the steeper slope (30 to 60 percent), susceptibility to erosion is greater than in the eroded phase. This soil differs from Clifton loam (not mapped in this county) in relief, in the loss of 25 to 75 percent of the surface soil that has been removed by accelerated erosion, and in color and



A, Paperboard plant at Sylva that uses a large quantity of forest products. Many farmers derive income from the sale of forest products processed here. *B*, Wood from dead chestnut trees is used by the paperboard plant at Sylva for the preparation of acid extract. Practically all the chestnut trees in the county have been killed by blight, but the dead trees thus become an important source of income to many farmers.



A, Potatoes mainly on Ashe loam, rolling phase, about a half a mile northwest of Glenville. To the left timothy is growing on Tusquitee loam. The cleared slopes of Ashe loam, hilly phase, in the background are in pasture. This soil is poor to fair cropland and fair to good pasture land. *B*, Congaree loamy fine sand in the lowland along the Tuckasegee River two-thirds of a mile northwest of Dillsboro. This soil is used to some extent for corn but is less productive than the silt loam. Slightly eroded Porters loam is on the cleared slope beyond the river; the wooded land in the background is on Rough stony land (Porters and Ashe soil materials) and is very poorly suited to crop and pasture.

texture of the surface soil. The quantity of material lost varies greatly, but in average areas the plow layer is reddish-brown clay loam. In places this phase is moderately gullied. Internal drainage is medium and external drainage very rapid. Areas of this soil are northeast of Greens Creek post office, west of Poplar Cove Knob, and in the vicinity of East Laport, Ochre Hill Church, and Cullowhee.

Nearly half this phase is in cropland and about a third in pasture. It is too steep for successful control of runoff if kept in cultivated crops. Most of it should be in permanent sod.

Clifton clay loam, severely eroded steep phase.—This soil differs from Clifton loam (not mapped in this county) in color and texture of the surface soil, in having a steeper relief (30 to 60 percent), and in having lost 75 percent or more of the surface soil and, in places, part of the subsoil by accelerated erosion. Owing to this loss the plow layer in average areas is reddish-brown clay loam (a mixture of surface soil and subsoil materials). In places there are many gullies that are too deep to be obliterated by ordinary tillage operations but may be crossed with common farm machinery. External drainage is rapid to very rapid and internal drainage medium. Areas of this phase occur west of Locust Field Church, in the vicinity of Green Creek School and East Laport, and near Speedwell. Due to the steep slope and severity of erosion it is very difficult to maintain satisfactory sod on this soil. The best use is woodland.

Congaree fine sandy loam.—Young soil of the first bottoms formed from alluvial material derived from uplands underlain mainly by gneiss, granite, and schist. It is level or nearly level and is subject to overflow. External drainage is slow and internal drainage medium to good. Areas occur along the Tuckasegee, Horsepasture, and Chattooga Rivers and along many of the creeks in association with other Congaree soils, the Toxaway soils, and those of the low terraces.

Following is a profile description in cultivated areas:

0 to 12 inches, brown friable loose fine sandy loam, apparently containing a small quantity of decomposed organic matter.
12 to 35 inches, light-brown or yellowish-brown friable crumbly fine sandy clay, slightly sticky when wet.
35 inches +, mottled gray, brown, and yellow friable loamy fine sand or fine sand.

Considerable variation from the above profile exists in texture and thickness of the layers. The surface soil varies from 8 to 12 inches in thickness and the second layer from 20 to 28 inches. In some places the first layer consists of very fine sandy loam and in others sandy loam, and in other places the second layer is loamy fine sand or loamy sand. Generally finely divided mica flakes are distributed throughout the profile.

This is one of the most desirable soils in the county for corn, truck, and grass. About two-thirds is in cultivation and 15 percent in pasture. Because of the ease of cultivation and control of water on the land, most of it should be used for tilled crops. It is subject, however,to overflow.

Congaree loamy fine sand.—Texture and drainage of this first-bottom soil differ from Congaree fine sandy loam and silt loam. The surface soil is rather open loamy fine sand, and the subsoil may

vary from fine sand to loamy fine sand. External drainage is moderately slow, but internal drainage is very rapid. This soil occurs along the Tuckasegee (pl. 2, *B*) and Oconaluftee Rivers, generally very near the stream channels, and is subject to overflow.

Nearly all this soil has been cleared and used at times for crops (pl. 3, *A*), but a considerable part has reverted to trees or is lying idle. It is not a productive soil and is somewhat droughty and subject to leaching. Organic matter should be supplied by turning under cover crops or by adding liberal quantities of manure.

Congaree silt loam.—Chiefly in texture this young soil of the first bottoms differs from Congaree fine sandy loam. The surface texture is variable but generally much smoother than in the sandy type, and the subsoil is usually heavier. External drainage is slow and internal drainage medium. Areas of this soil occur along the rivers and larger creeks of the county and are subject to overflow. Almost all of this soil is cleared and under cultivation or in pasture. The small acreage in idle land is subject to more frequent overflow than other areas of the type and should be in pasture or hay. This is probably the second best soil in the county for corn (pl. 3, *B*), potatoes, and truck crops. It is easily handled and responds readily to management

Congaree-Toxaway complex.—In association with the Congaree soils and Toxaway silt loam, this complex occupies level or nearly level positions on first bottoms. It consists of areas of Congaree and Toxaway soils, so intricately mixed that they cannot be shown separately on the soil map. The predominant soil is Congaree, which is light-brown silt loam, loam, fine sandy loam, fine sand, or medium sand. The surface layer of the Toxaway soil is gray, dark-gray, or nearly black silt loam or loam, and the subsoil is somewhat lighter colored and heavier. In some places, gravel or coarse sand occurs on the surface of the soils in this complex. The texture of the surface layer may be changed by the addition of new material each time the streams overflow. External drainage is very slow to slow and internal drainage medium to very slow. Areas of the complex occur near the Tuckasegee and Horsepasture Rivers and along many of the creeks and branches. A large part of the soil is used for field crops, principally corn and hay (pl. 4, *A*).

Mapped with this complex are two areas in which the surface layer consists of brown soil (Congaree material) and the subsoil of gray or dark-gray heavy-textured soil (Toxaway material).

Halewood loam.—This intermountain upland soil, formed from granite, gneiss, and schist, has a light-colored friable surface layer and a yellowish-brown moderately heavy-textured subsoil and is comparatively deep to bedrock. The relief is hilly (15 to 30 percent slope), and external and internal drainage are good. The soil occurs in relatively small areas in many places on the valley uplands, associated with Porters, Hayesville, Clifton, Rabun, and other soils. About two-fifths of the total area has been slightly eroded.

Following is a profile description:

0 to 5 inches, light-brown friable loam, apparently containing a very small quantity of decomposed organic matter.

5 to 10 inches, pale-yellow mellow loam, containing a few small roots.
10 to 30 inches, yellowish-brown moderately friable clay, breaking into irregularly shaped lumps. A few finely divided mica flakes are noticeable.
30 to 45 inches, somewhat yellow to reddish-brown friable clay.
45 inches+, yellowish-brown to reddish-brown friable clay or clay loam mixed with light-colored soft decomposed gneiss.

More than half this soil is in woodland and less than a third in crops. It is easily worked, responds readily to management, and more of it should be tilled. Systematic rotations, however, should be used 2 out of 3 years in close-growing vegetation.

Halewood loam, eroded phase.—Having lost 25 to 75 percent of its surface soil by accelerated erosion, this phase has a lighter colored surface soil than the normal phase of the type and its agricultural value is lower. The quantity of material lost varies greatly, but in average areas the plow layer is slightly heavier textured (a mixture of surface soil and subsoil materials). External drainage is medium to rapid and internal drainage good. In some places the soil may be moderately gullied. This soil occurs in the vicinity of Sylva and elsewhere on the valley uplands. Nearly half this soil is in pasture, the rest in crops or lying idle because of accelerated erosion—especially gullying. Since the soil is very susceptible to further loss by uncontrolled runoff its best use is sod-forming vegetation. Some of the gullied areas should be planted to white pine or locust or to kudzu.

Halewood loam, severely eroded phase.—This phase differs from the normal phase of the type in degree of and susceptibility to erosion, which has removed 75 percent or more of the surface soil and, in many places, part of the subsoil, resulting in a lighter color and somewhat heavier texture. External drainage ranges from good to very rapid, internal drainage is medium. The soil is often badly gullied, and its agricultural value has been definitely lowered by erosion. Areas are in the vicinity of Sylva and elsewhere on the valley uplands. All areas have been cleared and cultivated. At present about half are in pasture, a third are idle, and the rest are in crops. Control of further soil loss because of rapid runoff will be difficult unless sod-forming crops are used.

Hayesville loam.—This soil has developed over light-colored granite, gneiss, and schist, and it has a light-colored surface layer and a red subsoil. The relief is hilly (15 to 30 percent), and external drainage is medium to rapid and internal drainage medium. A comparatively large area of this soil lies north of Qualla Church; relatively small areas occur in many places on the valley uplands.

A profile description of this soil follows:

0 to 7 inches, gray to brownish-yellow friable loam or fine sandy loam.
7 to 30 inches, red moderately compact clay, brittle when dry and sticky and slightly plastic when wet.
30 to 40 inches, mottled red and yellow friable granular sandy clay or clay loam, reddish yellow when crushed to a fine mass.
40 inches+, light yellowish-red friable loam or sandy loam intermixed with soft decomposed granite.

In the few older cultivated fields where some erosion has taken place, the plowed layer is brownish red or reddish brown, owing to the mixture of surface soil and subsoil materials by plowing. Practically all this soil is in forest, consisting principally of hardwoods.

Mapped with this soil are a few areas of Hayesville loam, slightly eroded phase, most of which is cleared.

Hayesville loam, rolling phase.—Occurring in the intermountain uplands this phase differs from the normal phase of the type mainly in having milder relief (7 to 15 percent) and in having slightly thicker layers in many places. External drainage is good and internal drainage medium. This rolling phase is mostly wooded, only about a fourth being cleared and cultivated or in pasture. It is a good soil for general farm crops, particularly small grain, clover, and alfalfa. Because of the favorable relief, more of it should be cleared and cultivated.

Mapped with this phase are a few slightly eroded and moderately eroded areas and a few areas having a 2- to 7-percent slope.

Hayesville loam, steep phase.—This phase differs from the normal phase mainly in having stronger relief (30 to 60 percent) and, in many places, thinner profile layers. External drainage is rapid to very rapid and internal drainage medium to good. Most of the comparatively large areas of this soil are in the vicinity of Sylva, northwest of Beta, and northeast of Webster; many relatively small areas are on the valley uplands, associated with other Hayesville soils and those of other series.

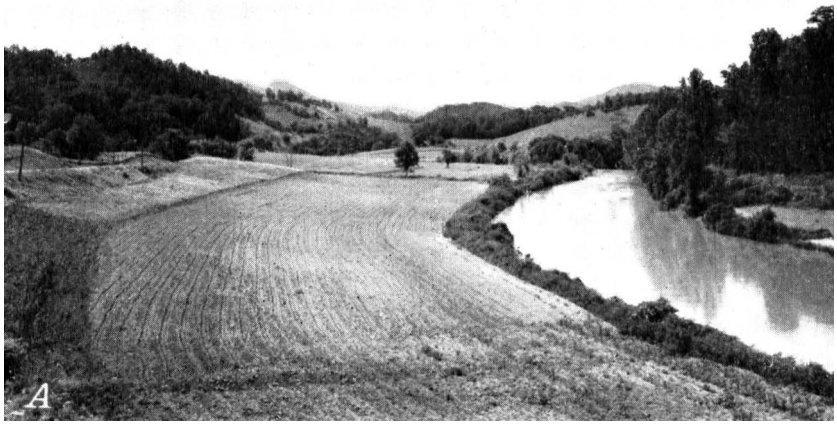
The difference in slope affects the use of the soil and about two-thirds of this phase is in woodland, which has never been entirely cut-over. The rest is in crops or pasture. Because of the steep slopes and susceptibility to erosion most of the woodland should not be cleared. Open areas will furnish satisfactory pasture for livestock, and erosion can be controlled, if sufficient amendments are used and grazing is not too heavy.

Mapped with this phase are some slightly eroded areas from which about 25 percent of the surface soil has been removed.

Hayesville clay loam, eroded phase.—The degree of and susceptibility to erosion and texture and color of the surface soil differentiate this phase from Hayesville loam. About 25 to 75 percent of the loam surface soil has been removed by erosion. The quantity of material lost varies greatly, but in average areas the plow layer is reddish-brown clay loam (a mixture of surface and subsoil materials). Some areas are moderately gullied. External drainage is very good to excessive and internal drainage fair. A relatively large area of this soil is west of Webster and another near Sylva; comparatively small areas are elsewhere on the valley uplands, associated with other Hayesville soils and those of other series.

Since nearly two-thirds of this phase is in cropland, runoff and the resultant erosion are severe. This is, however, a strong soil and one suited to general farming, but for better protection rotations with 3 out of 4 years in sod crops should be used. Also rotation strips of sod crops as hay and row crops may be established. These will give fairly adequate control of runoff water.

Hayesville clay loam, severely eroded phase.—This phase differs from Hayesville loam and Hayesville clay loam, eroded phase, in the more reddish color and heavier texture of the surface material, and in the degree of and susceptibility to erosion, resulting in the loss of 75 percent or more of the surface soil and, in places, some of



A, Field of Congaree loamy fine sand along the Tuckasegee River, about 1 mile north of Cullowhee, planted to corn. The strongly sloping plowed strip on the left is Hayesville clay loam, eroded phase. In the background a terrace of Hiwassee clay loam, eroded hill phase, is in alfalfa and barley. *B*, The low nearly level land is Congaree silt loam along Scott Creek, about a fourth of a mile northeast of Dillsboro. This soil is used extensively for corn and is best suited to that crop. A field of potatoes is in the right foreground. The wooded hills in the background are on Ramsey loam, severely eroded phase.

A, Wheat in the left middle ground and rye in the right middle ground on Congaree-Toxaway complex near Beta. Stalks from the corn crop of the previous year cover the land in the right foreground. Unimproved pasture on Hayesville clay loam, severely eroded phase, in the right background. *B*, Rills in a field of young corn on a 45-percent slope of Hayesville clay loam, severely eroded steep phase. A single hard rain caused this damage. Runoff is difficult to control, and the soil is poorly suited to intertilled crops.

the upper subsoil. The quantity of material lost varies, but in average areas the plow layer is reddish-brown clay loam or clay. In places the soil shows severe gullying. External drainage is very rapid and internal drainage slow. This phase occurs in association with other Hayesville soils and soils of other series on the valley uplands.

All areas of this phase have been cleared and cultivated at some time, but more than half are now in poor to fairly good pasture. Because of the relatively steep slope and severely eroded condition of these lands they should be in permanent sod—either pasture or hay. In some instances it will be necessary to plant the more gullied areas to locust or pine trees or kudzu for adequate control of runoff.

Hayesville clay loam, eroded rolling phase.—This phase differs from Hayesville loam in texture and color of the surface soil, in having rolling relief, and in having lost 25 to 75 percent of the friable loam surface soil by accelerated erosion. The quantity of material lost varies greatly, but in average areas the plow layer is reddish-brown clay loam (a mixture of surface soil and subsoil materials). Some areas show moderate gully damage. The slope is 7 to 15 percent and external drainage is excellent and internal drainage good. Relatively small areas of this soil occur in many places on the valley uplands, associated with other Hayesville soils and those of similar series.

All this soil has been cleared, about three-fifths being in crops, the rest in pasture. Tillage is difficult at times in some places because the soil tends to "ball up" when plowed too moist or will not turn freely from the moldboard when dry. The high proportion of the cleared land in almost continuous row crops has been responsible for considerable erosion, and the soil is rather susceptible to further loss. This is, however, a strong soil, and systematic crop rotations with only 1 out of 3 years in a row crop will aid greatly in checking runoff.

Hayesville clay loam, eroded steep phase.—This phase differs from Hayesville loam in color and texture of surface soil and steepness of slope (30 to 60 percent) and it has lost 25 to 75 percent of its surface soil by erosion. The quantity of material lost varies greatly, but in average areas the plow layer is reddish-brown clay loam (a mixture of surface soil and subsoil materials). A few gullies may be present in places. External drainage is excessive and internal drainage medium. A comparatively large area of this soil is north of East Laport, and smaller ones are in many other places on the valley uplands associated with other Hayesville soils and those of other series.

This phase is all in open land, about equally divided between row crops and pasture. Since the slope is steep and the surface soil material is largely heavy clay loam, control of runoff is a very difficult problem. The best use is permanent cover, preferably pasture.

Hayesville clay loam, severely eroded steep phase.—An intermountain upland soil that differs from Hayesville loam in color and texture of the surface soil, in having a steeper slope (30 to 60 percent), and having lost 75 percent or more of the surface soil and, in places, part of the upper subsoil by accelerated erosion. The quantity of material lost varies, but in average areas the plow layer is reddish-

brown heavy clay loam to clay. This severely eroded steep phase differs from the severely eroded phase of the type only in relief; and from Hayesville loam, steep phase, only in color and texture of the surface soil and in degree of and susceptibility to erosion. Locally it may be severely gullied (pl. 4, *B*). External drainage is excessive and internal drainage medium. Areas of this phase occur in many places on the valley uplands associated with other soils of the Hayesville and similar series.

All this land has been cleared and cropped, but practically none is now tilled. The gullied areas should be planted to locust or pine trees or to kudzu. Lespedeza should be used for temporary cover. Most areas are not easily accessible, and the necessary lime and fertilizer cannot be supplied (pl. 5, *A*). In such cases retirement to trees is preferable unless grazing is carefully controlled.

Hiwassee clay loam.—Occurring in association with the Altavista and State soils of the stream terraces and the Congaree soils of the first bottoms, this well-drained dark-colored soil is derived from old alluvium washed largely from soils underlain by granite, gneiss, and schist. The surface is gently sloping (2 to 7 percent). In a few cleared areas probably up to 25 percent of the original surface soil has been removed by accelerated erosion. Relatively small areas are northwest of Worley Chapel, west of Webster, southwest and southeast of Cullowhee, and elsewhere.

A description of a profile in a cultivated area follows:

0 to 6 inches, dark-brown or reddish-brown friable clay loam, sticky when wet. A moderate quantity of decomposed organic matter is well combined with the mineral material.

6 to 72 inches, brownish-red or red heavy stiff clay, sticky when wet and moderately friable when dry. On drying, rather wide cracks form and extend in many directions

In many places water-worn rocks occur on the surface and throughout the profile; in others the clay subsoil is underlain at a variable depth by mottled yellow and red friable sandy clay that overlies gravel mixed with sand. The surface layer generally ranges from 4 to 6 inches in thickness and the subsoil from 54 to 68 inches or more.

Practically all the soil has been cleared for agricultural use, and corn, wheat, and hay are the chief crops. When proper management is practiced, the soil is about as productive as any in the county.

Mapped with this soil are two areas in which the surface layer is predominantly medium brown and the subsoil brownish red.

Hiwassee clay loam, eroded sloping phase.—This soil occurs on high stream terraces but differs from the normal phase of the type in its steeper relief (7 to 15 percent (pl. 5, *B*)), loss of 25 to 75 percent of the surface soil by accelerated erosion, and in color of the surface soil. The quantity of material removed varies greatly, but in average areas the plow layer (a mixture of surface soil and subsoil materials) is darker red and heavier textured. External drainage is good to excessive and internal drainage medium. Areas of this phase occur north of Love Church at Webster.

All this phase is in open land—mostly tilled crops. It is an excellent soil for wheat, alfalfa, clover, and corn. Because of the heavy clay material tillage operations may be carried on under a rather

narrow range of moisture conditions in most places. Control of runoff is necessary and contour tillage, strip cropping, as well as the use of more close-growing vegetation, should be practiced.

Mapped with this phase are a few small severely eroded areas.

Hiwassee clay loam, eroded hill phase.—This phase differs from the normal phase of the type in having a steeper slope (15 to 30 percent) and in having lost 25 to 75 percent of the surface soil by accelerated erosion. The quantity of material lost varies greatly, but in average areas the plow layer (a mixture of surface soil and subsoil materials) is heavier textured and brighter red. It differs from the eroded sloping phase only in relief. Locally the soil may be moderately gullied. External drainage is rapid and internal drainage good. This phase occurs in the vicinity of Cullowhee and Webster. Most of this phase is in cropland (pl. 5, *C*). Many areas are often planted continuously to corn, and runoff is a very serious problem. A large part should be under sod crops—preferably hay—or long rotations with a row crop not oftener than 1 year out of 4. It is a strong soil and will respond favorably to management.

Hiwassee clay loam, severely eroded hill phase.—More than 75 percent of the surface soil and, in places, part of the subsoil (pl. 6, *A*) of this phase have been lost by accelerated erosion, thus giving the soil a heavier texture and bright red color. It differs from the normal phase in having a steeper slope (15 to 30 percent). It also differs from the eroded hill phase only in degree of and susceptibility to erosion. In places it may be severely gullied, and the gullies are too deep to be obliterated by ordinary tillage operations but may be crossed with the usual farm machinery. External drainage is very rapid and internal drainage medium to good. Areas of this phase occur along Tuckasegee River.

Less than one-half of this phase is in crops, although all of it has been cleared. About one-fourth is in pasture. More than one-fifth is idle, due almost entirely to the severity of erosion, especially gullying. Tillage operations are rather difficult in many places because of the heavy character of the soil and the somewhat frequent gullies. Most of this phase should be used for pasture or hay crops to prevent further loss by uncontrolled runoff.

Porters loam.—This is the most extensive soil in the county, covering a total area of 61,376 acres. The relief is steep (30 to 60 percent), and both external and internal drainage are rapid. Practically all the soil is in forest, consisting principally of mixed hardwoods. Extensive areas are at the sources of the Tuckasegee River and Caney Fork Creek, and a large part is on the mountains that form most of the county boundary.

A profile description follows:

0 to 10 inches, brown mellow friable loam. A small quantity of decomposed organic matter is mixed with the mineral material.

10 to 30 inches, brown, pale reddish-brown, or yellowish-brown permeable loam or friable clay loam.

30 inches+, mixed gray, yellow, and light brownish-yellow soft friable partly decomposed gneiss or granite. Some soft and hard angular rock fragments are intermixed with the material.

Throughout the soil there is no uniformity in the thickness of the profile layers. The surface layer is 7 to 12 inches thick and the subsoil 6 to 26. In a few places very little texture differentiation exists between the surface and the subsoil, and the predominant texture is loam. Color differences among the various layers, however, are fairly easily distinguishable in most places. The soil is medium acid, easily pervious to moisture, air, and roots, and its water-holding capacity is good. Some angular rock fragments, up to 10 inches in diameter, are on the surface and in the soil but are too few to interfere materially with cultivation.

Mapped with this soil is a total of about 4,000 acres of slightly eroded Porters loam from which up to 25 percent of the original surface layer has been removed by accelerated erosion. Part of this cleared land is used for pasture and the rest for corn, some wheat, rye, and potatoes.

