SOIL SURVEY

Jackson County Alabama

Series 1941, No. 8 Issued March 1954

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
ALABAMA AGRICULTURAL EXPERIMENT STATION
and the
TENNESSEE VALLEY AUTHORITY

How to Use THE SOIL SURVEY REPORT

FARMERS who have lived in one locality for a long time come to know about the soil differences on their own farms and on those of their immediate neighbors. What they do not know, unless a soil survey has been made, is how nearly their soils are like those at experiment stations or in other localities from which higher yields are reported. They do not know whether crop uses and fertilizer requirements of the experimental areas are applicable to their soils. Soil similarities and differences are known only after a map of the soils has been made. Knowing what kind of soil one has and comparing it with soils on which new developments have proved successful will remove some of the risk in trying new methods and varieties.

SOILS OF A PARTICULAR FARM

To find what soils are on any farm or other tract of land, locate the tract on the soil map. This is easily done by finding the township, section, and quarter section the farm is known to be in and locating its boundaries by such landmarks as roads, streams, villages, and other features.

Each kind of soil is marked with a symbol on the map. For example, all soils marked HfU are of the same kind. To find the name of the soil so marked, look at the legend printed near the margin of the map and find the symbol. The color where HfU appears in the legend will be the same as where it appears on the map. The HfU means Hartsells fine sandy loam, undulating phase. A section of this report tells what Hartsells fine sandy loam, undulating phase, is like, for what it is mainly used, and some of the uses to which it is suited.

How productive is Hartsells fine sandy loam, undulating phase? Find this soil name in the left-hand column of table 27 and note the yields of the different crops opposite it. This table also gives expected yields for all the other soils mapped so that the different soils may be compared.

Read in the section on Soil Types and Phases to learn what are good uses and management practices for this soil. Look also at the section headed Use and Management of Important Soil Groups. Here soils suited to about the same use and management practices are grouped. Find the group that contains Hartsells fine sandy loam, undulating phase. What is said about rotations, liming, fertilizing, drainage, erosion control, and other management practices applies to this soil.

SOILS OF THE COUNTY AS A WHOLE

If a general idea of the soils of the county is wanted, read the introductory part of the section on Soils and the section on Soil Associations. These tell where the principal kinds of soils are found and describe the broad sections of the county that differ from each other in the nature and distribution of the soils. Within each broad section, or soil association area, there is likely to be a particular type of farming or land use.

A newcomer who considers purchasing a farm in the county will want to know about the climate as well as the soils; the types and sizes of farms; the principal farm products and how they are marketed; the kinds and conditions of farm tenure; kinds of farm buildings, equipment, and machinery; availability of schools, churches, highways, railroads, telephone and electric services, and water supply; industries; and town, villages, and population characteristics. This information will be found in the sections on General Nature of the Area and on Agriculture.

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

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

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Series 1941, No. 8 Issued March 1954

SOIL SURVEY OF JACKSON COUNTY,[1] ALABAMA

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United States Department of Agriculture in cooperation with the Alabama Department of Agriculture and Industries, the Alabama Agricultural Experiment Station, and the Tennessee Valley Authority

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[1] Report revised by R. C. Jurney, Division of Soil Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering.

[2] Division of Soil Survey was transferred to Soil Conservation Service on Nov. 15, 1952.

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JACKSON COUNTY, one of the largest counties in Alabama, is in the Tennessee River Basin. It has a humid, mild temperate continental climate suitable for a wide variety of crops. From the time of early settlement farming has been the major occupation. Cotton is the principal cash crop, although corn surpasses it in acreage. Hay is grown on large areas. Much of the county not suitable for crops is in forests, which form a supplementary source of income. To provide a basis for the best agricultural uses of the land this cooperative soil survey was made by the United States Department of Agriculture, the Alabama Department of Agriculture and Industries, the Alabama Agricultural Experiment Station, and the Tennessee Valley Authority. Field work was completed in 1941, and, unless otherwise specifically mentioned, all statements in this report refer to conditions in the county at that time.

GENERAL NATURE OF THE AREA

LOCATION AND EXTENT

Jackson County, in the northeastern corner of the State (fig. 1), is bordered on the north by Tennessee and on the northeast by Georgia. It is one of the largest counties in the State, having an area of 1,084 square miles, or 693,760 acres. In addition, nearly 49 square miles are

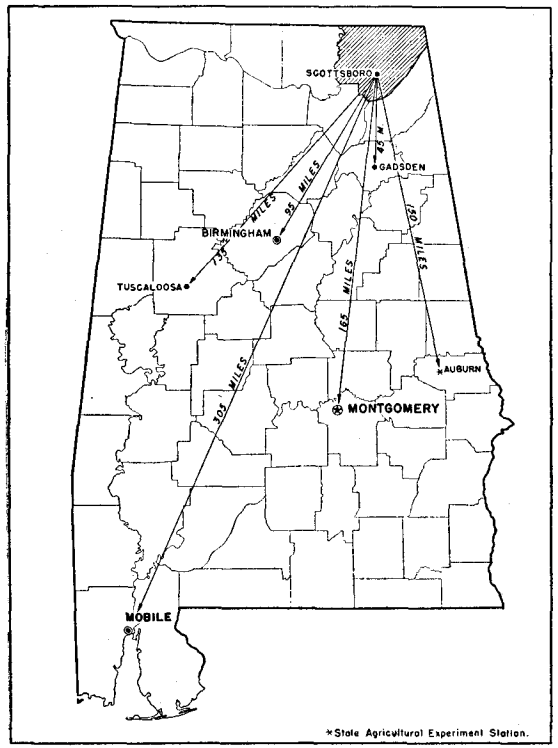


FIGURE 1.—Location of Jackson County in Alabama.

under water, chiefly Guntersville Reservoir. Scottsboro, the county seat, located in the south-central part, is 95 miles northeast of Birmingham and 165 miles north of Montgomery, the State capital.

PHYSIOGRAPHY, RELIEF, AND DRAINAGE

The county is in the Cumberland Plateau section of the Appalachian Plateaus physiographic province (*4*).[3] Before it was dissected by streams the area was mainly a nearly level plain gently inclined toward the south. A narrow upward fold, the Sequatchie anticline, however, extended from northeast to southwest. This anticline later eroded and left the broad regular valley traversed by the Tennessee River. The extensive, more level-bedded formations have been dissected, leaving three general physiographic divisions: (1) Sandstone plateaus, (2) rough mountain slopes, and (3) limestone valleys (fig. 2).