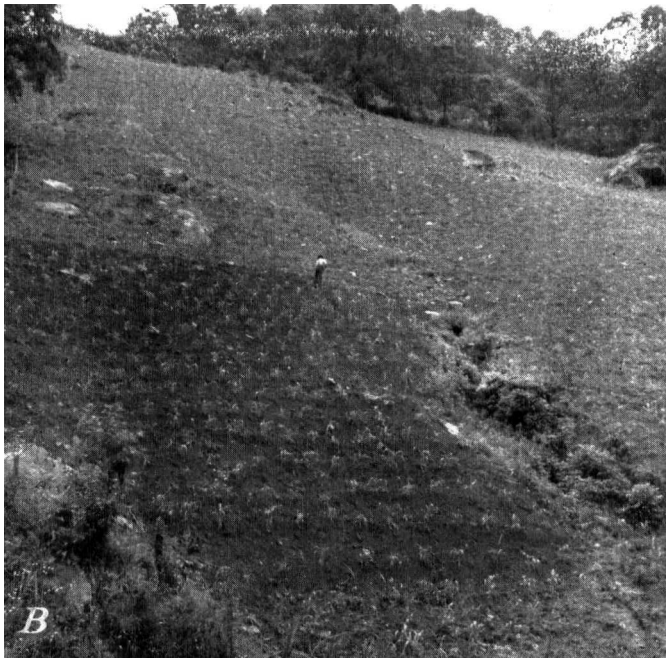
Porters loam, eroded phase.—This soil differs from the normal phase in having lost about 25 to 75 percent of the surface soil by accelerated erosion. The quantity of material lost varies greatly, but in average places the plow layer (a mixture of surface soil and subsoil materials) has a slightly heavier texture. In a few places this phase may be moderately gullied. External drainage is rapid and internal drainage good. The soil occurs in scattered areas over the mountainous part of the county. All this phase is in open land, slightly over half being pastured. Continuous row cropping is probably responsible for the loss of much surface soil material. Although the relief is steep the soil character is such that erosion is a much less serious problem than on most other soils of similar slope. Grasses seem particularly adapted to this soil, and pasture should be the eventual use of most areas.

Porters loam, severely eroded phase.—This phase differs from the normal type and its eroded phase only in the degree of and susceptibility to erosion. It has lost 75 percent or more of the surface soil and in places, part of the upper subsoil. This loss has resulted in a somewhat lighter colored plow layer (a mixture of surface soil and subsoil materials) In a few places it may show numerous gullies that are too deep to be obliterated by ordinary tillage operations but may be crossed with average farm machinery. External drainage is very rapid and internal drainage good. Areas of this phase occur throughout the mountainous parts of the county.

While all areas of this soil have at times been under cultivation practically none is now used for crops. About three-fourths is in pasture, the rest idle. The less steep areas, where accessible to transportation, should be treated to obtain adequate sod cover. The gullied areas and those beyond practical access should be planted to white pine or locust trees.

Porters loam, very steep phase.—In association with the other Porters soils in the mountainous part of the county, this phase differs from the normal phase in having a much steeper relief (60 percent or more) and a greater susceptibility to erosion. External drainage is very rapid and internal drainage good. Practically all this soil is in woodland, which, however, has been cut-over at times. Because of the steepness and rapidity of runoff it should remain in trees.

A, Pasture in the foreground, on Hayesville clay loam, severely eroded steep phase, about 1 mile south of Dillsboro, is grown according to common management practices, which generally do not include either liming or fertilizing. The evenly surfaced field at the foot of the slopes in the right foreground is occupied by Tusquitee loam, the soil material of which originated on distant slopes and was laid down on the foot slopes by colluvial action. *B*, Timothy in foreground, on Hiwassee clay loam, eroded sloping phase, about 2 miles southeast of Sylva. The pasture in the smooth middle ground is on Congaree-Toxaway complex, which is good to very good pasture land. The forest to the left is on Ramsey loam, a steep soil and very poorly to poorly suited to crops. *C*, Harvesting barley on Hiwassee clay loam, eroded hill phase, about 1 mile north of Cullowhee. Cradling small grain and tying it in bundles by hand are methods commonly used in harvesting small grain crops.



A, Profile of Hiwassee clay loam, severely eroded hill phase, about 2½ miles south of Sylva. Water-worn rocks of various sizes are characteristic of the lower part. *B*, Cultivating corn on Porters loam, eroded very steep phase, three-fourths of a mile northeast of Addie. Hoes are commonly used for cultivating on such very steep land. The soil has been moderately eroded, and, where cleared and cultivated, gullies are common.

Porters loam, eroded very steep phase.—This phase differs from the normal phase in having steeper relief (60 percent or more) and in having lost 25 to 75 percent of the surface soil by accelerated erosion. The quantity of material lost varies greatly, but in average areas the plow layer (a mixture of surface soil and subsoil materials) has a slightly heavier texture and a somewhat lighter color. In places this soil may be moderately gullied. External drainage is very rapid and internal drainage good. The soil occurs in the mountainous parts of the county (pl. 6, *B*). Nearly all is in pasture, and in many places the sod is of poor quality. Adequate treatment and control of grazing will aid in maintaining a sod sufficient for grazing and control of further soil loss.

Porters stony loam.—This soil differs from Porters loam in the degree of stoniness. A large quantity of stones and boulders is on the surface and throughout the profile, and there may be occasional small bedrock outcrops. External and internal drainage are medium to very rapid. Areas occur in association with other Porters soils. Because of the steep slope and large quantity of stone, this soil should be kept in trees.

Mapped with this soil are a few small areas cleared for agricultural use from which up to 75 percent or more of the surface soil has been removed, resulting in a lighter color and slightly heavier texture.

Porters stony loam, very steep phase.—Associated with the normal phase on the mountain upland, this phase differs from that soil in the steeper relief (more than 60 percent) and from Porters loam in relief and degree of stoniness. External and internal drainage are good to very rapid. Because of the excessive slope and high content of stone all areas of this phase should be in trees.

Mapped with this soil are a few cleared areas from which up to 75 percent or more of the original surface material has been lost, resulting in a lighter color and slightly heavier texture.

Rabun clay loam, steep phase.—Having a more steep relief than the normal phase, this phase has greater susceptibility to erosion. The slope ranges from 30 to 60 percent, and external drainage is rapid to very rapid and internal drainage medium. Comparatively large areas of this soil are east and northeast of Cowee Gap. Smaller ones are south of Greens Creek post office; west, northwest, and south of Cullowhee; southeast and west of Webster; west and southwest of Wayehutta School; near Cowee Gap and Greens Creek School; and in the vicinity of New Savannah Church.

About two-thirds of this soil is in forest, much of which has been cut-over. The rest is about equally divided among cultivated, idle, and pasture lands. These open areas are susceptible to erosion because of the steep slope and rather compact character of the soil. Sod cover is the best protection for these lands, and none of the woodland should be cleared for cropping.

Mapped with this soil are small cleared areas that have lost up to 25 percent of the surface soil.

Rabun clay loam, eroded steep phase.—This phase differs from the normal phase in having steeper relief and in having lost about 25 to 75 percent of the surface soil by erosion. The quantity of material

663933—48——3

lost varies greatly, but in average areas the plow layer (a mixture of surface soil and subsoil materials) shows more red color and is somewhat heavier textured. It has steeper relief than the eroded phase, is more susceptible to erosion than the steep phase, and in places may be moderately gullied. External drainage is rapid and internal drainage medium. This soil occurs in comparatively small areas northeast of Cowee Gap, north of Poplar Cove Knob, west of East Laport, north and south of Webster, north of Jenney Knob, and southwest of Wayehutta School.

Nearly half of this phase is in crops or idle land, the rest is in pasture. Although severely eroded in many places and occupying rather steep relief, a few areas may be retained in pasture where accessible for treatment. The best use for most of it is woodland.

Rabun clay loam, severely eroded steep phase.—The loss of 75 percent or more of the surface soil and, in places, part of the upper subsoil of this intermountain upland phase has occurred by accelerated erosion. The quantity of material lost varies, but in average areas the plow layer is red or reddish-brown heavy clay loam to clay (a mixture of surface soil and subsoil materials). This phase differs from the eroded steep and steep phases in the degree of and susceptibility to erosion and from the eroded phase in relief and susceptibility to erosion. Where gullies occur they are crossable by ordinary farm machinery but are not obliterated by tillage. External drainage is rapid to very rapid and internal drainage medium. Comparatively large areas occur in the vicinity of East Laport and southeast of Cullowhee, and many smaller ones in the same general region of the other Rabun soils.

Because of the steep slope and severity of erosion it is very difficult to establish and maintain adequate protective sod on this soil. Further cultivation without even greater soil loss is not possible. The best use is woodland, preferably locust.

Rabun clay loam, eroded phase.—This soil was formed over dark basic igneous and metamorphic rocks. It has lost 25 to 75 percent of the surface soil by erosion. This loss has resulted in a lighter color and a heavier texture of the plow layer (a mixture of the surface soil and subsoil materials). In places this phase may be moderately gullied. The topography is hilly, and external drainage is medium to rapid and internal drainage medium. Areas of the soil are south of Webster, north and southeast of Cullowhee, west of Little Savannah Church, Soapstone Gap, and Ochre Hill Church, southeast of Greens Creek post office, southwest of Thunder Struck Mountain, southeast and west of East Laport, and in the vicinity of Speedwell.

Most of this soil is in pasture. Because of the tendency toward heavy runoff and further erosion most of the rest should be in hay crops. Lands to be tilled are better handled under long rotations.

Mapped with this phase are a very few only slightly eroded areas and some that are severely eroded. The areas with little or no erosion represent a clay loam type. Also included are a few areas having a slope of 7 to 15 percent.

Ramsey loam.—Predominantly a steep, shallow, light-colored soil that has formed over highly siliceous rock in the mountainous areas. It occurs on mountainsides and foothills, has a low water-holding

capacity, and when cleared is very susceptible to accelerated erosion unless protected. The slope ranges from 30 to 60 percent, and external drainage is rapid to very rapid and internal drainage medium to rapid. Comparatively large areas are in the vicinity of Sylva, Tuckasegee, Rock Spring Church, Cedar Cliff Mountain, and near Gladie Creek, and many small areas occur in association with other Ramsey soils and with Halewood and Porters soils.

Following is a profile description:

0 to 6 inches, grayish-yellow friable loam. A very small quantity of decomposed vegetable matter apparently is mixed with the mineral material.
6 to 12 inches, brownish-yellow friable loam or light fine sandy clay having a weak granular structure and a slightly compact consistence. It is slightly plastic when wet but may be crushed easily to a friable granular mass when dry.
12 inches+, mingled yellow, very light-gray, and brown soft friable decomposed crystalline rock.

Considerable variation exists in the thickness of the profile layers, the surface soil ranging from 4 to 7 inches thick, the subsoil from 4 to 12 inches, and the substratum from a few inches to a few feet. A small number of angular rock fragments, up to about 6 inches in diameter, are on the surface and in the soil in some places. The profile is acid throughout. Most of this soil is in forest. Chiefly because of its steep slope, shallow depth to bedrock, and low fertility, it is not suited to crops, but under proper management the small cleared acreage affords some pasture.

Ramsey loam, eroded phase.—This mountain upland soil occurs in association with other Ramsey soils and with Halewood soils, but differs from the normal phase in having lost 25 to 75 percent of the surface soil by erosion. Gullies occur here and there. External drainage is very rapid and internal drainage good. At some time all this phase has been farmed, but about a fourth of it has reverted to woodland or is lying idle, and about 40 percent is in pasture. This nonproductive soil is susceptible to severe erosional losses and occupies strong relief. The open areas should be in sod crops, preferably pasture.

Ramsey loam, severely eroded phase.—A phase of the mountain upland areas differing from the normal phase mainly in loss of more than 75 percent of the surface soil and in places part of the subsoil by erosion. The soil may be severely gullied. External drainage is very rapid and internal drainage good. The soil occurs in small to comparatively large areas in association with the other Ramsey and the Halewood soils. All areas have been under cultivation at some time, but practically none are now in crops. About two-thirds of the land is used for pasture, and one-third is idle. Because of the normally shallow soil, steep slope, and severely eroded condition, it is difficult to establish and maintain a satisfactory sod. The gullied areas should be planted to locust or white pine trees, and sufficient lime and fertilizer used on other areas to establish and maintain adequate cover for livestock range as well as control runoff.

Rock outcrop.—Consisting of bare exposures of granite in most places, this land type generally occurs on mountainsides and is usually steep to almost precipitous. It is found in stony areas of Ashe and Porters soils and in areas of rough stony land. A few scrub trees and

occasional bushes grow in rock crevices where small quantities of soil material have accumulated.

Rough gullied land (Hayesville and Halewood soil materials).—A land type consisting of areas of Hayesville and Halewood soils so severely gullied as to be practically useless for crops or pasture (pl. 7, *A*). Small patches of the soil profile remain in places, but generally the soil has been so mutilated or practically destroyed by accelerated erosion that it is hardly possible to rebuild the land, except by such slow processes as reforestation. Runoff and internal drainage are very rapid. This land occurs in comparatively small areas, some of which are east of Shoal Creek School, East Fork Church, and Sheep Knob, west of Balsam Gap and Fallcliff, north of Cullowhee, south of Tuckasegee, southeast of Caney Fork School, and southwest of Fairfield Lake.

Nearly all of this land is lying idle or reverting to forest. Steps should be taken to plant all areas to white pine or locust trees or to kudzu where there is no satisfactory natural reforestation. Lespedeza will aid in establishing temporary cover until other vegetation is established.

Rough stony land (Porters and Ashe soil materials).—Many small angular rock fragments, boulders, and numerous bedrock outcrops are on the mountainous areas of this steep, broken, or precipitous land. In some places the land is not very stony, but bedrock is only a few inches below the surface. Where formed to any degree, the soil consists of Porters or Ashe soil material, but on some of the highest mountains it may be Burton soil material. The slope is 30 to more than 60 percent, and external drainage is very rapid and internal drainage medium to rapid. This is one of the most extensive types in the county, comparatively large areas occurring in many places in the steep mountainous sections.

Practically all the land is in forest, consisting principally of hardwoods (pl. 7, *B*). Owing to the rough country and poor quality of the timber, the trees are generally left standing. The most feasible use for the land is forest.

State loam.—Although this is a brown friable soil of the low stream terraces, it occurs at sufficiently high elevations not to be subject to overflow. The surface is very gently sloping to gently sloping, and external and internal drainage are medium. Although not very susceptible to erosion, this soil is slightly eroded in places on about half its total extent. It occurs in relatively small but rather widely scattered areas.

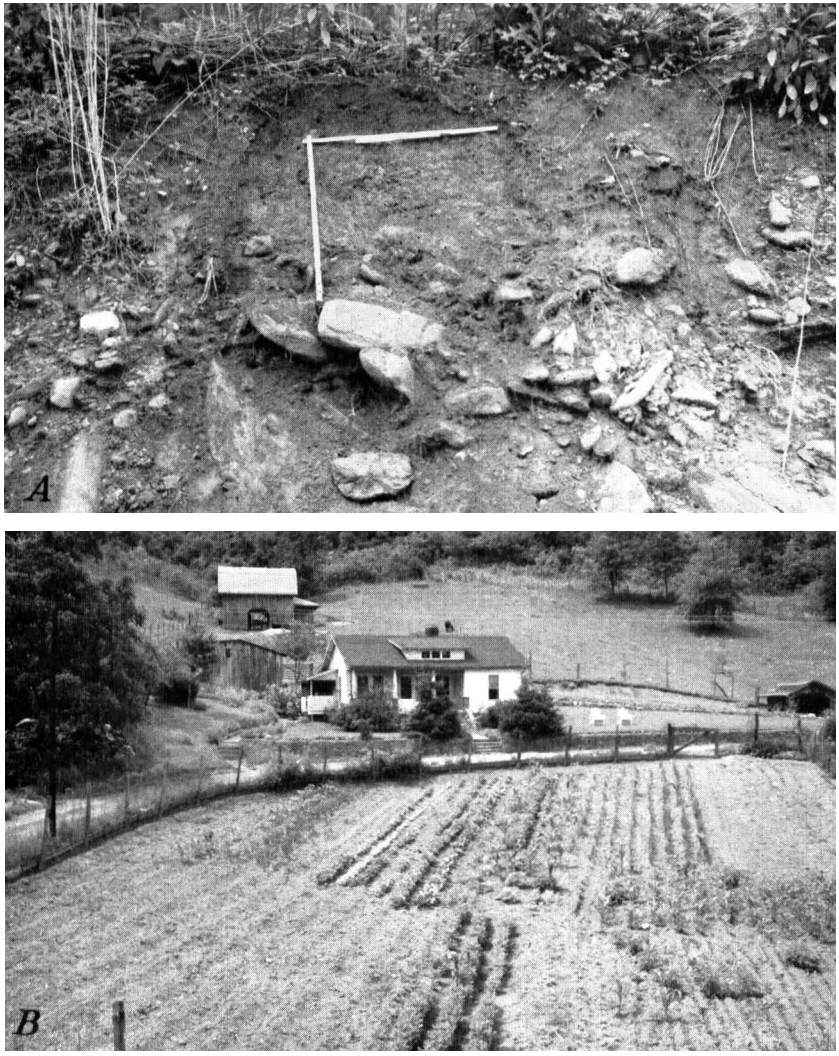
Following is a profile description in a cultivated area (pl. 8, *A*):

0 to 10 inches, brown mellow loam of granular structure. A moderate quantity of organic matter is well incorporated with the mineral material.

10 to 25 inches, reddish-brown friable clay loam, containing a few finely divided mica flakes and some rounded and angular rock fragments up to about 4 inches in diameter. It is slightly sticky when moist.

25 inches+, yellowish-brown friable clay loam having granular structure. A few gravel and some subangular rock fragments are intermixed with the material. Many finely divided mica flakes are distributed through the layer.

A, Rough gullied land (Hayesville and Halewood soil materials) on a slope of about 47 percent reforested to Virginia pine and black locust. This area lies about a third of a mile west of Willits. *B*, Forest on Rough stony land (Porters and Ashe soil materials) northwest of Glenville. Forest covers a large part of the county, and most of it is on steep and very steep mountain land.



A, Profile of State loam near Beta, the surface layer brown, friable, and mellow; the subsoil brown to reddish-brown and friable. The lower part of the profile consists of water-worn rock fragments of different sizes and shapes, intermixed with friable soil material. *B*, Vegetable garden on Tusquitee loam about half a mile southeast of Cullowhee. This soil is well suited to the vegetables commonly grown in the county.

The profile layers vary somewhat in thickness from place to place, the surface layer from 6 to 12 inches, the subsoil from 12 to 24 inches, and the substratum from a few inches to a few feet.

Having good tilth and favorable moisture conditions and a good supply of essential plant nutrients, this soil is considered one of the best in the county for general farming. Practically all of it is used for corn, small grains, hay, and other subsistence crops.

State loam, sloping phase.—Differing from the normal phase in having a steeper relief, this phase consequently has greater susceptibility to erosion. The slope is 7 to 15 percent, and external and internal drainage are good. Areas occur along many of the streams. Nearly all the land is cleared, some 70 percent being used for tilled crops. It is one of the most desirable soils in the county, is suited to a wide range of crops, and responds readily to treatment. Since it is slightly susceptible to erosion, average care exercised in its management will adequately control runoff.

Mapped with this phase are some slightly eroded areas from which runoff has removed up to 25 percent of the surface soil and a few moderately eroded areas that have lost 25 to 75 percent of the surface soil. The subsoil in these areas is within plow depth.

Stony colluvium (Porters soil material).—A very stony soil consisting of colluvial and local alluvial material derived from Porters soils, but in some places predominantly alluvial material mainly of Congaree character. It is mostly moderately sloping to very strongly sloping, although some of it is nearly level to gently sloping. External drainage is rapid and internal drainage medium to rapid. It occurs on foot slopes of mountains and along many of the streams, the largest areas in places along Soco Creek.

In general, the surface soil to a depth of about 12 inches is brown or dark-brown mellow friable loam of granular structure, containing a considerable quantity of decomposed vegetable matter mixed with the mineral material. Below this layer to a depth of about 23 inches the material is practically the same as that above but contains much less organic matter. This layer is underlain by dark-colored hard and soft rock fragments.

Locally a considerable quantity of organic matter derived from the decay of plant remains is on the surface of this soil. Rock outcrops occur in places. In some places the soil is similar in character to Congaree fine sandy loam, but a large quantity of gravel, rock fragments up to 10 inches in diameter, and boulders are on the surface and throughout the profile. Some areas are composed of riverwash, a brown material consisting of sand, gravel, and semiangular rock fragments.

A small part of the soil is cultivated, chiefly to corn; the rest is in pasture or forest. The many stones on and in the soil preclude its use for cultivation in most places, although such use might be feasible if enough stones were removed.

Talladega silt loam.—Formed over mica schist in the mountainous areas, this light-colored steep soil has a slope of 30 to 60 percent, very rapid external drainage, and medium to rapid internal drainage.

Areas of it occur in the vicinity of Ocala, Barkers Creek, and Whittier, west of Dillsboro, southeast of Webster, northwest of Shoal Creek School, and at the source of Waychutta Creek. The vegetation consists of white oak, blackjack oak, swamp red oak (Spanish oak), chestnut oak, sourwood, tuliptree (yellow-poplar), Virginia pine (scrub pine), black tupelo (blackgum), and black locust trees with an undergrowth of seedlings or sprouts of these trees, and rhododendron, mountain-laurel, and briers.

Following is a profile description of this soil:

0 to 5 inches, brown friable silt loam containing a small quantity of decomposed organic matter. Many small roots are present, and finely divided mica flakes give the material a slick feel.

5 to 22 inches, yellowish-red or light-red friable silty clay loam. The presence of many finely divided mica flakes gives the material a greasy feel. A few fine roots are present.

22 inches+, streaked gray, yellow, bright red, and pink friable decomposed material of mica schist that still retains the structural lines of the original rock. It has a slick soapy feel.

Considerable variation in the thickness of the layers exists from place to place; that of the surface layer is 4 to 6 inches, of the subsoil 12 to 20 inches, and of the substratum from a few inches to several feet. The texture is loam in some places and fine sandy loam in others, the former generally occurring in areas of the soil in the southern part of the county and the latter in areas in the western part.

All this soil is in forest and, because of its stony slope and shallow depth to bedrock, this is the only use to which it is suited. If cleared and cultivated the soil would soon become severely eroded.

Talladega silt loam, severely eroded phase.—Removal of 75 percent or more of the surface soil and, in places, part of the subsoil of this phase has been effected by the degree of and susceptibility to erosion. This loss has resulted in a red color and heavier texture. The soil is severely gullied. External drainage is rapid to very rapid and internal drainage good. Areas of this phase are west of Ocala, northwest of Shoal Creek School, south of Webster, northeast of Barkers Creek, and at the source of Waychutta and Cane Creeks.

All this phase has been cropped at some time, but much of it is reverting to woodland or lying idle. Areas in pasture are supporting a poor sod that offers little protection from runoff. Because of the difficulty of access by vehicle, adequate treatment with lime and fertilizer is difficult. The best use of most of this phase is woodland.

Mapped with this phase are a few moderately eroded areas that have lost only 25 to 75 percent of the surface soil.

Talladega silt loam, eroded hilly phase.—This phase differs from the normal phase in having milder relief (15 to 30 percent) and in having lost 25 to 75 percent of the surface soil by accelerated erosion. The quantity of material lost varies greatly, but in average areas the plow layer (a mixture of surface soil and subsoil materials) has a reddish-brown color and slightly heavier texture. External drainage is rapid and internal drainage medium. Areas occur in the vicinity of Ocala, southeast of Webster, northeast of Barkers Creek, and northwest of Shoal Creek School.

Although most areas have been under cultivation at some time, about a fourth of them have reverted to trees, mostly pine, about 40 percent are in pasture, and the rest in crops or lying idle. Adequate pasture for livestock may be obtained by supplying sufficient quantities of lime and fertilizer, and most areas are accessible enough for treatment. The gullied lands should be set to trees, preferably locust.

Mapped with this soil are a few severely eroded areas from which 75 percent or more of the surface soil has been removed by erosion; also a few forested areas that show no appreciable erosion. Severe gullying has taken place on many areas.

Talladega-Porters loams.—These soils have formed from weathered products of a rock formation consisting of mica schist intermixed with mica gneiss, hornblende gneiss, and other metamorphic rocks and they occur on mountainsides and foothills. The relief is steep (30 to 60 percent), external drainage is rapid, and internal drainage medium. The soil is in forest consisting largely of hardwoods, and if cleared it would be subject to severe erosion. It covers a few areas about 2 miles northwest of Thomas Peak near the Jackson-Swain County line. The mixed character of these soils is probably due largely to the mixed character of the parent rock. It includes small areas of Talladega silt loam (p. 37) and Porters loam (p. 31), which are so intricately mixed that the individual areas could not be separated on a small-scale map. Small areas of Ramsey loam (p. 34) and Chandler loam (p. 23) also are included.

Talledega-Porters loams, eroded phases.—With the exception of having lost 25 to 75 percent of the original surface layer by accelerated erosion, this soil complex resembles the Talladega-Porters loams. The relief is steep, external drainage is good to very rapid, and internal drainage medium. This inextensive complex occurs in a few areas northwest of Thomas Peak near the Swain County line. One area of the included hilly phase is near Pine Knob. A large part is either idle or growing up with pine or black locust trees. A small part of the less steep areas are used for subsistence crops. The most suitable use seems to be for forest.

Mapped with this complex are some severely eroded areas and some areas of Talladega-Porters loams, eroded hilly phases, which are similar to it in profile characteristics and degree of erosion and differ mainly in being hilly instead of steep. Little or no erosion has occurred in a few small areas of this included hilly phase.

Toxaway silt loam.—Derived from young alluvium washed from soils underlain by granite, gneiss, and schist, this soil of the first bottoms is associated with Congaree soils of the bottom lands and Altavista and State soils of the stream terraces, but is readily distinguished from them by the almost black color of the surface layer. Owing to the level or nearly level relief, the water table is at or near the surface most of the time. External drainage is very slow to slow, and internal drainage very slow. Fair-sized areas of this soil are near the source of Grassy Camp Creek and in the vicinity of Hurricane Lake, and comparatively small ones are southeast of Rock Spring Church, west of Hurricane Lake and High Hampton, northeast of Little Terrapin Mountain, and northwest of Cashiers.

Following is a profile description in an undisturbed place:

0 to 10 inches, dark-gray to almost black mellow friable silt loam, apparently containing a large quantity of organic matter. When wet it has a slick feel, and when dry it may be crushed to a fine flourlike condition.
10 to 30 inches, medium-gray compact sticky silty clay loam. It has a slick feel when wet but is very hard when dry.
30 inches+, gray, mottled with yellow and brown, compact sticky silty clay or clay, containing a few finely divided mica flakes.

Variations in the profile are in the thickness of the layers. The surface layer ranges from 8 to 12 inches thick, the second from 12 to 28 inches, and the third from a few inches to several feet. The entire profile is very strongly acid.

The soil is subject to overflow, and in its waterlogged condition is unsuitable for crops and not very well suited to pasture. A relatively small part is used as pasture land, and the rest is forested.

Mapped with this soil are two comparatively large areas near Panthertown Creek in which the soil to a depth of about 10 inches consists almost wholly of nearly black decomposed vegetable matter, underlain by a light-gray or medium-gray layer consisting almost entirely of sand.

Toxaway silt loam, drained phase.—Comprising the better drained areas of the type in which the external drainage is slow to medium, this level or nearly level phase is generally in a slightly higher position than the normal phase. Otherwise, the profiles of the two soils have practically the same characteristics. A comparatively large area of this phase is near the source of Silver Run Creek, smaller areas are along the Tuckasegee River between Barkers Creek and Whittier, southeast of Rock Spring Church and Fairfield Lake, northwest of Charley Creek School, west of Cullowhee, north of Cowarts and Savannah School, southwest of Cullowhee and Fairfield Lake, southwest of High Hampton, and northeast of Erastus. This soil is well suited to such crops as corn and meadow. About a third of it is cropped, a small acreage is lying idle, and the rest is in forest.

Tusquitee loam.—Occupying positions on foot slopes, this brown friable soil has formed from colluvial material derived from the Porters, Hayesville, and Halewood soils with which it is closely associated. In most places the color and texture of the layers are similar to those of Porters loam. The surface is sloping to strongly sloping, the gradient ranging from 7 to 15 percent. In most places internal drainage is good and in some places rather slow. This soil occurs in comparatively small areas, principally between soils on the uplands and those on bottom lands.

Following is a profile description of this type:

0 to 15 inches, brown mellow loam of weak granular structure that is sticky when wet.
15 to 30 inches, yellowish-brown to slightly reddish-brown friable readily permeable clay loam.
30 inches +, yellowish-brown or brownish-yellow, splotched with brown, yellow, and gray, friable clay loam.

The thickness of the layers varies considerably from place to place—the surface layer from 10 to 18 inches thick, the subsoil 12 to 18 inches, and the lowest layer 36 inches to probably 15 feet. In places near the sources of streams where internal drainage is rather slow, the lower

layers are mottled yellow, brown, and gray. Locally there may be very little difference in color and texture throughout the soil mass. Where closely associated with Hayesville soils, the profile is predominantly reddish brown. In some places a few rock fragments are on the surface and in the soil mass.

The favorable slope, tilth, fertility, and moisture relations make this one of the most desirable soils for crops and pasture (pl. 8, *B*). About three-fourths is cleared, and very little is idle.

Tusquitee loam, eroded phase.—This phase differs from the normal phase in degree of and susceptibility to erosion. It has 25 to 75 percent of the surface soil removed. The quantity of material lost varies greatly, but in average areas the plow layer (a mixture of surface soil and subsoil materials) is lighter brown and very slightly heavier textured. External drainage is medium to rapid and internal drainage medium. This phase occurs in comparatively small areas in association with other phases of the type and with those of the Hayesville, Halewood, and Porters series.

All areas of this phase are in crops or pasture. Intensive row cropping is responsible for the eroded condition. Runoff may be controlled by the use of systematic crop rotations and contour running of rows. This soil is very productive, responsive to management, and should be given every care to control runoff and prevent further soil removal. Mapped with this phase are a few areas from which more than 75 percent of the surface soil has been removed.

Tusquitee loam, gently sloping phase.—Having milder relief (2 to 7 percent), this phase differs from the normal phase in being less susceptible to erosion. External and internal drainage are good, but in places internal drainage may be slow. This phase occurs in association with the other phases of the type and those of the Hayesville, Halewood, and Porters series. A large part of this soil is cleared and used for crops and pasture. It is suited to practically all local crops and is easily maintained in a productive state under good management. Mapped with this phase are small slightly eroded areas that have lost up to 25 percent of the surface soil by accelerated erosion.

Tusquitee loam, hilly phase.—Since this phase differs from the normal phase in having steeper relief, it consequently has greater susceptibility to erosion. The slope is 15 to 30 percent, and external and internal drainage are good. This phase occurs in small areas in association with other phases of the type. Most of the soil is in forest, but the cultivated areas respond to good management and are suited to many of the crops commonly grown. Chiefly because of the slope, row crops should be limited.

Tusquitee loam, eroded hilly phase.—This phase differs from the normal phase of the type in relief and in the loss of 25 to 75 percent of the surface soil by accelerated erosion. The quantity of material lost varies greatly, but in average areas the plow layer (a mixture of surface soil and subsoil materials) has a somewhat lighter color, heavier consistence, and finer texture. There are a few gullies in places. The slope ranges from 15 to 30 percent, and external drainage is rapid to very rapid and internal drainage good. Areas of this phase occur in the mountainous parts of the county in association with the phases of

the Porters series. Practically all of this phase is in open land, about equally divided between crops and pasture. Because it is a strong soil, much of it has been kept in row crops too long. Uncontrolled runoff has resulted in considerable removal of soil material. Most of the tilled land should be converted to sod-forming crops.

Tusquitee loam, severely eroded hilly phase.—This phase differs from the normal phase in slope and degree of erosion, the steeper slope ranging from 15 to 30 percent and erosion having removed 75 percent or more of the surface soil. The remaining part has been mixed through tillage operations with a part of the subsoil, thus giving the present surface soil a lighter color and slightly heavier texture. Some areas are moderately gullied and in a very few places the gullies are less than 50 feet apart. Many are too deep to be obliterated by the general tillage operations, but very few cannot be crossed with ordinary farm machinery. External drainage is very rapid and internal drainage good. Areas of this phase occur in the mountainous parts of the county in association with phases of the Porters series.

All this soil is open land, being about equally divided between pasture, cultivated crops, and idle land. Because of the relatively steep slope and severely eroded condition, sod-forming crops should nearly always be used. Some of the gullied areas may be better suited to locust or white pine plantings.

Warne fine sandy loam.—This is a light-colored soil of the low stream terraces. It has formed from alluvium composed of materials washed from uplands underlain by igneous and metamorphic rocks. It is generally level to gently sloping, although about a third of its total area is moderately sloping to strongly sloping. External drainage is slow to rapid and internal drainage very slow. Accelerated erosion in a few places has removed up to 25 percent of the original surface layer and in some other areas 25 to 75 percent. All the individual areas are comparatively small and widely distributed over the stream terraces.

Following is a profile description of this soil in a cultivated field:

0 to 8 inches, yellowish-gray friable fine sandy loam of a slightly compact consistence, apparently containing very little organic matter.
8 to 27 inches, yellow compact fine sandy clay, mottled or splotched with gray and brown in the lower part. The material is sticky and plastic when wet and hard when dry.
27 inches +, mottled yellow, gray, and light-gray compact clay.

The surface layer varies in thickness from 4 to 8 inches and the subsoil from a few inches to a few feet. In some places this layer is underlain by yellow material consisting almost entirely of sand and gravel. In some places a few gravel and larger water-worn rocks are on the surface and in the soil mass.

About a fourth of this soil is used for crops, chiefly corn, and a large part of the rest for pasture. Artificial drainage is one of the requirements for increasing crop productivity.

SOIL USE, MANAGEMENT, AND PRODUCTIVITY [7]

The agriculture of the county as related to the soils and the major use and management requirements of the soils and their productivity are considered under one heading so that their interrelations may be

[7] Prepared by members of the North Carolina Agricultural Experiment Station, February 1945.

more readily understood. The first part of this section deals with water control on the land and points out its relation to soil management. The second part discusses the physical land classification and soil management practices in detail, followed by a discussion by groups of soils having similar management requirements. This information is supplementary to the definition of good management for columns C in the productivity rating table. The third part, soil productivity and a supporting table, gives data on expected yields and on the workability and conservability of the soils, and shows also physical land classification groups. Another table gives the productivity rating of the soils.

The term "land use" in this report refers broadly to the use of soils suitable for (1) tilled crops (row crops, small grains, and annual hay), (2) permanent sod for either pasture or hay, and (3) trees. The term "soil management" indicates such practices as (1) selection and rotation of crops; (2) application of soil amendments, as lime, manure, crop residues, and commercial fertilizers; (3) tillage practices; and (4) engineering measures for water control on the land.

WATER CONTROL ON THE LAND

The undisturbed natural vegetative cover of Jackson County, found only in a few protected forests, presents an excellent example of almost perfect control of the water that falls on the land. When man removed such cover because he needed open land for crops and pasture, he disrupted the water cycle. As a result runoff is rapid in many places, and little water enters the soil. In some areas a great quantity of soil material is removed. Occasional floods resulting from rapid runoff severely damage crops and even the land adjacent to streams. The flow of several streams has become irregular. The control of runoff therefore is a major problem in soil management in this county.

The changes in land use necessary for this control involve (1) modifying cropping systems to provide the maximum protective cover throughout the year, (2) reduction in the acreage planted to row crops, (3) use of less sloping lands for the row crops, (4) increase in acreage of hay and forage crops, (5) improvement of pasture sod, and (6) improved woodland management. A definite plan for control of surface runoff by any mechanical means possible or practicable, as contour tillage, terracing, and establishing hillside or diversion channels, should go along with vegetal cover. Included with these measures should be contour strip cropping, the use of permanent strips of sod crops, and the vegetating of all waterways and field outlets of terraces and channels. Control of soil losses will, of course, go hand in hand with control of surface runoff whether by mechanical or vegetative means or both. Water control by checking rapid runoff is not all, however, as drainage and irrigation should be considered in some places.

Despite the relatively high rainfall, there are seasons when the precipitation is not sufficient for growing crops. In some local areas irrigation is practicable for high-value truck crops. Ample water is generally available for irrigation by gravity systems.

A few low-lying bottom lands, low terraces, and some slightly depressed areas at the base of slopes have been drained by means of open or covered ditches. Additional areas can be drained successfully.

The deepening and straightening of channels will accelerate the flow of streams, thus reducing the flood hazard. Such measures have been employed to some extent. Impounding reservoirs will, of course, aid greatly in flood control.

PHYSICAL LAND CLASSIFICATION AND SOIL MANAGEMENT

The soils of Jackson County have been grouped in five classes on the basis of their relative physical suitability for agricultural use, so that their relationship to agriculture may be discussed more logically. These classes, in the order of decreasing desirability for use in present agriculture, are the First-class, Second-class, Third-class, Fourth-class, and Fifth-class soils. Although the soils of no one class are ideal for the existing agriculture, the First-class ones more nearly approach that ideal than do the Second-class. Likewise, the soils of each succeeding class are farther from that ideal than those of the preceding class.

The physical suitability of an individual soil for agricultural use is determined by the characteristics of that unit. Many characteristics contribute to the productivity, workability, and conservability of the soil. These three conditions determine the physical suitability of the soil for agricultural use. An ideal soil is one that is very productive of a large number of important crops, easily worked, and capable of being conserved with a minimum of effort. All the soils of this county fall short of the ideal, but they differ widely in the degree of such 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 physical use suitability of a soil is complex. No simple method of evaluating these three conditions and applying the values in determining physical use suitability can be used.

The relative physical suitability of the soils for agricultural use 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 than others. By comparisons of this nature within farms and among farms, the soils may be ranked in the order of their desirability for the agriculture of the area under present conditions. Cattle are fairly important on many farms, and suitability of soils for permanent pastures has been considered in determining the rank of each soil in this classification. Where information based on experience with a soil is lacking, the soil may be ranked by comparisons with other soils of similar characteristics for which information is available.

In the following pages the five physical land classes are separately discussed, each discussion being followed by a table consisting of pertinent use data for each soil of the land class. The table presents the estimated percentage of each soil used for crops, idle cropland, open pasture, and forest, and groups together soils having similar management requirements. Following each table are separate discussions of the management groups, in which their common character-

istics, present use and management, and management requirements are presented.

FIRST-CLASS SOILS

The First-class soils are very good to excellent for agriculture. They are good to excellent cropland and very good to excellent for pasture. Although differing somewhat in their characteristics, they are relatively similar in physical suitability for agricultural use. Each is moderately well supplied with plant nutrients and has fairly high natural productivity compared with other soils of the county. Even the most fertile, however, is responsive to additions of certain amendments for some crops. All are well drained, yet their physical characteristics are such that they retain moisture fairly well, thereby tending to insure a rather even and generally adequate supply for plant growth. Good tilth is easily maintained, and the range of moisture conditions for tillage is comparatively wide. The soils are moderately well supplied with organic matter, and their physical properties are favorable to the movement of air and moisture in the soil and to the free penetration of roots into all parts of the subsoil. None has any adverse condition or property, as stoniness and unfavorable relief; in each the problem of conserving fertility and soil material is relatively simple; and each is capable of intensive use with special management practices.

The First-class soils are listed by management groups, and the estimated percentage of each soil used for crops, idle cropland, open pasture, and forest in 1944 is given in table 4.

TABLE 4.—*Estimated percentage of each First-class soil in crops, idle cropland, open pasture, and forest in Jackson County, N. C., in 1944, according to management groups.*

Management group and soil	Crops	Idle cropland	Open pasture	Forest
GROUP 1–A:	*Percent*	*Percent*	*Percent*	*Percent*
Altavista silt loam	40	15	35	10
Congaree silt loam	70	15	13	2
Congaree fine sandy loam	70	5	15	10
GROUP 1–B:				
Hiwassee clay loam	70	15	15	0
Tusquitee loam	30	10	30	30
Eroded phase	40	10	50	0
Gently sloping phase	25	10	40	25
State loam	60	15	15	10
Sloping phase	70	10	15	5

MANAGEMENT GROUP 1–A

The soils of group 1–A are of alluvial origin. The Congaree soils occupy first-bottom positions and the Altavista soil low terrace positions. Physically, these soils are similar. They are well drained, and the relief is so nearly level that the control of runoff is no problem. The surface layers are friable, and the subsoils also are friable and open, yet they retain sufficient moisture and plant nutrients so that any of the common crops may be grown. Management problems are relatively simple. These soils are acid where they have not been limed in recent years. They are not so deficient in nitrogen, phosphorus, and potash

as those on the higher terrace and upland positions. During occasional flooding, new soil material is deposited on the Congaree soils, which are probably better balanced with respect to plant-nutrient content than are the higher lying soils. The Altavista soil is seldom flooded. It is less well supplied with plant nutrients than the Congaree soils and is more deficient in nitrogen than in other nutrients.

No special tillage practices are required for these soils. The land is generally broken late in winter or early in spring. Because of danger of clodding or compaction the two silt loams should not be plowed or cultivated as soon after rains as the fine sandy loam. Light implements may be used. Deep plowing is not necessary.

The principal crops grown are corn and potatoes; the minor ones are rye, 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 rye or crimson clover is grown on the cornland. In some places rye is cut for hay, and in other sections it is grazed, turned under, and followed by corn. A somewhat common practice is to follow crimson clover with corn and turn under the crimson clover for benefit of the corn. On a 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.

Amendments, other than lime, are not usually added to land for corn and crimson clover. Potatoes and truck crops are heavily fertilized, usually with 600 to 800 pounds an acre of a 4–12–4 [8] or 5–7–5 mixture. Lime is used for truck crops but not generally for potatoes, because of the risk of potato diseases. In most places small grains receive 300 to 400 pounds of 0–16–0 an acre.

Since these soils occupy favorable topographic positions and are well drained and easily tilled, but not subject to leaching, they can be used intensively. Although the average farm in this county has only a very few acres of First-class soils, even these small acreages can produce much of the corn, truck crops, and other row crops needed. Congaree silt loam is especially well suited to corn for grain or silage, and Congaree fine sandy loam and Altavista silt loam are well suited to corn. All three are very desirable for vegetables and for grasses for pasture or hay. When possible, however, uplands should be used for sod-forming crops. Crops, as crimson clover and lespedeza, respond readily to applications of 1 ton of ground limestone made at intervals of 4 to 6 years or once within the rotation period. Farmers who secure favorable yields of corn, small grains, and hay on these soils apply some phosphate and a little potash to the land before planting the grain crops and add nitrogen as a top dressing. When legumes grown in the rotations are turned under, nitrogen is added to the soil and is beneficial to the corn crop that follows. Little manure is used on the soils of this group. Special crop adaptations and recommended crop rotations and soil amendments are given in table 9.

MANAGEMENT GROUP 1–B

Occurring on stream terraces and colluvial slopes the soils of group 1–B are similar in that they are heavy or light clay loams, relatively

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

level to gently sloping, well drained, practically free of stone, and range in color from brown to reddish brown.

Contour tillage is one of the special practices necessary. Usually land is broken in spring for row crops, and the rows are laid out the most convenient way across the fields. All these soils are easily plowed and cultivated, except Hiwassee clay loam that tends to "ball up" on the plow or cultivator if tilled when too moist and will not readily scour or turn from the moldboard when dry. Light to moderately heavy implements are sufficient for tilling these soils.

Corn, small grain, hay, and vegetables are the principal crops grown. Because of favorable physical properties, the soils are well suited to intensive row cropping, especially to potatoes, vegetables, and tobacco. Some of the production of commercial green beans, peppers, and cabbage is on these soils. State loam and its sloping phase are well suited to silage corn, truck crops, and small grains; Tusquitee loam is well suited to truck crops, grasses, and legumes; and Hiwassee clay loam is excellent for wheat, alfalfa, and clover. All the soils are excellent for pasture but should be used for intensive cropping wherever feasible.

Land for corn is treated with 200 pounds of 16-percent superphosphate an acre, and manure is added when available. Truck crops are fertilized rather heavily with 500 to 800 pounds of 5–7–5 or 4–12–4. Some farmers apply 1,000 to 3,000 pounds of lime an acre to land used for truck crops, except potatoes. In general, very little lime is used for other crops on soils of this group. Lime, however, produces favorable results on these acid soils. For alfalfa, an initial acre application of about 2 tons of ground limestone is generally needed, but soil tests should be made to determine the proper quantity. The Tusquitee and State soils have a favorable ratio of nitrogen, phosphorus, and potash, but the total content of these is not very high. Special adaptations and recommended crop rotations and soil amendments are given in table 9.

Rotations are not generally practiced on these soils. Like the soils of group 1–A, these may be cropped intensively in suitable rotations. Sometimes one row crop is alternated with another, but frequently the same crop is grown 2 or 3 years in succession. Some of the rotations used are (1) potatoes, rye or wheat, lespedeza 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 is beneficial in maintaining high crop yields, especially when turned under.

SECOND-CLASS SOILS

The Second-class soils are good to very good for agriculture. They are fair to good cropland and good to very good for pasture. As with the First-class soils, they have considerable diversity of physical characteristics, but greater than that of the First-class. They are comparatively similar in their physical suitability for agricultural use, but they differ within a limited range in productivity, workability, and conservability. Each soil of this group is moderately deficient in one or more of these conditions, and the detrimental effect on the physical suitability of the soil for agricultural use is greater than that of any of the First-class soils, but less than for any of the Third-class soils.

The Second-class soils are listed by management groups, and the estimated percentage of each soil used for crops, idle cropland, open pasture, and forest in 1944 is given in table 5.

TABLE 5.—*Estimated percentage of each Second-class soil in crops, idle cropland, open pasture, and forest in Jackson County, N. C., in 1944, according to management groups*

Management group and soil	Crops	Idle cropland	Open pasture	Forest
GROUP 2-A:				
Ashe loam:	*Percent*	*Percent*	*Percent*	*Percent*
Rolling phase	10	5	15	70
Eroded rolling phase	40	5	55	0
Ashe sandy loam				
Rolling phase	25	5	35	35
Eroded rolling phase	35	30	35	0
GROUP 2-B:				
Hayesville loam, rolling phase	20	0	10	70
Hayesville clay loam, eroded rolling phase	45	20	35	0
Hiwassee clay loam, eroded sloping phase	75	20	5	0
GROUP 2-C				
Congaree-Toxaway complex	60	15	15	10
Toxaway silt loam, drained phase	35	5	10	50

MANAGEMENT GROUP 2–A

Group 2–A consists of the most uniform soils in the county. A difference exists in the texture and thickness of the surface layer, but very little exists in the texture, structure, and color of the subsoil. All the soils are derived from the same kind of parent material and are undulating to rolling. Under the prevailing management practices they are moderately productive, and management requirements are essentially the same for each soil. They are not very susceptible to erosion but are subjected to some leaching because of the rather open structure of the subsoil.

Special tillage practices are unnecessary on soils of this group. Sod crops should be turned under during winter, as weather conditions permit. Relatively light implements are adequate. Crop rows should be run along the contour so that excessive runoff and soil loss may be reduced, but many farmers run the rows the most convenient way, which in places is up and down the slope. In a few fields terraces may be used to advantage in checking runoff and as guides for crop rows. The land is generally broken late in winter or early in spring.

These soils are well suited to cabbage, potatoes, green beans, corn, other truck crops, and grass, all of which are rather exacting in their requirements. As the relief is relatively mild and the soils are friable, mellow, and highly absorptive of rain water, truck crops may be grown under contour tillage without much risk of severe erosion, and, wherever feasible, the soils should be so used.

Heavy applications of commercial fertilizers (600 to 1,000 pounds of 5–7–5 or 4–12–4 an acre) are made for cabbage and green beans and, in places, for potatoes. Some well-rotted manure is used on the land for cabbage; corn is not fertilized when grown in rotation, but in some places it is side-dressed with 15 to 20 pounds of nitrogen an acre. When a heavy growth of rye is desired for grazing or turning under, it is fertilized with 300 to 400 pounds of 16- or 20-percent

superphosphate an acre. Acre applications of 1 ton to 2 tons of lime are used on land for truck crops, except that for potatoes, which is generally not limed.

The general rotations consist of (1) corn, grass and clover for 2 years, cabbage, or potatoes; (2) green beans, rye and clover for 2 years, cabbage, corn; and (3) corn, rye, grass and clover for 2 years. In some places a row crop follows a row crop for a number of years before the land is used again for grass and legumes.

Suggested rotations and amendments for the Ashe soils included in this group are found in table 9. For maintaining productivity at a relatively high level a good rotation includes truck crops followed by small grain, and this by clover and grass for hay. If the individual farm has sufficient acreage, the sod crop may be left on the land 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, small grain, and clover and grass. Some areas of Ashe soils are not producing the yields they should. On these the small grain may be followed by lespedeza for 2 years before turning under.

MANAGEMENT GROUP 2–B

The three soils in group 2–B are inextensive but are important locally. About a fourth of Hayesville loam, rolling phase, is cleared and cultivated, but all of Hayesville clay loam, eroded rolling phase, and Hiwassee clay loam, eroded sloping phase, (pl. 5, *B*) are cleared and used for row crops or lying idle. All three are somewhat similar in physical characteristics, having a red color and a heavy-textured clay loam or clay subsoil in contrast to the yellow color and friable sandy clay subsoil of the Ashe soils in group 2–A.

Owing to similar physical characteristics and slope relations of the soils of this group, the management requirements are much the same. Hiwassee clay loam, eroded sloping phase, is more difficult to manage under a wide range of moisture conditions than Hayesville soils. It is sticky when wet and tends to "ball up" on implements if worked when too moist.

The common tillage practices include breaking and preparing the land for crops as early in spring as conditions allow. Crop rows are run in the most convenient way. Only a few farmers break and till the land along the contour. Fairly heavy farming implements are used in handling these soils, and good draft animals are required in breaking the land or turning under sod.

These soils, especially the Hiwassee, have a rather narrow range in moisture conditions and in many places tend to puddle and bake if tilled when too wet. Organic matter added to the soil will greatly lessen the possibility of puddling. It is not necessary to plow the soils deeply, if sod-forming crops in the rotations are turned under.

The soils of this group are subjected to rather severe losses of water and soil material in places where the crop rows run up and down the slope, and on such fields the control of water is of primary importance. Such losses from the larger fields can be effectively controlled through the use of crop rotations in a system of contour strip cropping in which bands of close-growing crops, alternating with row crops, serve as barriers to the runoff. Engineering measures for the control of water

663033—48——4

include the running of crop rows along the contour and possibly the construction of terraces. Permanent guide rows should be established in fields that are not terraced.

These soils are used for general farming. They are suitable for alfalfa, wheat, barley, clover, and grass, especially Hiwassee clay loam, eroded sloping phase. Corn yields are high when the crop follows a turned-under leguminous crop and rainfall is sufficient. Small, well-managed apple orchards probably would make good returns.

Generally, fertilizer (200 to 300 pounds an acre of 4–8–4) is used for corn. When available, manure is added to cornland in spring. Small grains receive about 300 pounds of 16-percent superphosphate. On some farms a small quantity of lime is applied to cropland.

In preparing the land for alfalfa, approximately 2 tons of ground limestone an acre should be applied. A similar quantity probably will be necessary during each rotation. Phosphate and potash should be added as needed. As the soils show a deficiency in boron in many places, small quantities should be supplied where needed. Manure is highly beneficial in producing good corn yields.

Systematic crop rotations are not commonly used, but on many farms corn is followed by small grain and lespedeza. In this rotation the first crop of lespedeza is cut for hay and the second is saved for seed, the residue being turned under. On some farms a shorter rotation, consisting of corn, crimson clover, corn, is followed rather consistently.

Rotations suggested for soils of this group are for so-called general farming. Corn, small grain, and 2 years of lespedeza usually meet the requirements of average farms consisting of Hayesville loam, rolling phase, and Hayesville clay loam, eroded rolling phase. A rotation of 4 years of alfalfa followed by corn, small grain, and 1 year of lespedeza gives excellent results on Hiwassee clay loam, eroded sloping phase. Alfalfa may also be grown on the Hayesville soils, and the yields would be almost as good as on the Hiwassee soil. The alfalfa rotation is very useful on dairy or beef-cattle farms, for it assures a sufficient quantity of high-quality feed each year. Only a few farmers have enough acreage of these soils to use in such a long rotation. It is advisable, however, that at least a small patch of alfalfa be grown on farms having these soils.

MANAGEMENT GROUP 2–C

The soils of group 2–C are very closely related. They occur in first bottoms and are subject to flooding during heavy rains. Toxaway silt loam, drained phase, occupies lower positions than Congaree-Toxaway complex. The latter consists of areas of Congaree and Toxaway soils that are too intricately associated and too small to be mapped separately.

No special tillage practices are common on these soils, but every reasonable effort should be made to avoid tilling them when too wet or too dry. Light farming implements and light work animals are sufficient. The land is usually broken late in winter or early in spring.

Toxaway silt loam, drained phase, has had some form of drainage, generally open ditches. A few farmers use "blind ditches," or boxed drains made of boards, split or whole logs, stones, or combinations of these, for effective drainage, and a few use tile. Some streams have been dredged, thus lowering and further aiding drainage by means of lateral ditches or tile.

Soils of this group are excellent for corn and, where drainage is adequate, will produce good truck crops. On fields where the drainage is only partly successful, grass and clover for meadow are probably the surest crops.

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

The common rotations used on these soils are (1) corn, crimson clover, corn, and (2) corn, rye or other small grain, corn. Corn is grown in many places for several successive years with no intervening crop. Some fields lie idle for a year or two, especially following a very wet one when the corn crop was largely ruined by excessive water.

Rotations that give excellent results in nearby counties on similar soils are (1) corn followed by grass and clover meadow for 3 or 4 years, for use on the general farm on which labor is scarce; and (2) a truck crop of green beans, cabbage, peppers, or potatoes, followed by rye, corn, and meadow, for use on farms where labor is adequate. Such rotations should also be suitable for soils of this group in Jackson County.

Drainage is essential to the successful management of these soils. This can be accomplished most effectively by a combination of broad V-type ditches and tiling. In many places the stream channel should be lowered and straightened for the necessary outlet. Such drainage measures are relatively expensive, and much care is required to maintain the improvement.

THIRD-CLASS SOILS

The Third-class soils are fair to good for agriculture, poor to good for cropland, and fair to good for pasture. Under prevailing or more intensive farming practices, they are limited in physical suitability for the production of the common tilled crops. None of the limitations, however, is great enough to make them definitely unsuited physically to tilled crops. Among the limitations, or undesirable features, are strong slope, low plant-nutrient and organic content, undesirable texture, structure, or consistence, eroded condition, and inadequate natural drainage.

The Third-class soils are listed by management groups, and the estimated percentage of each soil used for crops, idle cropland, open pasture, and forest in 1944 is given in table 6.

TABLE 6.—*Estimated percentage of each Third-class soil in crops, idle cropland, open pasture, and forest in Jackson County, N. C., in 1944, according to management groups*

Management group and soil	Crops	Idle cropland	Open pasture	Forest
GROUP 3-A:	*Percent*	*Percent*	*Percent*	*Percent*
Clifton clay loam, eroded phase	50	20	20	10
Halewood loam	30	2	10	58
Hayesville loam	10	2	10	78
Hiwassee clay loam, eroded hill phase	65	5	20	10
Hiwassee clay loam, severely eroded hill phase	45	20	25	10
GROUP 3-B:				
Ashe sandy loam, hilly phase	20	2	2	76
Ashe sandy loam, eroded hilly phase	50	10	40	0
Ashe loam, hilly phase	10	2	2	86
Ashe loam, eroded hilly phase	30	20	50	0
Tusquitee loam, hilly phase	10	0	10	80
GROUP 3-C:				
Congaree loamy fine sand	40	25	20	15
GROUP 3-D:				
Toxaway silt loam	0	0	20	80
Warne fine sandy loam	25	15	45	15

MANAGEMENT GROUP 3–A

The five soils of group 3–A are very similar. They have a brown-colored loam or clay loam surface layer and reddish-colored, heavy-textured clay loam or clay subsoil. They have about the same relief and are about equally susceptible to erosion.

No special tillage practices are employed. The land is generally broken late in winter. Crop rows are run along the contour in a few fields, but, in general, they are run the most convenient way. On some farms hillside ditches of sharp decline are run crosswise of the fields. In soils of this group, the range in moisture conditions for tillage is rather narrow. If plowed when too wet, they tend to puddle, bake, and form clods; on the other hand, if plowed when too dry, tillage is difficult in many places with the implements and work animals commonly used. Land broken in spring is probably more desirable for corn than that broken in fall, unless it is left in rough condition throughout the winter.

These soils are commonly used for such general farm crops as corn, small grains, lespedeza, clover, and grass. No particular recognition is given to their suitability for any special crop. The physical properties of the soils, including their relatively high content of clay and comparatively good water-holding capacity, render them especially desirable for alfalfa, clover, and wheat. These crops help conserve water and soil material, factors highly useful in an adequate soil-management program. Apples and other tree fruits make good yields on these soils. Less than 25 percent of the total acreage is cultivated, approximately 5 percent is idle cropland, and about 20 percent is in pasture.

The most common amendment used is 16-percent superphosphate, applied at the rate of 200 to 300 pounds an acre for corn and 300 to 400 pounds for small grains. In many places corn is side-dressed with 10 to 15 pounds of nitrogen an acre. Manure is applied to galled spots in the fields and then to cornland in general. Very little lime is used.

No systematic crop rotations are in general practice. A corn-small grain-lespedeza rotation is used on several farms, and some alternation

of crops is practiced on nearly all farms. Suitable rotations are (1) corn, small grain, clover, and grass meadow for 4 or 5 years; and (2) alfalfa for 3 or 4 years, corn, small grain, and lespedeza.

Unless proper precautions are taken, control of erosion soon becomes a major problem in the management of these soils. The more organic matter is added to these soils through rotations including legumes, the more retentive of moisture they become. Row crops should not be planted more than 1 year in every 5. It may be preferable to substitute barley for corn when feasible. To the extent practicable, corn should be restricted to the soils of the first bottoms and smooth areas on the second bottoms. A strip-crop rotation system is often desirable, if row crops must be grown on soils of this group. Such a system should be aided by contour tillage and possibly by terraces.

MANAGEMENT GROUP 3–B

The Ashe and Tusquitee soils of group 3–B are closely related physically. They are brown to light brown, have a mellow sandy loam to loam surface layer, loam to clay loam subsoil, occupy similar positions on the general landscape, and respond about equally well to similar management practices.

No special tillage practices are employed. Most of the land is plowed late in winter or early in spring. No particular precautions are taken to control water on the land. Crop rows in many fields coincide with a field boundary without regard to the slope. A few farmers practice strip cropping. Although the strips are laid out usually without the use of instruments, they appear to be satisfactory.

The principal crops are corn, cabbage, green beans, potatoes, clover and grasses for meadow and pasture, and rye, to which all soils of the group are suited. Most areas of the soils are at relatively high elevations where the summers are cool. Truck crops mature at the time when prices are usually favorable. (In nearby counties in the mountainous part of the State, soils similar to these are considered excellent for apples and other tree fruits.) About 18 percent of all this group is cultivated, about 6 percent is idle cropland, and about 16 percent is in pasture.

Areas used for truck crops, except potatoes, generally receive rather heavy applications of ground limestone, in some places 2 tons an acre. They also receive 800 to 1,000 pounds of 5–7–5 or 4–12–4 fertilizer an acre. Manure is added to cornland, the thin spots in the fields receiving the first applications. Some well-rotted manure is applied to the land for cabbage and occasionally to land for potatoes. When grown in rotation, corn is generally not fertilized. Very little lime or fertilizer is used on pasture land.

Because of the open porous character of these soils, their lime requirements are relatively high in many places, and applications of 1½ tons an acre during each rotation give good results. Land for potatoes should not be limed heavily, because of the prevalence of potato diseases on sweet soils.

In some pasture land areas potash may become deficient, and, when the need is indicated, it should be applied. Manure should be added first to galled and thin or eroded spots in cultivated fields or pastures and then to cornland in general.

The Ashe soils are subjected to considerable leaching, and the Tusquitee to some leaching; consequently, it may be necessary to apply lime more often than suggested above, but the quantity should be the same. When a heavily fertilized truck crop follows sod leaching is retarded.

Rotations used by some farmers are (1) corn, grasses and clover for 2 years or longer, cabbage or potatoes; (2) green beans, rye and clover for 2 years, cabbage, corn; (3) corn, rye or grass and clover for 2 years, potatoes, cabbage or beans. Variations of these rotations are practiced by some farmers.

In order to control water adequately on these soils, row crops should not be grown in succession. Suggested crop rotations are (1) truck crops, small grain, mixed hay for 2 or 3 years; (2) corn, small grain, lespedeza for 2 years. Orchards may be intertilled with a strip-crop rotation.

Contour tillage and strip cropping are essential for successful management of the larger fields of these soils. A strip-crop rotation will prove very satisfactory. Lines for the strips should be laid out by instruments; and the smaller fields, where strips are not feasible, should be contour-tilled to aid in checking runoff.

MANAGEMENT GROUP 3–C

The only soil (Congaree loamy fine sand) in group 3–C, occurs on first bottoms near streams. It differs from the other soils of the county in being very loose and open and subject to severe leaching. It is used principally for corn and truck crops, and approximately 40 percent of it is in crops, 25 percent in idle cropland, and 20 percent in pasture.

The idle land is not cultivated for periods of 1 or 2 years as the soil is not very productive, and these periods of idleness are considered necessary. No specific system of crop rotation is generally practiced, and the soil is not especially suited to any particular crop. Manure is generally applied to cornland, and usually supplemented by acre applications of 300 to 400 pounds of 16-percent superphosphate. The corn is frequently side-dressed with about 100 pounds of nitrate of soda.

In order to check leaching, organic matter should be supplied by turning under cover crops and by adding liberal quantities of manure. Recommended crop rotations are (1) corn, crimson clover, lespedeza; (2) corn, rye, lespedeza; and (3) truck crop, rye, lespedeza.

MANAGEMENT GROUP 3–D

The two soils of group 3–D are somewhat similar in physical characteristics. Toxaway silt loam occurs on first bottoms and is poorly drained. None of it is cultivated, but about 20 percent is in pasture. Warne fine sandy loam occupies positions on rather low terraces and has a compact and almost impenetrable subsoil. About 25 percent of it is cultivated and about 45 percent is in pasture. It is suited to meadow and pasture, but coarse grasses, reeds, and alder bushes grow rapidly under average conditions and frequent clipping is necessary to control them. Drainage is essential before any crops can be satisfactorily grown.

No rotation system is in use on these soils. Corn is the principal crop. Recommended rotations for drained areas are (1) corn, meadow; and (2) corn, pasture. When meadow or pasture becomes weedy, the soil should be broken and cultivated to corn for one season and then planted to sod-forming crops. Information on management is given in table 9.

FOURTH-CLASS SOILS

Because of their physical characteristics, Fourth-class soils are poorly suited to crops requiring tillage but are at least moderately productive of pasture plants. Each is so difficult to work or to conserve, or both, that cultivation is not generally feasible. On the other hand, each is sufficiently fertile and has adequate moisture to maintain a moderately good to very good cover of pasture plants. Although these soils are poor to fair for the general agriculture of the county, a considerable total acreage is tilled, but such use cannot well be avoided in the present agricultural economy, because there are only small areas of First-, Second-, or Third-class soils in many parts of the county. Where adequate areas of fair to good cropland are available, most of the Fourth-class soils are used for pasture or forest.

The Fourth-class soils are listed by management groups, and the estimated percentage of each soil used for crops, idle cropland, open pasture, and forest in 1944 is given in table 7.

TABLE 7.—*Estimated percentage of each Fourth-class soil in crops, idle cropland, pasture, and forest in Jackson County, N. C., in 1944, according to management groups*

Management group and soil	Crops	Idle cropland	Open pasture	Forest
GROUP 4–A:	*Percent*	*Percent*	*Percent*	*Percent*
Ashe loam, severely eroded hilly phase	10	45	45	0
Halewood loam:				
Eroded phase	40	15	45	0
Severely eroded phase	20	35	45	0
Hayesville clay loam:				
Eroded phase	60	20	20	0
Severely eroded phase	35	10	55	0
Tusquitee loam:				
Eroded hilly phase	43	10	45	2
Severely eroded hilly phase	30	35	35	0
Rabun clay loam, eroded phase	15	15	60	10
GROUP 4–B:				
Ashe loam	.5	.5	2	97
Eroded phase	25	5	70	0
Ashe sandy loam	.5	.5	2	97
Eroded phase	30	15	55	0
Clifton loam, steep phase	10	5	35	50
Hayesville loam, steep phase	15	5	15	65
Clifton clay loam, eroded steep phase	45	15	30	10
Hayesville clay loam, eroded steep phase	45	10	45	0
Porters loam	2	.5	5	92.5
Eroded phase	45	1	54	0
Rabun clay loam, steep phase	15	10	10	65
GROUP 4–C:				
Burton stony loam	0	0	0	100
Chandler loam, hilly phase	30	10	30	30
Ramsey loam	5	0	5	90
Eroded phase	35	10	40	15
Talladega silt loam, eroded hilly phase	25	15	35	25
Stony colluvium (Porters soil material)	10	5	55	30

MANAGEMENT GROUP 4–A

The eight soils in group 4–A are somewhat unlike in color, texture, and structure, but they are moderately or severely eroded, have about the same range in slope, and occupy relatively similar positions on the landscape. All except Ashe loam, severely eroded hilly phase, are brown to reddish brown and are of heavy loam to clay loam texture. All have been cleared and cultivated, but a few acres are now in woodland, chiefly shortleaf pine. About 33 percent is in cultivation, about 23 percent is idle cropland, and about 44 percent is used for grazing.

No special tillage practices are employed. The land is generally plowed in spring. Hillside ditches are used on many fields, but frequently they have gradients of 8 to 20 percent and many have become active gullies. A few farmers have laid out strips across the fields and thus have been fairly successful in controlling runoff.

Lime is added to cropland on some farms at the rate of 1 ton an acre every fourth or fifth year. It is applied to hay land and pasture land on a very few farms. Considerable superphosphate is used. Manure is added to these soils rather than to the less eroded ones, not only to increase crop yields, but also to help control water on the land.

No definite rotation is in general use on these soils, although some farmers alternate corn and small grain and a few add lespedeza so as to have a 4-year rotation of these crops.

The eroded condition of these soils indicates that they are not very well suited to tilled crops, therefore the most feasible use should be permanent sod, principally pasture. Tusquitee loam, eroded hilly phase, may be used for apple orchards and sod established between the trees. If some areas are needed for corn or other row crops, such crops should be followed by wheat or rye, and then by a grass-legume mixture. It is preferable that sod-forming crops occupy the fields 5 out of every 6 years. All such fields should be used in the contour-strip rotation, and only a narrow band should be broken and cultivated each year. Manure will prove beneficial to the galled spots in these soils.

MANAGEMENT GROUP 4–B

Group 4–B comprises the largest number of and the most widely distributed soils of any group in the county. They are relatively similar in general physical characteristics. All have steep relief (30 to 60 percent), range in texture from loam to clay loam and in color from light yellowish brown to brownish red, are relatively free from stones, and when cultivated are susceptible to more or less erosion. Approximately 21 percent of the acreage is cultivated and about 29 percent is in pasture. Vast areas of the Ashe and Porters soils are in forest.

Little lime is applied, but an application of 200 to 300 pounds an acre of 16-percent superphosphate is used for corn and wheat. To establish a good sod, it is generally necessary to add 1½ to 2 tons an acre of ground limestone to these soils, preferably 4 to 6 months before seeding, and to follow this with 1 ton of ground limestone every fourth or fifth year. Rather heavy applications of phosphate should be made. Potash may be needed by crops on the Porters and Ashe soils, but plant symptoms should be noted and tests made to deter-

mine the quantity to be supplied. Manure added to thin spots in meadow and pasture will produce better returns than if spread over the entire area.

No common rotation is in general use on these soils, although corn is usually followed by rye. On some farms rye is followed by lespedeza for 2 years, so that a 4-year rotation may be had. A strip-crop rotation should be used on these soils, and a row crop should not be used more often than once in 5 years.

These soils are best suited physically to pasture and meadow, and permanent sod should be the eventual use. The economy of most farms, however, is such that some acreage must be used each year for row crops. The Porters soils are well suited to the production of apples, and small home orchards, when properly managed, will bring good returns.

MANAGEMENT GROUP 4–C

The six soils in this group are shallow and rather stony. In general, the relief is very strong to steep; and, except Burton stony loam, the soils are susceptible to severe erosion. All are unsuited physically to field crops and should never be in any use except pasture or forest. None is highly productive, and 2 tons of ground limestone an acre should be added when the grass mixtures are seeded, or as long as possible before seeding the land. Thereafter, 1 ton of limestone should be applied every fifth or sixth year. An application of 75 to 100 pounds of phosphoric acid an acre will be necessary at seeding, and light applications will also be necessary at intervals of 3 or 4 years. Available quantities of manure should be applied to thin spots in pastures.

FIFTH-CLASS SOILS

Because of adverse physical characteristics, Fifth-class soils are poorly suited to cultivated crops or to pasture under almost any condition. The limitations are steepness, stoniness, poor moisture relations, and scarcity of plant nutrients. Under such conditions, tillage is very impractical or even impossible and use for pasture is generally not feasible. Existing conditions, either of the locality or the farm unit, however, may require the use of some of these soils for pasture and crops; but it should be emphasized that conservation and workability are very difficult, and long-time yields are generally quite low. Hand implements must be used in most places for preparing the seedbed and for cultivating. Although trees grow more slowly on many of these soils than on those of the other classes, the Fifth-class soils are better suited to forest than to crops or pasture.

The estimated percentage of each Fifth-class soil used for crops, idle cropland, open pasture, and forest in 1944 is given in table 8.

The Fifth-class soils are used mainly for forest production. They are not suitable for crops requiring tillage and are poorly to very poorly suited to pasture. It is therefore assumed that most of their acreage will remain in forest for a long time. At present little can be said about soil management practices for forest production, particularly from the farmers' point of view. The Fifth-class soils have therefore not been subdivided into groups according to soil management requirements and responses.

TABLE 8.—*Estimated percentage of each Fifth-class soil in crops, idle cropland, pasture, and forest in Jackson County, N. C., in 1944*

Soil	Crops	Idle cropland	Open pasture	Forest
	Percent	*Percent*	*Percent*	*Percent*
Ashe loam:				
Severely eroded phase	0	45	55	0
Very steep phase	0	0	0	100
Ashe stony loam	0	0	1	99
Very steep phase	0	0	0	100
Chandler loam	1	2	7	90
Clifton clay loam, severely eroded steep phase	10	10	80	0
Hayesville clay loam, severely eroded steep phase	2	8	90	0
Porters loam:				
Eroded very steep phase		0	100	0
Severely eroded phase	2	23	75	0
Very steep phase	0	0	2	98
Porters stony loam	5	1	2	92
Very steep phase	0	0	2	98
Rabun clay loam:				
Eroded steep phase	30	25	45	0
Severely eroded steep phase	2	3	95	0
Ramsey loam, severely eroded phase	2	30	68	0
Rock outcrop	0	0	0	0
Rough gullied land (Hayesville and Halewood soil materials)	0	100	0	0
Rough stony land (Porters and Ashe soil materials)	0	0	0	100
Talladega-Porters loams	0	0	2	98
Eroded phases	30	0	70	0
Talladega silt loam	0	0	8	92
Severely eroded phase	0	40	60	0

Although the Fifth-class soils are not physically suited to crops and pasture, small areas are being used for pasture and crops because of economic and social factors, both inside and outside the farm boundary. This applies chiefly to the Chandler, Talladega, Porters, Ashe, Clifton, Hayesville, and Rabun soils that are not very steep, stony, or severely eroded. The fertility of and required treatments for the Rabun and Clifton soils are different from most of the other soils listed, but further experience and experimentation are needed to verify this interpretation. Even these, the better Fifth-class soils, have slopes of 30 to 60 percent, are eroded in many places, and are low to moderate in fertility. It is very expensive if not impracticable to maintain satisfactory yields of crops requiring tillage on these soils.

Where the production of tilled crops is attempted on these steep soils, adequate liming and fertilizing and every reasonable supporting practice for water control are needed. The use of amendments and careful selection and rotation of crops are especially needed to encourage heavy vegetation. Strip cropping is usually required if productivity is to be maintained any considerable length of time.

For the maintenance of pasture, addition of lime and fertilizer, particularly phosphorus, and other good management practices are necessary. In general, 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 every fourth to sixth year. It is difficult to apply these materials and also to control weeds in many places, chiefly because of steep slopes and inaccessibility.

TABLE 9.—*Crop adaptation and fertilizer requirements per acre by management groups for soils of Jackson County, North Carolina*

Management group and soil	Special crop adaptation	Rotations	Nitrogen	Phosphoric acid	Potash	Lime	Manure	Water control	Remarks
			Pounds	*Pounds*	*Pounds*	*Tons*			
GROUP 1-A:									
Congaree silt loam Congaree fine sandy loam Altavista silt loam	Corn, grass, pasture, and truck.	1. Corn, crimson clover, 1 year 2. Corn, small grain, lespedeza, 2 years (especially with silage corn, 3 years).	15–20 30–50	25–40 70–100	15–30 50–70	1 every 4 to 6 years or as indicated by soil test.	None		Nitrogen applied on corn and small grain at planting or as top dressing, or both; phosphate and potash on corn or small grain; most of fertilizer on truck crops where they appear in rotation.
		3. Truck (beans, cabbage), small grain, lespedeza, and grass hay, 3 years. 4. Truck (potatoes), small grain, lespedeza, 3 years.	40–60	70–120	50–80	½ every 4 to 6 years or as indicated by soil test.			
GROUP 1-B:									
State loam Sloping phase Tusquitee loam Eroded phase Gently sloping phase Hiwassee clay loam	Wheat, clover and alfalfa, truck, and pasture.	1. Corn, small grain, lespedeza, 3 years. 2. Corn, small grain, clover and grass hay, 4 years.	30–60	70–120	30–50	1 every 4 to 6 years, or as indicated by soil test.	To corn and alfalfa.	Contour tillage	Potatoes and alfalfa probably should not be grown in same rotation because of potato diseases; use boron on alfalfa.
		3. Corn, crimson clover, 1 year 4. Alfalfa, 4 years; corn, small grain, lespedeza, alfalfa, 6–7 years.	15–20 30–50	25–40 200–300	15–30 200–300	2, or as indicated by soil test.			
		5. Truck (beans, potatoes, cabbage), small grain, clover or lespedeza, 3–4 years.	40–60	70–120	40–60	1 on cabbage and beans, ½ on potato land.			
GROUP 2-A:									
Ashe loam: Rolling phase Eroded rolling phase Ashe sandy loam: Rolling phase Eroded rolling phase	Truck, and apple orchards.	1. Truck (beans, potatoes or cabbage), small grain, clover and grass hay, 3 years.	50–70	70–120	40–60	1, or as indicated by soil test; ½ on potato land.	To corn	do	
		2. Corn, small grain, lespedeza, 3 years.	20–40	60–100	35–50	1, or as indicated by soil test.			
GROUP 2-B.									
Hiwassee clay loam, eroded sloping phase. Hayesville loam, rolling phase. Hayesville clay loam, eroded rolling phase.	Grains, legumes, and orchards.	1. Corn, small grain, lespedeza, 3 years.	25–50	70–120	25–50	do	To corn and alfalfa.	do	Use boron on alfalfa.
		2. Alfalfa, 4 years; corn, small grain, lespedeza, alfalfa, 6–7 years.	30–50	200–300	250–350	2, or as indicated by soil test.			
GROUP 2-C:									
Toxaway silt loam, drained phase. Congaree-Toxaway complex	Corn, truck, and grass.	1. Corn, grass and clover meadow, 4–5 years. 2. Beans or potatoes, rye, meadow, 4 years.	30–50	60–120	60–100	1 or 2 every 3 to 4 years, or as indicated by soil test; ½ on potato land.		Drainage necessary for successful cropping.	
GROUP 3-A:									
Hiwassee clay loam: Eroded hill phase Severely eroded hill phase. Halewood loam Hayesville loam Clifton clay loam, eroded phase.	Orchards, alfalfa, clover, and small grains.	1. Corn, small grain, clover, and grasses, 5–6 years.	20–50	80–120	50–80	1, or as indicated by soil test.	To eroded areas first.	Strip cropping and contour tillage.	Should not be in row crops more often than once in 5 years; may be preferable to substitute barley for corn.
		2. Alfalfa, 3–4 years; corn, small grain, lespedeza, alfalfa, 5–6 years.	30–50	200–300	250–350	2, or as indicated by soil test.			
GROUP 3-B:									
Tusquitee loam, hilly phase. Ashe sandy loam: Hilly phase Eroded hilly phase Ashe loam: Hilly phase Eroded hilly phase	Truck, orchards, grasses, hay, and pasture.	1. Truck (beans, potatoes, cabbage), small grain, hay, 4–5 years.	50–80	80–120	50–80	1, or as indicated by soil test; ½ on potato land.	do	do	Subject to considerable leaching; lime requirements often higher than reported here.
		2. Corn, small grain, lespedeza, 3 years.	25–50	70–120	35–50	1, or as indicated by soil test.			
GROUP 3-C:									
Congaree loamy fine sand		1. Corn, crimson clover, lespedeza, 1 year.	30–50	25–40	25–40	1 every 6 years or as indicated by soil test.	Liberal quantities.		Subject to severe leaching; organic matter should be supplied by turning cover crops and manure into soil.
		2. Corn, rye, lespedeza, 3 years 3. Truck, rye, lespedeza, 3 years	30–60	60–100	30–60				
GROUP 3-D:									
Warne fine sandy loam Toxaway silt loam	Meadow and pasture.	1. Corn, meadow, 5–6 years 2. Corn, pasture, 5–6 years	15–20	60–100	35–50	1½ to 2, or as indicated by soil test.		Drainage generally essential.	Tendency for coarse grass, alder, bushes, and reeds to grow under average conditions.
GROUP 4-A:									
Ashe loam, severely eroded hilly phase. Halewood loam: Eroded phase Severely eroded phase Hayesville clay loam: Eroded phase Severely eroded phase Tusquitee loam: Eroded hilly phase Severely eroded hilly phase. Rabun clay loam, eroded phase.	Pasture, meadow, and apple orchards.			60–100 at seeding and every 3–5 years.	15–20 at seeding.	1 to 1½ on grass-legume mixture, 5–8 years.	To eroded areas in meadow or pasture.	If necessary to cultivate, use a strip-crop type of rotation, with rather narrow row-crop areas, and laid off on contour.	Subject to severe erosion losses; best in pasture or hay meadow. If essential to cultivate, follow corn by wheat or rye, and grass-legume mixture; preferable not to be in row crops more often than every sixth year.
GROUP 4-B:									
Ashe loam, eroded phase Ashe sandy loam, eroded phase. Clifton loam, steep phase Clifton clay loam, eroded steep phase. Hayesville loam, steep phase. Hayesville clay loam, eroded steep phase. Porters loam, eroded phase Rabun clay loam, steep phase.	do			70–120 at seeding and every 3–5 years.	30–50 at seeding.	1–1½ on grass-legume mixture at seeding.	do	do	Less susceptible to erosion than groups 4-A or 4-C; tendency to plant to row-crop too often. Use cover; eventually to permanent sod; if necessary to cultivate, use row-crop only once in 5–6 years.
GROUP 4-C:									
Ramsey loam Eroded phase Burton stony loam Talladega silt loam, eroded hilly phase. Chandler loam, hilly phase	Pasture	Should be in permanent pasture		60–100 at seeding and every 4–5 years.	30–50 at seeding and every 2 years.	do	do	Permanent sod	All except Burton stony loam susceptible to very severe water and soil loss if tilled.
Stony colluvium (Porters soil material).		Where smooth enough, a rotation may be used with corn or truck, small grain, and lespedeza.	25–50	50–100	25–50	1 every 4 to 6 years	Liberal quantities.		High content of stones frequently prevents tillage or hay crop harvest. Best use is pasture.
GROUP 5.									
Ashe loam: Severely eroded phase	Trees with small local areas in pasture or hay.								Locust and white pine trees should be planted on all open areas not covered with fair sod; mulching frequently necessary.
Very steep phase	do								Do.
Ashe stony loam Very steep phase	Remain in trees do								
Chandler loam	Trees only								
Clifton clay loam, severely eroded steep phase.	Trees, with small local areas in pasture or hay.								Do.
Hayesville clay loam, severely eroded steep phase.	do								Do.
Porters loam: Eroded very steep phase Severely eroded phase Very steep phase	do do Trees only								Do. Do.
Porters stony loam Very steep phase	Remain in trees do								
Rabun clay loam: Eroded steep phase	Trees with small local areas in pasture or hay.								Do.
Severely eroded steep phase.	do								Do.
Ramsey loam, severely eroded phase.	do								Do.
Rock outcrop									
Rough gullied land (Hayesville and Halewood soil materials).									Mulch; seed to appropriate lespedeza and grass mixtures; kudzu and locust or white pine may be used in places.
Rough stony land (Porters and Ashe soil materials).	Trees only								
Talladega-Porters loams Eroded phases	do Trees with small local areas in pasture or hay.								Do.
Talladega silt loam Severely eroded phase	Trees only Trees with small local areas in pasture or hay.								

Rough gullied land (Hayesville and Halewood soil materials) requires special attention for the reestablishment of vegetation. Most farmers will do this gradually for economic reasons. To the extent feasible, ditches, terraces, or other means of water diversion should be employed. Following this diversion, it may be advisable to mulch the areas and seed the ground to mixtures of lespedeza and suitable grasses. Kudzu might be used, or suitable tree seedlings, as black locust and white pine, might follow the sod to provide a more permanent cover. The less sloping phases of this land type might be prepared gradually for pasture production.

The remaining Fifth-class soils are either steep and stony and often severely eroded or very steep and stony. They are used for forest with the exception of very small scattered patches that are used otherwise for short periods. For these soils, management is restricted to a few simple practices, such as the control of fire, trampling, and unusual accumulations from runoff.

CROP ADAPTATIONS, ROTATIONS, AND FERTILIZER REQUIREMENTS

Crop adaptations, rotations, and fertilizer requirements by management groups of the soils of Jackson County are given in table 9.

Fertilizers recommended are listed on the basis of nitrogen, phosphoric acid, and potash required on a given rotation with a particular management group. The following general principles should be kept in mind in applying plant food to the rotations:

1. *Nitrogen.* Corn, small grain, and truck crops give best returns from direct applications, and most of that used in the rotation should be applied to these crops.
2. *Phosphoric acid.* The largest response to phosphate is usually obtained by applying this plant nutrient to legumes, as clover and alfalfa, and to truck crops and small grain. Therefore, most of the phosphate in the rotation should be used on these crops.
3. *Potash.* This plant nutrient usually produces the largest returns when used on truck crops, small grain, legumes, and sometimes corn. Its use, however, should generally be spread fairly well over most of the crops in rotation.
4. *Limestone.* Lespedeza, clover, alfalfa, and other legume crops are usually most responsive to lime, which should be applied either just prior to seeding the legume or to the crop just preceding the legume in rotation. For example, where lespedeza or clover is to be seeded in small grain, the lime should be applied for the rotation when preparing the land for the small grain.

Examples of the application of these principles in fertilizer rotations are given in table 10. They show how the recommended fertilization could be obtained. It might be obtained in many other ways. Straight phosphate and potash materials may be used where available, and their use should be taken into account in the application of complete fertilizer on the rest of the rotation.

TABLE 10.—*Fertilizer recommendations for two crop rotations in management groups 1–A and 1–B, for Jackson County, N. C.*

ROTATION 3, MANAGEMENT GROUP 1-A

Rotation	Fertilizer mixture	Nitrogen	Phosphoric acid	Potash
	Pounds	*Pounds*	*Pounds*	*Pounds*
Cabbage	700 of 6–8–6	42	56	42
Small grain	200 of 0–14–7	0	28	14
	100 of 16–0–0 [1]	16	0	0
Lespedeza and grass	None [2]			
Total		58	84	56

ROTATION 2, MANAGEMENT GROUP 1-B

Corn	200 of 6–8–6	12	16	12
	100 of 16–0–0 [3]	16	0	0
Small grain	300 of 3–12–6	9	36	18
	100 of 16–0–0 [1]	16	0	0
Clover, grass	200 of 0–14–7	0	28	14
Total		53	80	44

[1] Apply as top dressing in spring.
[2] If lime is needed, apply when preparing land for small grain
[3] Apply as side dressing at last cultivation

AGRICULTURAL PRACTICES

Cropland is broken in spring, usually during March and April, except on south-sloping land, which is generally broken in November and December. Contour tillage is often practiced on steep land. Strip cropping is becoming a common practice in a few localities. Very few, if any, farmers, however, run the contour strip by use of a level but depend merely on the unaided eyesight. Practically none of the land has been terraced and, because of the prevailing rather steep slopes, terraces generally are not recommended. There is little poorly drained land, and much of this has been artificially drained. Open ditches or covered box-type ditches made of poles and slabs or rocks are used to remove excess water.

Crop rotations are carried out on some farms. Those used on soils of the bottom lands, stream terraces, and colluvial slopes are (1) first year, potatoes, followed by rye; second year, rye, followed by corn, the cornland sown to rye; third year, lespedeza; and fourth year, potatoes; (2) corn, followed by rye and lespedeza, these by lespedeza, then corn; (3) tobacco, followed by rye and lespedeza, and these by corn. In some places the rotation is corn, crimson clover, and corn; in others, rye, corn, and rye. In a number of communities corn is followed by corn year after year. Rotations practiced on the Halewood and Hayesville soils include either small grain and lespedeza, followed by corn; or red clover, followed by corn. The following rotations are used on the Ashe soils: Corn, followed by grass and clover for 2 years, and then cabbage or potatoes; snap beans, followed by rye and clover for 2 years, and then cabbage, followed by corn; corn, followed for 2 years by rye or by grass and clover, and then potatoes, cabbage, or snap beans. The rotations on the Porters soils include corn for 2 or 3 years, followed by grass and clover, a mixture used the first year for hay and then for pasture.

Usually in the production of grass and clover, the crops are cut the first summer for hay and then grazed for 2 years, or until the land is

again cultivated. Grasses, clover, and rye are seeded in crops harvested in fall, and lespedeza is generally seeded in small grain in spring.

Commercial fertilizer is used throughout the agricultural districts in the production of practically all the crops. About 75 percent of it is applied to truck crops, 15 percent to corn, 5 percent to wheat, and the rest to other crops.[9] The heaviest applications per acre are to land used for truck crops. The applications range from 800 to 1,000 pounds an acre, and the grades generally used are 5–7–5 or 4–12–4. Superphosphate, the main fertilizer for corn and small grains, is used in quantities of 200 to 300 pounds for corn and 300 to 400 pounds for small grains. A few farmers apply 200 to 300 pounds of 0–10–4, 4–8–4, or 4–12–4 for corn and wheat. Some phosphate fertilizer is applied to pasture at the rate of about 300 pounds of 16-percent grade or its equivalent.

Practically all the manure used is applied either in spring to eroded places in cornland or in fall to eroded areas in small-grain land, at the rate of 5 to 6 tons an acre. In the Glenville section some manure is used for cabbage, and a small quantity of well-rotted manure is applied for potatoes. In general, none is used on pasture.

The use of lime has gradually increased. About three-fifths of that applied is for truck crops and much of the rest to land producing general farm crops. Some is applied to the more accessible areas of pasture, practically none being applied to the steep slopes. The usual initial application of lime is 1 to 2 tons an acre, although soils on the bottom lands receive 2 to 4 tons.[10]

Dates on which crops in the county are planted and harvested are given in table 11.

TABLE 11.—*Planting and harvesting dates of the principal crops in Jackson County, N. C.*

Crop	Date of planting	Date of harvesting	Crop	Date of planting	Date of harvesting
Corn	Apr. 15–30	Oct. 15–30.	Cabbage (transplanted).	May 15–30	Sept. 1–30.
Oats	Mar. 30–Apr 15.	July 1–15.	Green beans	May 1–July 30	July 1–Sept. 30.
Wheat	Oct. 10–30	June 15–30	Tobacco (beds seeded).	Feb. 15–25	
Rye	Oct. 15–30	Apr. 1–15 (turned under).	Tobacco (transplanted).	May 15–30	Aug. 15–Sept. 15.
Potatoes	Mar 15–30	Sept 1–15.	Pasture mixtures.	Feb. 15–Apr. 1	Apr 1–Oct. 30 (grazed).
Grass	Feb. 20–Apr. 15.	Apr. 1–Oct. 30.			
Clover	Apr. 1–15	July 1–30 (hay)			
Lespedeza	do	Sept. 1–15 (hay).			
Cabbage (beds seeded).	Apr 10–20				

SOIL PRODUCTIVITY

The soils of Jackson County are listed in table 12 to show the expected average yield of crops and in table 13 according to their productivity of the crops most generally grown. Many soils are not suited physically to crop production and are listed under pasture or forest. Two yield levels are given for the crops on each soil, corresponding to probable production under two different kinds of treatment (columns B and C). Yields vary between soils, depending on soil characteristics, management, and crops.

[9] The fertilizer percentage stated does not include the triple superphosphate supplied by the Tennessee Valley Authority chiefly for improvement of sod crops.

[10] Information from the county agricultural agent.

TABLE 12.—*Expected average acre yields of the principal crops of Jackson County, N. C., under two levels of soil management, and the conservability, workability, and physical land class of each soil*

Soils [1] (soil type, phase, complex, or miscellaneous land type)	Corn		Wheat		Rye		Clover and grass hay		Lespedeza hay		Potatoes		Green beans for truck		Cabbage for truck		Permanent pasture		Conservability [5]	Workability [6]	Physical land classification [7]
	B [2,3]	C [4]	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C			
	Bu	*Bu*	*Bu*	*Bu*	*Bu*	*Bu*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu*	*Bu*	*Bu*	*Bu*	*Tons*	*Tons*	*Cow-acre-days* [8]	*Cow-acre-days* [8]			
Altavista silt loam	25	40	12	25	12	20	1.1	1.7	(9)	(9)	120	180	120	140	8	12	65	105	Very good	Excellent	First.
Ashe loam [10]	10	20	(11)	(11)	6	10	.4	.8	(11)	(11)	(11)	(11)	(11)	(11)	6	10	[12] 25	70	Poor	Poor	Fourth.
Eroded phase	8	16	(11)	(11)	4	7	.3	.7	(11)	(11)	(11)	(11)	(11)	(11)	4	7	[12] 20	60	...do	...do	Do.
Eroded hilly phase	14	24	8	13	7	12	.6	1.0	.4	.8	50	90	110	150	5	10	40	80	Fair	Good	Third.
Eroded rolling phase	13	30	8	15	6	12	.6	1.1	.5	.8	60	110	(9)	(9)	7	11	40	80	Good	...do	Second.
Hilly phase [10]	18	32	10	18	8	14	.8	1.4	.5	1.0	60	120	120	160	9	15	40	80	...do	...do	Third.
Rolling phase [10]	18	32	10	18	8	14	.7	1.3	.6	1.0	80	150	(9)	(9)	9	14	45	85	Very good	...do	Second.
Severely eroded phase	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	[12] 10	40	Very poor	Very poor	Fifth
Severely eroded hilly phase	6	10	(11)	(11)	4	8	(11)	(11)	.3	.6	(11)	(11)	(11)	(11)	(11)	(11)	20	50	Poor	Fair	Fourth.
Very steep phase	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	Very poor	Very poor	Fifth.
Ashe sandy loam [10]	8	16	(11)	(11)	4	6	.3	.6	(11)	(11)	(11)	(11)	(11)	(11)	6	8	[12] 15	60	Poor	Poor	Fourth.
Eroded phase	6	9	(11)	(11)	3	5	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	[12] 10	40	...do	...do	Do.
Eroded hilly phase	12	20	7	12	6	10	.5	.9	.3	.6	40	60	70	100	5	9	25	65	Fair	Good	Third.
Eroded rolling phase	10	25	5	10	4	9	.4	.8	.3	.6	(9)	(9)	(9)	(9)	6	10	30	65	Good	...do	Second.
Hilly phase [10]	15	28	8	16	8	17	.6	1.2	(9)	(9)	60	100	100	140	7	12	30	75	...do	...do	Third.
Rolling phase [10]	14	32	10	15	10	15	.5	9	.4	.7	50	100	(9)	(9)	8	12	35	65	Very good	...do	Second.
Ashe stony loam	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	[12] 15	50	Poor	Poor	Fifth.
Very steep phase	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	Very poor	Very poor	Do
Burton stony loam	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	75	90	Very good	...do	Fourth.
Chandler loam	(9)	(9)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(9)	(9)	Very poor	Poor	Fifth.
Hilly phase	6	10	(9)	(9)	(9)	(9)	(9)	(9)	3	.5	(11)	(11)	(11)	(11)	(11)	(11)	(9)	(9)	Fair	Fair	Fourth.
Clifton clay loam																					
Eroded phase	12	20	(9)	(9)	(9)	(9)	.5	.9	.4	.8	(11)	(11)	(11)	(11)	(11)	(11)	(9)	(9)	...do	Good	Third.
Eroded steep phase	6	10	(11)	(11)	(11)	(11)	.3	.6	.3	.5	(11)	(11)	(11)	(11)	(11)	(11)	(9)	(9)	Poor	Fair	Fourth.
Severely eroded steep phase	5	8	(11)	(11)	(11)	(11)	(9)	(9)	(9)	(9)	(11)	(11)	(11)	(11)	(11)	(11)	(9)	(9)	...do	...do	{Fifth / Fourth.
Clifton loam.																					
Steep phase [10]	7	12	(11)	(11)	(9)	(9)	(9)	(9)	.3	.5	(11)	(11)	(11)	(11)	(11)	(11)	(9)	(9)	Fair	...do	Do.
Congaree fine sandy loam [13]	40	60	14	18	14	18	1.4	1.8	(9)	(9)	120	180	100	150	9	14	60	100	Very good	Excellent	First.
Congaree loamy find sand [13]	10	20	(9)	(9)	(9)	(9)	.4	.7	(9)	(9)	70	120	(11)	(11)	(11)	(11)	20	45	Fair	Very good	Third.
Congaree silt loam [13]	45	70	12	14	12	14	1.5	2.0	(9)	(9)	125	200	140	200	10	16	110	125	Excellent	Excellent	First.
Congaree-Toxaway complex [13]	30	65	(9)	(9)	(9)	(9)	1.2	1.8	(9)	(9)	100	160	80	120	8	14	115	130	Very good	Good	Second.
Halewood loam [10]	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(11)	(11)	(11)	(11)	30	65	Fair	...do	Third
Eroded phase	12	20	8	15	6	12	.6	1.1	.4	.8	80	140	(11)	(11)	(11)	(11)	30	65	...do	Fair	Fourth.
Severely eroded phase	6	12	5	9	4	7	.4	.7	.3	.6	(11)	(11)	(11)	(11)	(11)	(11)	20	45	Poor	...do	Do.

Hayesville clay loam:																					
Eroded phase	8	16	7	13	5	11	.3	1.0	.3	.6	(11)	(11)	(11)	(11)	(11)	(11)	40	65	....do.....	Poor.....	Do
Eroded rolling phase	12	25	10	16	9	14	(9)	(9)	(9)	(9)	(11)	(11)	(11)	(11)	(11)	(11)	60	90	Good.....	Very good.	Second.
Eroded steep phase	6	10	(9)	(9)	(9)	(9)	.3	.7	.2	.5	(11)	(11)	(11)	(11)	(11)	(11)	30	55	Poor.....	Poor.....	Fourth.
Severely eroded phase	10	18	4	8	3	7	.2	.6	.2	.5	(11)	(11)	(11)	(11)	(11)	(11)	20	50	....do....	...do.....	Do
Severely eroded steep phase	4	12	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	10	30	Very poor.	...do.....	Fifth.
Hayesville loam [10]	12	22	9	14	8	14	.6	1.2	.5	.9	(11)	(11)	(11)	(11)	(11)	(11)	45	75	Good.....	Fair.....	Third.
Rolling phase [10]	12	30	10	18	6	14	.4	.9	.4	.8	(11)	(11)	(9)	(9)	(9)	(9)	60	90	...do.....	Very good.	Second.
Steep phase	8	14	6	10	6	10	.5	1.0	.4	.8	(11)	(11)	(11)	(11)	(11)	(11)	35	60	Poor.....	Fair.....	Fourth.
Hiwassee clay loam	30	55	15	25	12	20	1.0	1.5	.6	1.1	(11)	(11)	(11)	(11)	(11)	(11)	105	120	Very good.	Very good.	First.
Eroded hill phase	15	30	9	16	9	16	.6	1.1	.4	.8	(11)	(11)	(11)	(11)	(11)	(11)	45	80	Good.....	Good.....	Third.
Eroded sloping phase	25	45	12	22	10	18	.8	1.3	.5	1 0	(11)	(11)	(11)	(11)	(11)	(11)	60	100	...do.....	Very good.	Second.
Severely eroded hill phase	8	20	5	12	4	9	.4	.7	.2	.5	(11)	(11)	(11)	(11)	(11)	(11)	20	60	Fair.....	Good.....	Third
Porters loam [10]	16	35	(9)	(9)	10	14	.8	1.2	(9)	(9)	(11)	(11)	(11)	(11)	(11)	(11)	60	90	...do.....	Fair.....	Fourth.
Eroded phase	12	30	(11)	(11)	6	11	.5	1.0	.4	.8	(11)	(11)	(11)	(11)	(11)	(11)	55	90	Poor.....	...do.....	Do.
Eroded very steep phase	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	Very poor.	Very poor.	Fifth
Severely eroded phase	10	20	(11)	(11)	(11)	(11)	.4	.6	.3	.6	(11)	(11)	(11)	(11)	(11)	(11)	30	75	...do.....	Poor.....	Do.
Very steep phase [10]	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	30	60	...do.....	Very poor	Do.
Porters stony loam [10]	8	14	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	40	70	...do.....	...do.....	Do.
Very steep phase [10]	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	25	50	...do.....	...do.....	Do.
Rabun clay loam:																					
Eroded phase	12	35	10	18	8	15	.7	1.1	.6	1.0	(11)	(11)	(11)	(11)	(11)	(11)	55	95	Fair.....	Fair.....	Fourth.
Eroded steep phase	6	10	(11)	(11)	(11)	(11)	(11)	(11)	.3	.5	(11)	(11)	(11)	(11)	(11)	(9)	(9)	(9)	Poor.....	Poor.....	Fifth.
Severely eroded steep phase	5	9	(11)	(11)	(11)	(11)	(11)	(11)	.2	.4	(11)	(11)	(11)	(11)	(11)	(9)	(9)	(9)	Very poor.	...do.....	Do
Steep phase [10]	10	25	(11)	(11)	(11)	(11)	(11)	(11)	.4	.7	(11)	(11)	(11)	(11)	(11)	(9)	(9)	(9)	Fair.....	Fair.....	Fourth.
Ramsey loam [10]	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	15	30	...do.....	...do.....	Do.
Eroded phase	7	12	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	15	30	...do.....	...do.....	Do.
Severely eroded phase	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	Poor.....	Poor.....	Fifth.
Rock outcrop	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	Excellent..	Very poor.	Do.
Rough gullied land (Hayesville and Halewood soil materials)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	Very poor.	...do.....	Do.
Rough stony land (Porters and Ashe soil materials).	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	Good.....	...do.....	Do.
State loam	45	70	14	25	10	20	1.3	2.0	.8	1.2	140	220	120	180	12	18	110	125	Excellent..	Excellent..	First.
Sloping phase	40	65	13	23	9	18	1.1	1.8	.7	1.0	100	180	100	160	10	16	90	110	Very good.	...do.....	Do.
Stony colluvium (Porters soil material)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	40	55	...do.....	Very poor.	Fourth.
Talladega-Porters loams [10]	7	14	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	30	50	Very poor.	Poor.....	Do.
Eroded phases	5	10	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	25	45	...do.....	...do.....	Do
Talladega silt loam	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	20	35	...do.....	...do.....	Do.
Eroded hilly phase	4	8	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	15	25	Poor.....	Fair.....	Do.
Severely eroded phase	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	Very poor.	Poor.....	Fifth.
Toxaway silt loam [12]	20	20	(11)	(11)	(11)	(11)	.8	.8	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	55	85	Excellent..	Fair.....	Third.
Drained phase [12]	40	65	(11)	(11)	(11)	(11)	1.0	1.5	(11)	(11)	120	180	120	180	10	14	115	130	...do.....	Good.....	Second

See footnotes at end of table.

TABLE 12.—*Expected average acre yields of the principal crops of Jackson County, N C., under two levels of soil management, and the conservability, workability, and physical land class of each soil*—Continued

Soils [1] (soil type, phase, complex, or miscellaneous land type)	Corn		Wheat		Rye		Clover and grass hay		Lespedeza hay		Potatoes		Green beans for truck		Cabbage for truck		Permanent pasture		Conservability [5]	Workability [6]	Physical land classification [7]
	B [2 3]	C [4]	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C			
	Bu.	*Bu.*	*Bu*	*Bu.*	*Bu*	*Bu*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu*	*Bu*	*Bu*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [8]	*Cow-acre-days* [8]			
Tusquitee loam	40	65	14	24	10	18	1.2	1.8	.7	1.1	130	200	130	200	12	18	100	115	Very good	Very good.	First.
Eroded phase	35	60	13	22	9	16	1.0	1.5	.5	.9	80	160	(9)	80	6	10	100	115	Good	do	Do.
Eroded hilly phase	10	20	9	14	6	11	.5	.9	.4	.8	40	100	(9)	(9)	5	8	60	100	Fair	Good	Fourth
Gently sloping phase	45	70	16	25	12	20	1.3	1.9	.7	1.1	150	220	130	210	13	19	110	125	Excellent	Excellent	First.
Hilly phase [10]	12	25	12	20	12	18	.7	1.1	.5	1.0	60	120	(9)	(9)	6	10	65	100	Good	Good	Third.
Severely eroded hilly phase	8	14	5	8	3	6	.4	.8	.3	.6	25	60	(9)	(9)	4	7	40	70	Fair	Fair	Fourth.
Warne fine sandy loam	18	30	8	12	7	11	.7	1.0	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	40	70	Good	Very good.	Third.

[1] The soils are listed in alphabetical order

[2] Expected yields under the soil-management practices followed by most farmers

[3] Columns A have been omitted If included they would give yields expected without the use of amendments or beneficial crop rotations on the specified soil after use for crops for 5 years or more

[4] Expected yields from soil-management practices considered the best that most farmers can feasibly follow

[5] Conservability refers to the ease with which the productivity and workability can be maintained or improved It includes the ease of conservation of soil material and plant nutrients and the ease of maintenance of good tilth. Relative terms in the decreasing order of conservation and maintenance are excellent, very good, good, fair, poor, and very poor. In order that these terms may be comparable among the soils, they are used with respect to conservability for crops requiring tillage

[6] Workability refers to the ease of tillage, harvesting, and other field operations Relative terms in the decreasing order of farming operations are excellent, very good, good, fair, poor, and very poor.

[7] A classification according to relative suitability for use First class represents soils especially well suited physically to crops generally grown, whereas Fifth class represents soils most poorly suited physically to crop use

[8] The term "cow-acre-days" is used to express the carrying capacity of pasture land As used here, it 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. For example, the soil type able to support 1 animal unit per acre for 360 days of the year rates 360, whereas a soil type able to support 1 animal unit on 2 acres for 180 days of the year rates 90

[9] Crop not commonly grown, the soil is considered suited physically to its production, though less well suited than to crops for which yields are given.

[10] Uneroded areas are practically all under a cover of trees.

[11] Crop not commonly grown, the soil is considered poorly suited physically to its production under the management specified

[12] Current practices include practically no pasture treatment

[13] High water usually causes damage every fourth or fifth year.

There are very few, if any farmers in the county who do not make some effort to improve their land either by adding manure or small quantities of commercial fertilizer or by occasionally changing fields and crops. In columns B the crop yields listed are those the average farmer obtains under the prevailing soil-management practices. These practices are not the same on all soils, nor in all agricultural districts of the county.

The yield data in columns B are based on information obtained from individual farmers throughout the county and from the county agricultural agent and other agricultural leaders. Specific crop yields on soil types for periods of several years were obtained. Information on the carrying capacity of pastures could be assembled from only a few farmers for each soil commonly used for grazing.

In columns C the crop yields listed are those actually obtained on the average by some of the more progressive farmers. They are of practical attainment and represent expected yields under good soil management. The term "good soil management" involves the selection of suitable crops and rotations; the correct use of commercial fertilizers, lime, and manure; the return of organic matter to the soil; proper tillage; and engineering measures for the control of water on the land where necessary; all of which are employed to maintain or increase soil productivity within practical limits. The yields indicated, when compared with those shown in columns B, give some idea of the response crops are expected to make to good soil management. Yields in columns C may be considered as production goals, which can be reached by feasible management practices. The same goal may be reached by one or several different combinations of practices. The proper choice of soil-management practices will depend upon the farm business as a whole. On one farm it may be practical to manage the soil so that yields exceed that goal; on another it may not be practical to reach the goal. The best feasible management for a farm unit may give yields in excess of the goal for one crop and soil, and yields below the goal for another crop on the same soil.

Although knowledge about good management required by specific soils for certain crops is rather limited, some deficiencies in the soils are known and others are considered probable. From this knowledge some of the practices required are discussed in the subsection on Physical Land Classification and Soil Management, and reference may be made to it for the definition of the level of management for yields stated in columns C.

It should be noted that as different crops require different treatment on the same soil, so also the requirements of the same crop on dissimilar soils may be quite unlike. Then, too, there is the point at which the farmer no longer finds it profitable to intensify further the management practices by which higher yields are obtained. This level depends on the soil and the crop, as well as on the other soils, crops, and enterprises on the farm; also on prices and many other factors. In this report it is not possible to define fully the practical limits to production, because of insufficient knowledge and the uncertainty of those limits. The probable or average yields per acre of various crops are converted into indexes in table 13, and the soils are grouped according to their physical suitability for agricultural use.

663933—48——5

TABLE 13.—*Productivity ratings of the soils under each of two levels of management for the crops most commonly grown in the soils of Jackson County, N. C.*

FIRST-CLASS SOILS

[Good to excellent cropland, very good to excellent pasture land]

Soil [1]	Crop productivity index [2] for—																	
	Corn (100=50 bushels)		Wheat (100=25 bushels)		Rye (100=25 bushels)		Clover and grass (100=2 tons)		Lespedeza hay (100=1 ton)		Potatoes (100=200 bushels)		Green beans for truck (100=120 bushels)		Cabbage for truck (100=10 tons)		Permanent pasture (100=100 cow-acre-days) [3]		Forest suitability
	B [4] [5]	C [6]	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	
Congaree silt loam	90	140	50	55	50	55	75	100	(7)	(7)	65	100	115	165	100	160	110	125	Excellent
Congaree fine sandy loam	80	120	55	70	55	70	70	90	(7)	(7)	60	90	80	125	90	140	60	100	Very good
Altavista silt loam	50	80	50	100	50	80	55	85	(7)	(7)	60	90	100	115	80	120	65	105	Excellent
State loam	90	140	55	100	40	80	65	100	80	120	70	110	100	150	120	180	110	125	Do
Sloping phase	80	130	50	90	35	70	55	90	70	100	50	90	80	135	100	160	90	110	Do
Tusquitee loam	80	130	55	95	40	70	60	90	70	110	65	100	110	165	120	180	100	115	Do
Eroded phase	70	120	50	90	35	65	50	75	50	90	40	80	(7)	65	60	100	100	115	Good.
Gently sloping phase	90	140	65	100	50	80	65	95	70	110	75	110	110	175	130	190	110	125	Excellent
Hiwassee clay loam	60	110	60	100	50	80	50	75	60	110	(5)	(5)	(5)	(5)	(5)	(5)	105	120	Do

SECOND-CLASS SOILS

[Fair to good cropland, good to very good pasture land]

Congaree-Toxaway complex	60	130	(7)	(7)	(7)	(7)	60	90	(7)	(7)	50	80	65	100	80	140	115	130	Excellent
Toxaway silt loam, drained phase	80	130	(5)	(5)	(5)	(5)	50	75	(5)	(5)	60	90	100	150	100	140	115	130	Very good
Ashe loam, rolling phase	35	65	40	70	30	55	35	65	60	100	40	75	(7)	(7)	90	140	45	85	Do
Ashe sandy loam, rolling phase	30	65	40	60	40	60	25	45	40	70	25	50	(7)	(7)	80	120	35	65	Do
Hayesville loam, rolling phase	25	60	40	70	25	55	20	45	40	80	(5)	(5)	(7)	(7)	(7)	(7)	60	90	Do
Ashe loam, eroded rolling phase	25	60	30	60	25	50	30	55	50	80	30	55	(7)	(7)	70	110	40	80	Good
Ashe sandy loam, eroded rolling phase	20	50	20	40	15	35	20	40	30	60	(7)	(7)	(7)	(7)	60	100	30	65	Do
Hayesville clay loam																			
Eroded rolling phase	25	50	40	65	35	55	(7)	(7)	(7)	(7)	(5)	(5)	(5)	(5)	(5)	(5)	60	90	Do
Eroded sloping phase	50	90	50	90	40	70	40	65	50	100	(5)	(5)	(5)	(5)	(5)	(5)	60	100	Do

THIRD-CLASS SOILS

[Poor to good cropland, fair to good pasture land]

Ashe loam, hilly phase	35	65	40	70	30	55	40	70	50	100	30	60	100	135	90	150	40	80	Very good.
Ashe sandy loam, hilly phase	30	55	30	65	30	65	30	60	(7)	(7)	30	50	80	115	70	120	30	75	Do
Tusquitee loam, hilly phase	25	50	50	80	50	70	35	55	50	100	30	60	(7)	(7)	60	100	65	100	Excellent
Ashe loam, eroded hilly phase	30	50	30	50	30	50	30	50	40	80	25	45	90	125	50	100	40	80	Good
Ashe sandy loam, eroded hilly phase	25	40	30	50	25	40	25	45	30	60	20	30	60	80	50	90	25	65	Do
Hiwassee clay loam, eroded hill phase	30	60	35	65	35	65	30	55	40	80	(8)	(8)	(8)	(8)	(8)	(8)	45	80	Do
Hayesville loam	25	45	35	55	30	55	30	60	50	90	(8)	(8)	(8)	(8)	(8)	(8)	45	80	Do
Clifton clay loam, eroded phase	25	40	(7)	(7)	(7)	(7)	25	45	40	80	(8)	(8)	(8)	(8)	(8)	(8)	45	75	Do.
Congaree loamy fine sand	20	40	(7)	(7)	(7)	(7)	20	35	(7)	(7)	35	60	(8)	(8)	(8)	(8)	20	45	Do
Hiwassee clay loam, severely eroded hill phase	15	40	20	50	15	35	20	35	20	50	(8)	(8)	(8)	(8)	(8)	(8)	20	60	Fair
Toxaway silt loam	40	40	(8)	(8)	(8)	(8)	40	40	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	55	85	Very good.
Halewood loam	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(8)	(8)	(8)	(8)	(8)	(8)	30	65	Good
Warne fine sandy loam	35	60	30	50	30	45	35	50	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	40	70	Do

FOURTH-CLASS SOILS

[Very poor to poor cropland, fair to very good pasture land]

Rabun clay loam, eroded phase	25	70	40	70	30	60	35	55	60	100	(8)	(8)	(8)	(8)	(8)	(8)	55	95	Good
Porters loam	30	70	(7)	(7)	40	55	40	60	(7)	(7)	(8)	(8)	(8)	(8)	(8)	(8)	60	90	Very good
Eroded phase	25	60	(8)	(8)	25	45	25	50	40	80	(8)	(8)	(8)	(8)	(8)	(8)	55	90	Do
Halewood loam, eroded phase	25	40	30	60	25	50	30	55	40	80	40	70	(8)	(8)	(8)	(8)	30	65	Good
Tusquitee loam, eroded hilly phase	20	40	35	55	25	45	25	45	40	80	20	50	(7)	(7)	50	80	60	100	Very good
Rabun clay loam, steep phase	20	50	(8)	(8)	(8)	(8)	(8)	(8)	40	70	(8)	(8)	(8)	(8)	(8)	(8)	(7)	(7)	Do.
Ashe loam	20	40	(8)	(8)	25	40	20	40	(8)	(8)	(8)	(8)	(8)	(8)	60	100	25	70	Good.
Hayesville clay loam, severely eroded phase	20	35	15	30	12	30	10	30	20	50	(8)	(8)	(8)	(8)	(8)	(8)	20	50	Fair
Hayesville loam, steep phase	15	30	25	40	25	40	25	50	40	80	(8)	(8)	(8)	(8)	(8)	(8)	35	60	Good
Hayesville clay loam, eroded phase	15	30	30	50	20	45	15	50	30	60	(8)	(8)	(8)	(8)	(8)	(8)	40	65	Do
Ashe sandy loam	15	30	(8)	(8)	15	25	15	30	(8)	(8)	(8)	(8)	(8)	(8)	60	80	15	60	Do
Ashe loam, eroded phase	15	30	(8)	(8)	15	30	15	35	(8)	(8)	(8)	(8)	(8)	(8)	40	70	20	60	Do.
Ashe sandy loam, eroded phase	12	18	(8)	(8)	12	20	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	10	40	Fair
Ashe loam, severely eroded hilly phase	12	20	(8)	(8)	15	30	(8)	(8)	30	60	(8)	(8)	(8)	(8)	(8)	(8)	20	50	Do
Halewood loam, severely eroded phase	12	25	20	35	15	30	20	35	30	60	(8)	(8)	(8)	(8)	(8)	(8)	20	45	Do
Clifton loam, steep phase	15	25	(8)	(8)	(7)	(7)	(7)	(7)	30	50	(8)	(8)	(8)	(8)	(8)	(8)	(7)	(7)	Good.
Tusquitee loam, severely eroded hilly phase	15	30	20	30	12	25	20	40	30	60	13	30	(7)	(7)	40	70	40	70	Fair.
Clifton clay loam, eroded steep phase	12	20	(8)	(8)	(8)	(8)	15	30	30	50	(8)	(8)	(8)	(8)	(8)	(8)	(7)	(7)	Do.
Ramsey loam, eroded phase	15	25	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	15	30	Do.
Hayesville clay loam, eroded steep phase	12	20	(7)	(7)	(7)	(7)	15	35	20	50	(8)	(8)	(8)	(8)	(8)	(8)	30	55	Do.
Chandler loam, hilly phase	12	20	(7)	(7)	(7)	(7)	(7)	(7)	30	50	(8)	(8)	(8)	(8)	(8)	(8)	(7)	(7)	Do.
Talladega silt loam, eroded hilly phase	8	15	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	15	25	Do.
Burton stony loam	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	75	90	Good.
Ramsey loam	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	15	30	Fair.
Stony colluvium (Porters soil material)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	40	55	Poor.

See footnotes at end of table.

TABLE 13.—*Productivity ratings of the soils under each of two levels of mangement for the crops most commonly grown in the soils of Jackson County, N. C.*—Continued

FIFTH-CLASS SOILS

[Very poor cropland, very poor to poor pasture land, best suited to forest]

Soil [1]	Crop productivity index [2] for—																		Forest suitability
	Corn (100=50 bushels)		Wheat (100=25 bushels)		Rye (100=25 bushels)		Clover and grass (100=2 tons)		Lespedeza hay (100=1 ton)		Potatoes (100=200 bushels)		Green beans for truck (100=120 bushels)		Cabbage for truck (100=10 tons)		Permanent pasture (100=100 cow-acre-days) [3]		
	B [4 5]	C [6]	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	
Porters loam, severely eroded phase	20	40	(5)	(5)	(5)	(5)	20	30	30	60	(5)	(5)	(5)	(5)	(5)	(5)	30	75	Fair
Ashe stony loam	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	15	50	Do
Very steep phase	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	Do
Porters stony loam	15	30	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	40	70	Do
Rabun clay loam																			
Eroded steep phase	12	20	(5)	(5)	(5)	(5)	(5)	(5)	30	50	(5)	(5)	(5)	(5)	(5)	(5)	(7)	(7)	Do
Severely eroded steep phase	10	18	(5)	(5)	(5)	(5)	(5)	(5)	20	40	(5)	(5)	(5)	(5)	(5)	(5)	(7)	(7)	Do
Clifton clay loam, severely eroded steep phase	10	15	(5)	(5)	(5)	(5)	(7)	(7)	(7)	(7)	(5)	(5)	(5)	(5)	(5)	(5)	(7)	(7)	Do
Hayesville clay loam, severely eroded steep phase	8	25	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	10	30	Do
Ashe loam, severely eroded phase	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	10	40	Do
Talladega Porters loams	15	30	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	30	50	Do
Eroded phases	10	20	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(6)	(5)	(5)	(5)	(5)	(5)	(5)	25	45	Do
Porters loam, eroded very steep phase	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	Poor
Talladega silt loam	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	20	35	Fair
Severely eroded phase	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	Do
Ashe loam, very steep phase	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	30	60	Do
Porters loam, very steep phase	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	25	50	Do
Porters stony loam very steep phase	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(7)	(7)	Do
Chandler loam	(7)	(7)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	Do
Ramsey loam, severely eroded phase	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	Poor
Rough stony land (Porters and Ashe soil materials)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	Do
Rough gullied land (Hayesville and Halewood soil materials)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	
Rock outcrop	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	

[1] The soils are listed approximately in the decreasing order of their physical suitability for the agriculture of the county under present conditions

[2] Each index is the expected yield expressed as percent of a standard yield of each crop The standard yield of each crop is listed at the head of the appropriate column and represents approximately the average yield obtained without the use of fertilizer or other amendments on the more extensive and better soils of the region of the United States in which the crop is most commonly grown

[3] The term "cow-acre-days" is used to express the carrying capacity of pasture land As here used, it 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 For example, a soil type able to support 1 animal unit per acre for 360 days of the year rates 360, whereas a soil type able to support 1 animal unit on 2 acres for 180 days of the year rates 90.

[4] These indexes are for yields that are to be expected under the level of management practiced on most farms

[5] Columns A have been omitted Indexes for that column would be for yields to be expected without the use of amendments or beneficial crop rotation on the specified soil after use for crops or pasture for 5 years or more

[6] These indexes are for yields to be expected from soil-management practices considered as the best that most farmers can feasibly follow

[7] Crop not commonly grown, the soil is considered physically suited to its production, although less well suited than to crops for which ratings are given

[8] Crop not commonly grown, the soil is considered poorly suited physically to its production under the management specified.

The rating compares the productivity of each soil for each crop to a standard of 100. This standard index represents the approximate average acre yield obtained without the use of fertilizers or other amendments on the more extensive and better soils of the regions of the United States in which the crop is most widely grown. An index of 50 for a soil in Jackson County indicates that the soil is about half as productive of the specified crop as the soil with the standard index. Unusually productive soils may have indexes of more than 100 for some crops.

AGRICULTURE

Prior to the white settlements in the territory in which Jackson County is located, Indians carried on a form of agriculture [11] Crops were planted and harvested, and game was hunted for meat and skins. It is said that dances and festivals were held at the present site of Cullowhee in honor of the planting and ripening of maize, or corn. Indians, however, planted only small patches of corn and other crops, usually in bottom lands, and depended largely on game and fish for subsistence.

When white men moved into the area they cleared and farmed small tracts until the natural fertility was practically exhausted. Other areas were then cleared, and abandoned fields were left to grow up in trees The early settlers carried on a type of agriculture somewhat like that followed by the Indians They planted only enough crops to supply themselves with food and depended on livestock, hunting, and Indian trade for other things needed.

Cattle raising, established early in the history of the region, soon became a chief part of the agriculture. In later years, when grazing lands became scarce because of the increase in population, cash crops replaced cattle to some extent. As roads became available for the transportation of agricultural products to market, large areas were cleared and used for cultivated crops.

Most of the land suitable for agriculture is cleared and in use. Because of its steepness and susceptibility to erosion, however, a considerable part of the cleared land is not suitable for tilled crops. Were it not that the timber industry supplements the agriculture, the county would have fewer people, because the present population could hardly gain a livelihood from farming alone.

In 1880, according to the census of that year, agriculture consisted chiefly of the production of corn, wheat, rye, oats, and hay, with potatoes and sweetpotatoes as minor crops. Some livestock was produced.

The present agriculture consists mainly of the production of corn, wheat, rye, oats, hay, and forage as subsistence crops, and of cabbage, snap beans, potatoes, and tobacco as the principal cash crops Considerable forest products also are prepared for marketing.

Almost every farm produces garden vegetables and usually sufficient potatoes and sweetpotatoes for home consumption. There are no commercial orchards, but practically all the farms have apple, peach, and cherry trees, and some also have pear and plum trees.

[11] Information on the history of the early agriculture was furnished by T. Cox, engineer-surveyor, Cullowhee, N C , and by other local citizens

No one crop dominates the agriculture. Truck crops are limited largely to the Glenville community. Corn, wheat, and hay crops are grown in all agricultural sections, but their distribution is determined by the character of the soil and slope of the land.

The relief of the Tuckasegee River Valley in the central part of the county and of a small area in the vicinity of Glenville and Cashiers Valley is smoother than in other sections. These areas, therefore, are better suited to the production of the various crops. Even though the soil and relief of Cashiers Valley are suitable for agricultural use, very little of this valley is cultivated, as most of the land is held by large landowners who do not farm but use it chiefly for summer resorts or homes and for hunting and fishing reserves. Since other fairly large areas having soil and relief suitable for agriculture are situated in isolated sections and owned mostly by lumber companies, they have never been cultivated. Although the areas mentioned are comparatively smooth, most of the county is hilly to steep, and a large part is occupied by high, rugged mountains. Generally, and in some places specifically, a close relation is evident between soil character and the crops grown, especially truck crops.

The agriculture of this county depends largely on a few soils. Listed in order of relative importance, these are Tusquitee loam; Congaree fine sandy loam and silt loam; State loam; Ashe loam, rolling phase; Ashe sandy loam, rolling phase; Hiwassee clay loam; Warne fine sandy loam; and Altavista silt loam. These soils, except the Ashe, produce most of the corn, wheat, and hay. The rolling phases of the Ashe soils, which occur on mountains and high plateau-like areas, are only moderately productive, but on them are grown most of the cabbage, beans, potatoes, and turnips. Owing to the high elevation, however, they are limited for other agricultural use, except grazing. Tilled crops are grown wherever the relief is favorable (*5*). The steeper lands are used mostly for pasture but are sometimes cultivated in order to kill weeds. On farms having both steep and relatively smooth land, the general practice is to crop the less steep fields and use the rest of the open areas for pasture. By this system, water control and erosion problems are considerably modified. Many farms, however, have only hilly or steep lands, and on those the loss is rather high, because it is difficult to control the runoff.

The changes that have taken place in the acreage of the principal crops since 1879 are shown in table 14, compiled from Federal census for the period 1879–1939.

Corn, the most important crop in acreage, is grown on every available soil, but the yields are often low. This is due largely to the relatively low soil content of mineral plant nutrients and organic matter, and because only a small quantity of fertilizer is used. The average yield of 19.6 bushels an acre in 1939 was higher than in previous census years. Best yields are generally obtained on Tusquitee loam, which occurs at or near the base of some mountains. It has a relatively high organic content and normally a favorable moisture content. Other good corn soils are the Congaree, State, and Porters. Practically all the corn produced is used for feeding work animals and cattle and for fattening hogs, although some is ground into meal for domestic use. A local demand always exists for any excess corn

produced. In 1939, 46 farms reported corn hogged or grazed or cut for fodder from a total of 99 acres Some corn is also cut for silage.

TABLE 14.—*Acreage of the principal crops and numbers of principal fruit trees in Jackson County, N C, in stated years*

Crop	1879	1889	1899	1909	1919	1929	1939
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Corn							
Harvested for grain	12,793	16,322	18,747	14,553	12,609	9,801	10,740
Cut for silage or fodder or hogged or grazed					3,311	257	249
Oats							
Threshed	1,521	3,892	2,252	789	444	22	42
Cut and fed unthreshed						291	220
Wheat	4,217	4,006	3,710	2,997	3,320	968	805
Rye	1,583	957	189	500	651	311	661
Sweet sorghums harvested for sirup		420	218	276	435	75	73
Hay, total	877	2,232	1,858	4,301	4,744	4,119	3,424
Annual legumes					371	292	142
Alfalfa					2	7	52
Clover or timothy, alone or mixed			371		2,800	2,245	1,263
Sweetclover					[1] 420	[1] 176	46
Lespedeza							806
Small grain hay			94	93	232	171	306
All other tame hay			1,354	4,154	668	1,128	635
Wild hay			39	54	161	100	174
Sorghums cut for silage, hay, or fodder					282	212	412
Vegetables harvested for sale					125	261	925
Potatoes		362	280	428	385	759	998
Sweetpotatoes	131	134	153	215	187	249	202
Tobacco	21	54	54	21	20	22	20
		Number	*Number*	*Number*	*Number*	*Number*	*Number*
Apples ..... trees		37,357	86,165	81,278	55,412	47,426	38,131
Peaches ..... do		21,172	19,795	26,097	14,023	23,212	6,266
Cherries ..... do		675	1,500	533	430	1,156	2,808

[1] Clover, all kinds

Hay—mixed clover and grass, lespedeza, timothy, or other grass alone, or wild grasses—is grown on most of the agricultural soils and occupies the second largest total acreage. It is used locally as feed for cattle during winter and also for work stock. Most farms produce a sufficient quantity for this purpose but not for sale. The average yield of all hay, exclusive of sorghums, in 1939 was 1.1 tons an acre, an increase over that of most previous census years.

The acreage used for the production of wheat is much less than for hay, and yields are low, owing to poor seed, poor seeding practices, winter-killing, and low fertilization. In 1939 the average yield was only 8.8 bushels an acre, which, however, was higher than reported in other census years. Areas of fine-textured soils are used for wheat. Generally about 200 pounds an acre of low-grade fertilizer is applied to the land or the grain is grown after crops that have received a heavy application of fertilizer.

Rye follows wheat in total acreage, and the average acre yield of 7.5 bushels in 1939 was higher than in other census years. Small quantities are sold by a few farmers. Only a few acres are planted to oats and barley, which are not important in the agriculture of the county Most of the oats is cut and fed unthreshed.

Although the total acreage of tobacco, early cabbage, and early beans is small, these crops contribute to the income of farmers who have no other cash crops.

A considerable acreage convenient to good roads is used for truck crops, which can be hauled easily by motortruck to distant markets. Because of the excellent quality and heavy yields, these crops can be grown and marketed profitably despite the distance to the consuming centers. A rather large acreage is in cabbage, snap beans, and potatoes, and a small acreage in rutabagas. In the vicinity of Glenville truck crops are grown for the late market, but in other sections they are produced for midseason sale. The soil and climate in the Glenville area are especially favorable to the growth of these crops, but heavy applications of fertilizer are necessary to obtain good yields and high quality. The soils most generally used are Ashe loam and Ashe sandy loam, which because of their open friable character are easily tilled. They also respond readily to management. Cabbage averages 8 tons an acre; snap beans, 100 bushels; potatoes, 100 bushels; and rutabagas, 12 tons.[12]

The values of agricultural products by classes in 1929 and 1939, according to the Federal census, are given in table 15.

TABLE 15.—*Values of agricultural products by classes in Jackson County, N. C., in 1929 and 1939*

Products	1929	1939	Livestock products	1929	1939
All cereals	$248,289	$196,604	Whole milk, cream, and butter sold	$45,114	$26,784
Corn for grain	234,255	184,927	Whole milk	17,583	19,723
Wheat threshed	10,917	6,466	Cream [1]	13,965	2,377
Other cereals	3,117	5,211	Butter	13,566	4,684
Other grains and seeds	287	1,469	Wool shorn	3,864	723
Hay and forage	77,765	74,317	Honey produced	3,541	2,348
Tobacco	3,175	2,701	Poultry raised	67,213	41,676
Vegetables for sale and farm household use (excluding potatoes and sweetpotatoes)	150,587	233,518	Chickens	64,460	41,443
For sale	32,015	70,919	Other poultry	2,753	233
For farm household use	118,572	162,599	Chicken eggs produced	87,249	52,684
Potatoes and sweetpotatoes	80,752	65,141	Livestock butchered on farms	(2)	50,213
Fruits	60,134	47,816	Cattle and calves	(2)	432
Horticultural specialties sold		642	Hogs and pigs	(2)	49,462
All other crops	4,590	3,279	Sheep and lambs	(2)	319
Forest products sold	87,981	28,318	Livestock sold alive	(2)	79,787
			Cattle and calves	(2)	62,325
			Hogs and pigs	(2)	15,598
			Sheep and lambs	(2)	1,864

[1] Both sweet cream and sour cream (butterfat)
[2] Not available.

In 1943 permanent pastures covered a total of 20,415 acres,[12] a greater acreage than in previous years. These pastures are located largely on Ashe and Porters soils; to some extent on Halewood, Hayesville, and other upland soils; and on soils of the bottom lands. Pasture mixtures used on Porters soils include Kentucky bluegrass, redtop, orchard grass, and Korean lespedeza. These mixtures also are generally used on the bottom-land soils. For Halewood and Hayesville soils Korean lespedeza, orchard grass, and redtop, or lespedeza alone, form the pasture. The rate of seeding is about 25 pounds an acre.

The grazing season extends from about April 1 to October 15, and pasture yields are generally good. Porters soils produce the better upland pasturage, followed in order by the Ashe, Halewood, and Hayesville. Well-drained bottom-land soils and those of low terraces

[12] See footnote 10, p. 61.

are very desirable for pasture, the carrying capacity of which is higher than upland areas.

Some livestock is raised, and 63 5 percent of the farms reported livestock and livestock products sold or traded in 1939 (1940 census). Almost every well-established farm has a few hogs, 1 to 3 milk cows, and a small flock of chickens. The hogs are raised chiefly for a home supply of lard and meat, although a few are sold to local markets. Much of the milk and a large part of the chickens and eggs produced are used by the farm households but some is sold at outside markets.

The number of livestock on farms in the census years 1910–40 and specified livestock products produced or sold in 1929 and 1939 are given in tables 16 and 17.

TABLE 16.—*Number of livestock on farms in Jackson County, N. C., in stated years*

Livestock	1910	1920	1930	1940
	Number	*Number*	*Number*	*Number*
Horses	1,207	1,501	1,000	[1] 1,130
Mules	637	727	714	[1] 319
Cattle	8,153	9,007	7,599	[1] 7,520
Swine	8,924	9,554	4,152	[2] 3,126
Sheep	7,678	3,173	4,863	[3] 1,059
Goats	152	175	199	[2] 172
Chickens	[4] 30,369	44,004	[4] 39,383	[2] 43,147
Other poultry	([5])	1,895	([5])	[2] 539
Bee hives	2,230	2,372	2,550	2,004

[1] Over 3 months old, Apr 1.
[2] Over 4 months old, Apr 1
[3] Over 6 months old, Apr 1
[4] All poultry
[5] Not available

TABLE 17.—*Specified livestock products produced or sold in Jackson County, N. C. in 1929 and 1939*

Products	1929	1939
	Quantity	*Quantity*
Milk produced ..... gallons	1,300,622	1,410,267
Whole milk sold ..... do	56,719	73,048
Cream sold as butterfat ..... pounds	31,232	10,803
Butter churned ..... do	308,761	316,617
Butter sold ..... do	41,110	24,054
Wool shorn ..... do	10,169	3,143
Honey produced ..... do	14,753	14,672
Chickens raised ..... number	83,714	81,260
Chickens sold (alive or dressed) ..... do	33,920	25,724
Chicken eggs produced ..... dozens	281,449	263,419

The 1940 Federal census, classifying the farms by major source of income from products sold or traded in 1939, showed that 35 farms derived their major source of income from livestock; 8 from dairy products; 3 from poultry and poultry products; 20 from field crops; 149 from vegetables; 5 from fruits; 10 from forest products; and 2,243 from farm products used by farm households.

In 1940 there were 2,565 farms in the county, with an average size of 57.9 acres. Land in farms aggregated 148,404 acres, or 46.5 percent of the county area, of which 20,649 acres was land used for crops (harvested and failure) in 1939, 5,388 acres was idle or fallow cropland, 18,274 acres was plowable pasture, 84,238 acres was woodland, and 19,855 acres was all other land in farms.

The range in size of farms, number of farms, cropland harvested, and the value of land (including buildings) and implements and machinery, classified by size of farm, as reported by the 1940 census, are given in table 18. It will be noted that slightly more than 60 percent of the farms range in size from less than 10 to 50 acres and about 30 percent are between 50 and 140 acres. A large part of the cropland harvested and the greater amount invested were on farms of less than 140 acres.

TABLE 18.—*Number of farms, total land in farms (1940); cropland harvested (1939); and specified values (1940); classified by size of farm, in Jackson County, N. C.*

Farms		Land in farms		Values	
Size (acres)	Number	Total	Cropland harvested	Land and buildings	Implements and machinery
		Acres	*Acres*	*Dollars*	*Dollars*
Under 10	402	2,280	1,310	342,968	10,166
10–29	668	12,061	3,536	654,115	18,800
30–49	535	20,131	3,892	669,689	17,393
50–69	355	20,296	3,230	526,064	18,394
70–99	231	18,757	2,819	466,122	12,300
100–139	187	20,832	2,364	411,274	11,214
140–179	71	11,137	1,124	241,018	4,883
180–219	46	9,128	663	147,995	6,539
220–259	18	4,307	411	76,818	3,665
260–379	21	6,452	550	119,231	4,875
380–499	13	5,532	87	65,400	1,870
500–699	8	4,545	129	52,900	3,200
700–999	3	2,446	90	34,800	515
1,000 and over	7	10,500	67	134,770	6,050
Total	2,565	148,404	20,272	3,943,164	119,924

Owners and part owners operated 79.4 percent of the farms in 1940, tenants 20.3 percent, and managers 0.3 percent.

The average investment in all farm property per farm in 1940 was $1,766, 87 percent of which represented the value of land and buildings, 2.7 percent the value of implements and machinery, and 10.3 percent the value of domestic animals, poultry, and bees. The average value of land and buildings per farm was $1,537, or $26.57 an acre.

Only about 17 percent of the farms reported the hire of labor in 1939 at a total cost of $27,596, an average of $61.05 each. About 68 percent of the farms reported a total expenditure of $64,144 for feed, an average of $36.65.

The use of fertilizer, according to census reports, has increased greatly since 1879, when the total expenditure was only $110. In 1909 it was purchased by 379 farms at a total cost of $5,931 and in 1929 by 793 farms at a cost of $14,433. Much less fertilizer was bought in 1929 than in 1919, however, when 829 farms reported an expenditure of $20,847, but the quantity used again increased in the next decade and 1,226 tons were purchased by 55.9 percent of the farms (1,432 farms) in 1939 at a total cost of $34,596, or an average of $24.15 a farm. In addition, $3,772 was spent by 264 farms for 1,378 tons of liming materials.

MORPHOLOGY AND GENESIS OF SOILS

Soil is the product of the forces of weathering and soil development acting on the parent material deposited or accumulated by geologic

agencies. The characteristics of the soil at any given point 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 the forces of development have acted on the material. The climate, and its influence on soil and plants, depends not only on temperature, rainfall, and humidity but also on the physical characteristics of the soil or soil material and on the relief, which, in turn, strongly influences drainage, aeration, runoff, erosion, and exposure to sun and wind.

The parent material of the soils of Jackson County may be considered in two broad classes—(1) material residual from the weathering of rocks in place and (2) material transported by water or gravity and laid down as unconsolidated deposits of clay, silt, sand, and rock fragments Material of the first class is related directly to the underlying rocks from which derived, that of the second class to the soils or rocks from which it was washed or fell

The residual parent material consists of weathered products of igneous and metamorphic rocks. These rocks differ greatly in chemical and mineralogical composition, and the parent material derived from them differs correspondingly in composition and physical character. The rocks of this county have not been studied adequately enough to determine differences in chemical and mineralogical composition and to correlate such differences with differences among the soils developed from them. It is apparent, however, that differences among most soils developed from the residual products of rocks weathered in place are associated with differences among the rocks from which they were derived. Similar rocks underlie dissimilar soils in several places where differences in relief have been important contributing factors. The soil series and the parent material from which the soil of each series was derived are listed in table 19, p. 79.

Although some of the characteristics of soils can be correlated with the kinds of parent material from which derived, others, especially those of regional significance to soil genesis, cannot be so correlated and must be attributed to other factors.

The climate varies from place to place, and differences in climate have contributed to differences among the soils.

The valley sections of the county are characterized by long moderately warm summers, short mild winters, and moderately high rainfall. The moderately warm weather that prevails much of the year favors rapid chemical reaction under the moist conditions existing in the soil much of the time. The high rainfall promotes leaching of soluble materials, as bases, completely from the soil and translocation of less soluble materials and colloidal matter downward in the soil. The soil is frozen for only short periods and to only shallow depths, which further intensifies the extent of weathering and translocation of materials.

Temperatures are much lower in the mountainous sections than in the valleys. Chemical reactions in soils on the mountains are probably appreciably slower under these conditions than in the valleys. The rainfall is high, however, and tends to leach soluble materials completely from the soil and, to translocate less soluble materials and colloidal matter downward in the soil. On the other hand the soil is

frozen for longer periods and to greater depths than in the valleys, and leaching is retarded correspondingly.

In general, the climatic conditions of the valleys are those that commonly give rise to soils of the Red or Yellow Podzolic great soil group; those of the mountains to Gray-Brown Podzolic soils. All gradations between these two conditions of soil formation may be found.

Within any one climatic zone certain outstanding characteristics are common to the well-drained, well-developed soils, but the soils differ in other characteristics that may be correlated with factors other than climate. The kinds of parent material appear to have been outstandingly important in causing differences among soils. The climate over a large part of the county has characteristics of the climate of both the Red and Yellow Podzolic and the Gray-Brown Podzolic regions; consequently, Red Podzolic, Yellow Podzolic, and Gray-Brown Podzolic soils are intimately associated, and differences in such factors as parent material, drainage, and age have been important in determining the great soil group to which many of the soils belong.

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 that exist are determined by the kinds of climate, parent material, and relief, by the age of the soil, and by other organisms among the many factors that constitute their environment. Climate is the most apparent but not always the most important determinant of the kinds of higher plants that grow on the well-developed, well-drained soils and thus exerts a powerful indirect influence on their morphology. Climate and vegetation together, therefore, are the active factors of soil formation.

Forests, consisting principally of deciduous trees, originally covered this county. Cherry, oak, maple, birch, and beech trees were dominant in the mountains, and ash, poplar, white basswood (linn), oak, maple, chestnut, and walnut trees in the valleys. The undergrowth of the mountain forests included rhododendron and many other plants that were absent in the valley forests. These differences have been partly the result of differences in climate.

Many of the trees and shrubs are moderately deep feeders. Most of them shed their leaves annually. The content of the various plant nutrients 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 the conifers. In this transfer of materials, essential plant nutrients returned to the upper part of the soil from the lower replace those lost through the action of percolating waters. It is probable that this transfer of plant nutrients is greater in the valleys than in the mountains and tends to offset to some extent the more rapid weathering of rocks and leaching of soils in the valleys.

Much organic material is added to the soil by the decay of leaves, twigs, roots, and entire plants, most of it to the topmost part, where it is acted on by micro-organisms, earthworms, and other forms of life and by direct chemical reactions. The rate of decomposition is probably more rapid in the valleys than on the mountains, and partly as a

result of this some well-drained soils of the higher mountains contain considerably more organic matter than do well-drained soils of the valleys.

The decomposition of organic matter releases organic acids, which promote 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 it affects the kinds of vegetation, the kinds of micro-organisms, and rates of reaction and leaching.

The relief of the soils ranges from almost level to very steep. Relief modifies the effects of climate and vegetation. On some steep areas where the quantity of runoff is large, 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 and hence do not remain in place long enough for a profile of genetically related horizons to form. The quantity of water that percolates through the soil is small, and the extent of leaching and translocation of materials is correspondingly small. The vegetation is commonly less dense on such soils than on soils with more favorable moisture relations. It has been noted that soils of steep slope are better developed where the slope is concave than where it is convex. Here 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 whose materials have been in place for a long time have characteristics that well-drained soils do not have. Their subsoil is commonly mottled yellow and gray and may be very compact. Geologic erosion ordinarily is slow, and a highly leached surface layer and a compact subsoil may develop. The vegetation differs from that on well-drained soils, as also does the micropopulation, and conditions are less favorable for the rapid decomposition of organic matter.

Soil 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 slopes have their materials constantly renewed or removed by geologic erosion and do not develop genetically related horizons. These two broad groups comprise the young 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. A soil that is almost level and very little eroded may develop more intense profile characteristics than well-drained, well-developed soils on the gently rolling uplands. Such a soil is very old. The soils range in age from very young to very old, but they are largely young or very young.

One of the main objectives of the soil survey is to describe the soils, state their relations to agriculture, and to give each a name. There are so many kinds that it is difficult for one to remember the characteristics of all. Many have some characteristics in common. It is easier to remember the common characteristics of soils of a few groups and the differences among soils of each group than to remember all the characteristics of each soil; consequently, the second objective of the soil survey is to group soils according to common characteristics and to give each group a name.

This classification consists of several steps or categories. The lowest three—phase, type, and series—are discussed in the section on Soil Survey Methods. Soil series may be grouped into higher categories, the highest of which is called the soil order, which consists of three divisions—zonal, intrazonal, and azonal. Subdivisions within each order are called great soil groups. In table 19 the soil series are classified into orders and great soil groups. The chief factors contributing to morphology of the separate series are given in table 2 in the section on Soils of Jackson County

TABLE 19.—*Classification of soil series of Jackson County, N. C, into higher categories*

Order and great soil group	Series [1]	Parent rock
Zonal soils		
Red Podzolic	Rabun	Dark basic igneous or metamorphic rocks.
	Clifton	Do
	Hayesville	Granite, gneiss, and schist.
	Hiwassee	Old alluvium
Yellow Podzolic	Altavista	Alluvium.
Gray-Brown Podzolic	Halewood	Granite, gneiss, and schist.
	Porters [2]	Granite and gneiss
	Ashe [2]	Do
	Tusquitee	Colluvium
	State	Alluvium
Intrazonal soils		
Brown Forest to Half Bog	Burton	Granite and gneiss.
Planosol	Warne	Alluvium.
Azonal soils.		
Lithosol	Talladega	Mica schist.
	Ramsey	Highly siliceous rock
	Chandler	Mica schist.
	Rough gullied land [3]	Various
	Rough stony land [3]	Do.
	Rock outcrop [3]	Do
Alluvial	Congaree	Recent alluvium
	Toxaway	Do
	Stony colluvium [3]	Do

[1] For morphology of series see table 2
[2] Since the profiles of the Porters and Ashe soils are only weakly developed, they are regarded as lithosolic Gray-Brown Podzolic soils
[3] Miscellaneous land type

Zonal soils are defined as any one of the great groups of soils having well-developed soil characteristics that reflect the influence of the active factors of soil genesis—climate and living organisms, chiefly vegetation (*5*). In this county, the zonal soils constitute the Red Podzolic, Yellow Podzolic, and Gray-Brown Podzolic great soil groups. These great soil groups and their series members are defined and described as follows:

Red Podzolic soils are a zonal group of soils having thin organic and organic-mineral layers over a yellowish-brown leached layer resting on an illuvial red horizon, developed under a deciduous or mixed forest in a warm-temperate moist climate. The soil-forming processes involved in their development are laterization and podzolization (*5*, *2*). Soils of the Rabun, Clifton, Hayesville, and Hiwassee series belong to this great soil group. They have the common characteristics of Red Podzolic soils 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 due primarily to differences in slope. Rather outstanding differences existing in the kinds of parent material from which the soils are derived appear to be directly or indirectly the major cause of differences among the soil series of this group.

The Red Podzolic soils are mainly in the lower lying parts of the county on terraces along streams or on the uplands of the intermountain valleys or lower mountain slopes, where temperatures are highest. They are derived from materials that are generally higher in bases or have been in place for a longer time than those of Gray-Brown Podzolic soils at similar elevations. Internal drainage is better than in the associated Yellow Podzolic soil.

The most extensive of the Red Podzolic soils are in the Hayesville series. They have developed from light-colored granite, gneiss, and schist, on undulating to steep relief in the intermountain uplands and are characterized by a yellowish-brown to light-brown friable surface soil over a compact brownish-red clay subsoil. These soils differ from the Halewood (Gray-Brown Podzolic) in being redder and heavier textured. They have developed under a warm moist climate and deciduous forest characteristic of regions marginal between Gray-Brown Podzolic and Red and Yellow Podzolic soil regions. The parent rocks weather to a darker red residuum under such conditions and apparently contain less silica and more clay-forming minerals than the rocks underlying the Halewood soils. The base status of the residuum may be higher than that of the parent material of Halewood soils, but data to substantiate this possibility are lacking.

Following is a profile description of Hayesville loam in a forested area:

A_0 A very thin layer of forest litter

A_1. 0 to 3 inches, dark-gray to light-gray friable loam or fine sandy loam, apparently containing a small quantity of decomposed organic matter and many fine roots

A_2 3 to 7 inches, brownish-yellow or yellowish-brown friable granular loam, containing a very small quantity of decomposed organic matter and a large number of fine roots.

B. 7 to 30 inches, red moderately compact clay, brittle when dry, and sticky and slightly plastic when wet. A few holes are in the material and are apparently coated with organic matter. A few fine roots are in the upper part

C_1. 30 to 40 inches, mottled red and yellow friable granular sandy clay or clay loam, which is reddish yellow when crushed to a fine mass

C_2 40 inches+, light yellowish-red friable loam or sandy loam intermixed with soft decomposed granite rock, which shows the structure lines of the original rock.

Yellow Podzolic soils are a zonal group of soils having thin organic and organic-mineral layers over a grayish-yellow leached layer resting on a yellow horizon; developed under the coniferous or mixed forest in a warm-temperate moist climate (*ō*).

Altavista silt loam, the only Yellow Podzolic soil in this county, developed on low terraces from alluvial materials washed mainly from soils underlain by igneous and metamorphic rocks, is characterized by a yellowish-gray surface soil and a yellow moderately compact subsoil. Internal drainage is slightly restricted but adequate for most farm crops. Occurring in rather narrow areas along streams in association with the Red Podzolic Hiwassee soils of the high terraces,

the Gray-Brown Podzolic State soils of low terraces, and the alluvial Congaree and Toxaway soils of the first bottoms, the Altavista soil appears to be derived from parent material similar to that which gives rise to Hiwassee and State soils and to have developed under similar conditions of climate, relief, and vegetation. It appears to be younger than the Hiwassee soils and older than the State and may represent an intermediate stage in the development of a Red Podzolic soil. Restricted internal drainage may be largely responsible for the yellow color in contrast to the red color of Hiwassee soils.

Following is a profile description of Altavista silt loam in a cultivated area:

A$_s$ 0 to 10 inches, gray to yellowish-gray friable silt loam, containing only a small quantity of organic matter. In forested areas this layer to a depth of about 1 inch would be gray or dark-gray friable silt loam, containing an appreciable quantity of organic matter derived from decayed leaves and other plant remains

B. 10 to 30 inches, yellow friable to moderately compact fine sandy clay to silty clay.

C. 30 inches+, mottled yellow and gray compact slightly plastic silty clay.

The surface layer varies slightly in color, thickness, and texture from place to place. A few small water-worn rocks may occur on the surface and in the profile in places.

Gray-Brown Podzolic soils are a zonal group of soils having a comparatively thin organic covering and organic-mineral layers over a grayish-brown leached layer that rests on an alluvial brown horizon. They have developed under deciduous forest in a temperate moist climate. Podzolization is the dominant soil-forming process (*5*, *2*).

Soils of the Halewood, Porters, Ashe, Tusquitee, and State series belong to this great soil group. These soils lie at high elevations where the climate is cooler than in most places at similar latitudes. They generally occupy higher positions than the Red Podzolic soils, but in some places they are closely associated with them. Generally, where soils of these two great groups are associated, the Red Podzolic are derived from materials that are higher in bases or are older than the Gray-Brown Podzolic. They have apparently developed under similar vegetation and on similar relief. Soils of both groups are well drained.

Differences between series of the Gray-Brown Podzolic soils are due mainly to differences in parent material or relief. The texture profiles of the Porters and Ashe soils are weakly developed. The soils of these series approach Lithosols in character and are regarded as lithosolic Gray-Brown Podzolic soils. Well-developed profiles may be found in the Tusquitee soils, which occupy less steep slopes but have developed under similar climate and vegetation from similar parent material.

The Tusquitee series are the most representative of the Gray-Brown Podzolic soils in this county. These soils have formed on colluvial slopes from an accumulation of soil material and rock waste washed or sloughed from the uplands. The relief ranges from very gently sloping to strongly sloping.

The Tusquitee soils range considerably in age, and their character is changed somewhat from time to time by the addition of new materials through colluvial action. Although the well-developed soils belong to the Gray-Brown Podzolic great soil group, as mapped they include young soils that should be considered members of the

alluvial soils great soil group as they lack profile development and show very little differentiation in the soil column from the surface downward.

The profile of Tusquitee loam in a forested area shows the following characteristics:

A_0. A thin layer of forest litter.
A_1. 0 to 2 inches, dark grayish-brown friable loam. A moderate quantity of decomposed organic matter is mixed with the mineral material.
A_2 2 to 15 inches, brown mellow granular loam, sticky when wet. Some decomposed organic matter apparently is mixed with the mineral material
B_2. 15 to 30 inches, yellowish-brown to slightly reddish-brown friable, easily pervious clay loam
C_1. 30 inches+, yellowish-brown or brownish-yellow friable clay loam splotched with brown, yellow, and gray.

Following is a profile description of Porters loam in a forested area:

A_0. A thin layer of forest litter
A_1. 0 to 2 inches, dark-brown friable loam containing a large quantity of organic matter derived from the decay of leaves, twigs, and other plant remains.
A_2. 2 to 10 inches, brown mellow friable loam. A small quantity of decomposed organic matter is mixed with the mineral material.
B. 10 to 25 inches, brown, reddish-brown, or yellowish-brown friable permeable clay loam containing many holes usually coated with organic matter.
C. 25 inches+, mixed gray, yellow, and light brownish-yellow soft friable partly decomposed gneiss or granite. Some soft and hard angular rock fragments are intermixed with the material.

Throughout the extent of this soil there is no uniformity in the thickness of the profile layers, but color differences among the various layers are fairly easily distinguishable in most places. The reaction is medium acid. The soil is easily pervious to moisture, air, and roots, and its water-holding capacity is very good. Some angular rock fragments, up to 10 inches in diameter, are on the surface and in the profile but are too few to interfere materially with cultivation.

Intrazonal soils are any of the great groups of soils with more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief, parent material, or age over the normal effect of the climate and vegetation (*5*). In this county they include the Brown Forest to Half Bog and Planosol great soil groups.

Brown Forest soils are an intrazonal group of soils with very dark-brown surface horizons, relatively rich in humus (mull), grading through lighter colored soil into the parent material, and characterized by slightly acid reaction, little or no illuviation of iron and alumina, and a moderate content of calcium in the soil colloids. They are developed under deciduous forest in temperate humid regions from parent material relatively rich in bases (*5*).

Burton stony loam is a Brown Forest soil, developed on the tops of mountains and in mountain coves from granite and gneiss, which generally lies at a shallow depth. It is characterized by a very dark-gray or almost black thick highly organic surface layer over yellowish-brown to dark-brown friable clay loam. Bedrock outcrops are common. This soil has developed under a cool, moist climate. The original vegetation was probably deciduous trees, but much of the area was covered by grasses, sedges, and shrubs when the county was first settled. Cool climate favors slow decomposition of organic

matter, and this factor probably contributed greatly to its accumulation. Trees and grasses that supply organic matter high in bases may also have been a factor in the formation of a thick upper layer, and it is possible that the parent materials are relatively high in bases, although the soils are strongly acid.

On north slopes the Burton soil profile closely approaches that of the Half Bog soils. These areas have mucklike surface material and gray loam or clay loam subsoils.

Following is a profile description of Burton stony loam in a forested or grassed area:

1 0 to 20 inches, very dark-gray or almost black friable stony loam, containing a large quantity of decayed vegetable matter.
2. 20 to 30 inches, yellowish-brown to dark-brown friable loam or clay loam, stained dark by organic matter in the upper part
3 30 inches +, brownish-yellow to dark-brown clay mixed with slightly weathered angular fragments of granitic rock

Angular rock fragments, up to 10 inches in diameter, are strewn over the surface and mixed with the soil mass. Some boulders also are on the surface. Bedrock outcrops here and there.

Planosols are an intrazonal group of soils with eluviated surface horizons underlain by B horizons more strongly illuviated, cemented, or compacted than associated normal soils developed on nearly flat upland surface under grass or forest vegetation in a humid or subhumid climate (*5*).

Warne fine sandy loam is a Planosol developed on low terraces from moderately young alluvium composed of material washed from uplands underlain by igneous and metamorphic rocks. Closely associated with the Altavista and the State, this soil is characterized by a light-colored mellow friable surface layer, and by a sticky fine sandy clay to clay subsoil, underlain by a gray or light-gray compact clay layer mottled with brown and yellow. External and internal drainage are slow, but external drainage is rapid in places. Although its characteristics are associated with slow external and internal drainage, it is uncertain whether the 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, which 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, which, combined with slow external drainage, may have caused abnormal compaction in the illuvial layer.

Following is a profile description of Warne fine sandy loam in a cultivated field:

A_2 0 to 8 inches, yellowish-gray friable fine sandy loam of weak granular structure and slightly compact consistence, apparently containing very little organic matter In forested areas this layer would be light-gray or gray friable fine sandy loam to a depth of about 1 inch, underlain by pale-yellow friable fine sandy loam.
B_2 8 to 27 inches, yellow compact but friable fine sandy clay mottled or splotched gray and brown in the lower part, very sticky and slightly plastic when wet and very hard when dry.
C. 27 inches+, mottled yellow, gray, and light-gray compact clay.

Azonal soils are any group of soils without well-developed profile characteristics, owing to their youth or conditions of parent material

or relief, that prevent the development of normal soil-profile characteristics (*5*). In this county they comprise the Lithosol and alluvial soils great soil groups.

Lithosols are an azonal group of soils having no clearly expressed soil morphology and consisting of a freshly and imperfectly weathered mass of rock fragments, largely confined to steeply sloping land (*5*). In this county soils that are shallow over bedrock or extremely variable in this respect and have little development of a genetic profile are included. The included soils and land types are generally steep and broken or severely eroded. Geologic erosion almost keeps pace with weathering of rocks, or the materials slough, slip, or roll down the slopes so often that little true soil can develop Some areas of zonal soils are included in the mapping units.

Alluvial soils are an 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 (*5*) Soils of only two series in the county, Toxaway and Congaree, belong to the alluvial soils great soil group. The Toxaway are poorly drained and have developed some of the characteristics of the Half Bog soils. They are here designated as alluvial soils with glei to distinguish them from true alluvial soils The Congaree are well drained and the more extensive of the two

The Congaree are young soils of first bottoms derived from alluvial materials washed mainly from soils underlain by crystalline rocks. They are subject to overflow, and periodically receive deposits of new materials. As the soil material is thus constantly renewed, the soils remain very young. They have developed little or no genetically related horizons, and they vary from place to place in kind and arrangement of soil layers Colors range from light brown to dark brown in the topmost layer and from brown to brownish yellow mottled with brown at a depth of 2 feet. Textures range from loamy fine sand to silt loam.

A profile description of Congaree fine sandy loam, an important soil in the county, has the following profile characteristics in cultivated areas:

1. 0 to 12 inches, light-brown friable loose fine sandy loam containing a small quantity of decomposed organic matter.
2. 12 to 35 inches, light-brown or yellowish-brown fine sandy loam or friable fine sandy clay loam, slightly sticky when wet
3. 35 inches+, mottled gray, brown, and yellow friable loamy fine sand or fine sand.

Considerable variation from this profile exists. The surface soil varies from 8 to 12 inches in thickness and the second layer from 20 to 28 inches. In some places the first layer consists of very fine sandy loam and in others sandy loam, and the second layer is loamy fine sand or loamy sand in places. Finely divided mica flakes are distributed throughout the profile in most places.

The miscellaneous land types—Rough gullied land (Hayesville and Halewood soil materials), Rough stony land (Porters and Ashe soil materials), Rock outcrop, and Stony colluvium (Porters soil material)—are azonal soils The rough gullied land type is a Lithosol and represents soils seriously damaged by accelerated erosion. Most areas have lost all the surface soil and a large part of the subsoil and have

an intricate pattern of gullies. The rough stony land type is a shallow Lithosol having sufficient rock outcrops to make the areas unsuitable for crops requiring tillage. Most areas have a steep to precipitous slope. No separations were made on the basis of differences in parent Rock. Most of the rock, however, is either granite or gneiss. The rock outcrop is a Lithosol type consisting almost wholly of bedrock. There is some soil material in interstices and crevices but not sufficient to support more than a scattered cover of scrub trees and bushes. No separations are made on the basis of differences in parent rock, most of which is either granite or gneiss. The stony colluvium is an alluvial type. The large quantity of gravel, rock fragments, and boulders on the surface and throughout the profile in most places preclude its use for cultivation.

GLOSSARY

Acidity. The degree of acidity of the soil mass expressed in pH values, or in words as follows:

Extremely acid	below 4.5	Neutral	6.6–7.3
Very strongly acid	4.5–5.0	Mildly alkaline	7.4–8.0
Strongly acid	5.1–5.5	Strongly alkaline	8.1–9.0
Medium acid	5.6–6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1–6.5		

Bedrock. The solid rock underlying soils

Colluvium. Deposits of rock fragments and soil material accumulated at the base of slopes through the influence of gravity, including creep and local wash. Frequently of rather mixed character. Colluvial soils are developed from such material.

Conservability, soil. A term indicating the ease of maintenance or improvement of the productivity and workability of the soil. The degree to which the soil responds to management practices is reflected in the requirements for conservation.

Consistence. A soil term expressing degree of cohesion and the resistance opposed to forces tending to deform or rupture the aggregates; the relative mutual attraction of the particles in the whole mass, or their resistance to separation.

Brittle. When dry a soil will break with a sharp, clean fracture. If struck a sharp blow, it will shatter into cleanly broken hard fragments.

Claypan. A layer or horizon of accumulation, or a stratum; or stiff, compact, and relatively impervious clay.

Compact. Dense and firm but without any cementation.

Firm. Resistant to forces tending to produce rupture or deformation.

Friable. Readily ruptured and crushed with application of moderate force.

Impervious. Very resistant to penetration by water and usually by air and plant roots; impenetrable.

Plastic. Readily deformed without rupture; pliable but cohesive; can be readily molded; puttylike.

Sticky. Adhesive rather than cohesive when wet, but usually very cohesive when dry. When wet, the 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. Usually applied to condition of the soil in place and moderately wet.

Tight. Compact, impervious, tenacious, and usually plastic

Erosion, soil. The wearing away or removal of soil material by water or wind.

Fertility, soil. The inherent quality of a soil as measured by the quantity of compounds provided for proper or balanced growth of plants

First bottom. The 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 with more or less well-defined characteristics.

Horizon, A. The upper horizon of the soil mass from which material has been removed by percolating waters; the eluviated part of the solum; the surface soil. It is generally subdivided 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. The horizon of deposition, to which materials have been added by percolating waters; the illuviated part of the solum; the subsoil. This horizon may also be divided into several subhorizons, depending on the color, structure, consistence, or character of the material deposited. These are designated as B_1, B_2, B_3, and so on.

Horizon, C. The horizon of partly weathered material underlying the B horizon; the substratum; usually the parent material.

Permeable. Easily penetrated, as by water.

Phase, soil. A subdivision of the soil type covering departures from the typical soil characteristics insufficient to justify the establishment of a new type, yet worthy of recognition and forming a mapping unit. The variations are chiefly in such external characteristics as relief, stoniness, accelerated erosion, or depth of surface soil. (Example: Porters loam, eroded phase.)

Normal. When a soil type is divided into phases, that part of the type having no phase name is considered the normal phase of the type.

Productivity, soil. The capability of a soil to produce a specified plant or plants under a given system of management.

Profile, soil. A vertical section of the soil from the surface into the underlying unweathered material.

Reaction, soil. *See* Acidity.

Series, soil. A group of soils having the same profile characteristics—the same general range in 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 soils.

Slope classes:

	Percent		*Percent*
A, Level	0–2	D, Hilly	15–30
B, Gently sloping (undulating)	2–7	E, Steep	30–60
C, Sloping (rolling)	7–15	F, Very steep	more than 60

Soil (*see also* Conservability, Consistence, Erosion, Fertility, Horizon, Phase, Productivity, Profile, Reaction, Series, Slope classes, Subsoil, Substratum, Surface soil, Structure, Texture, Type, and Workability). A natural body on the surface of the earth in which plants grow; composed of mineral and organic materials.

Structure, soil. The 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.

Subsoil. That part of the profile below plow depth; the B horizon.

Substratum. Material underlying the subsoil.

Surface soil. That part of the upper profile usually stirred by plowing; the A horizon.

Terrace (geologic). An old alluvial plain, usually flat or smooth, bordering a stream; frequently called second bottoms as contrasted with flood plains; seldom subject to overflow.

Texture. Size of the individual particles making up the soil mass. The various soil separates are the size groups, as sand, silt, and clay. A coarse-textured soil is one high in content of sand; a fine-textured soil has a large proportion of clay.

Type, soil. A group of soils having genetic horizons similar as to differentiating characteristics, including texture and arrangement in the soil profile, and developed from a particular type of parent material.

Upland (geologic). Lands consisting of materials unworked by water in recent geologic time and lying in general at higher elevations than the alluvial plains.

Workability, soil. A term referring to ease of tillage, harvesting, and other field operations. Texture, structure, consistence, organic content, moisture conditions, stoniness, and slope are important among the characteristics that affect workability.

LITERATURE CITED

(1) KELLOGG, C. E
1937. SOIL SURVEY MANUAL U. S. Dept. Agr. Misc. Pub 274, 136 pp , illus.
(2) MARBUT, C. F.
1935. SOILS OF THE UNITED STATES. U S Dept. Agr. Atlas of American Agriculture, pt. 3, 98 pp , illus
(3) NORTH CAROLINA DEPARTMENT OF CONSERVATION AND DEVELOPMENT.
1929. NORTH CAROLINA: RESOURCES AND INDUSTRIES. 287 pp , illus.
(4) RAND MCNALLY AND COMPANY.
1943. RAND MCNALLY COMMERCIAL ATLAS AND MARKETING GUIDE. 545 pp , illus New York, Chicago, San Francisco.
(5) UNITED STATES DEPARTMENT OF AGRICULTURE
1938. SOILS AND MEN. U S. Dept. Agr Yearbook 1938, 1232 pp., illus.
(6) ———
1941. CLIMATE AND MAN. U S Dept Agr. Yearbook 1941, 1248 pp , illus.
(7) UNITED STATES GEOLOGICAL SURVEY.
1907. GEOLOGIC ATLAS OF THE UNITED STATES, Pisgah Folio, North Carolina-South Carolina. Folio 147, 8 pp., illus.

U S GOVERNMENT PRINTING OFFICE: 1948

For sale by the Superintendent of Documents, U S Government Printing Office
Washington 25, D. C. - Price $1 25

Accessibility Statement

This document is not accessible by screen-reader software. The U.S. Department of Agriculture is committed to making its electronic and information technologies accessible to individuals with disabilities by meeting or exceeding the requirements of Section 508 of the Rehabilitation Act (29 U.S.C. 794d), as amended in 1998. Section 508 is a federal law that requires agencies to provide individuals with disabilities equal access to electronic information and data comparable to those who do not have disabilities, unless an undue burden would be imposed on the agency. The Section 508 standards are the technical requirements and criteria that are used to measure conformance within this law. More information on Section 508 and the technical standards can be found at www.section508.gov.

If you require assistance or wish to report an issue related to the accessibility of any content on this website, please email Section508@oc.usda.gov. If applicable, please include the web address or URL and the specific problems you have encountered. You may also contact a representative from the USDA Section 508 Coordination Team.

Nondiscrimination Statement

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the

Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by:

(1) mail: U.S. Department of Agriculture
Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
Washington, D.C. 20250-9410;

(2) fax: (202) 690-7442; or

(3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.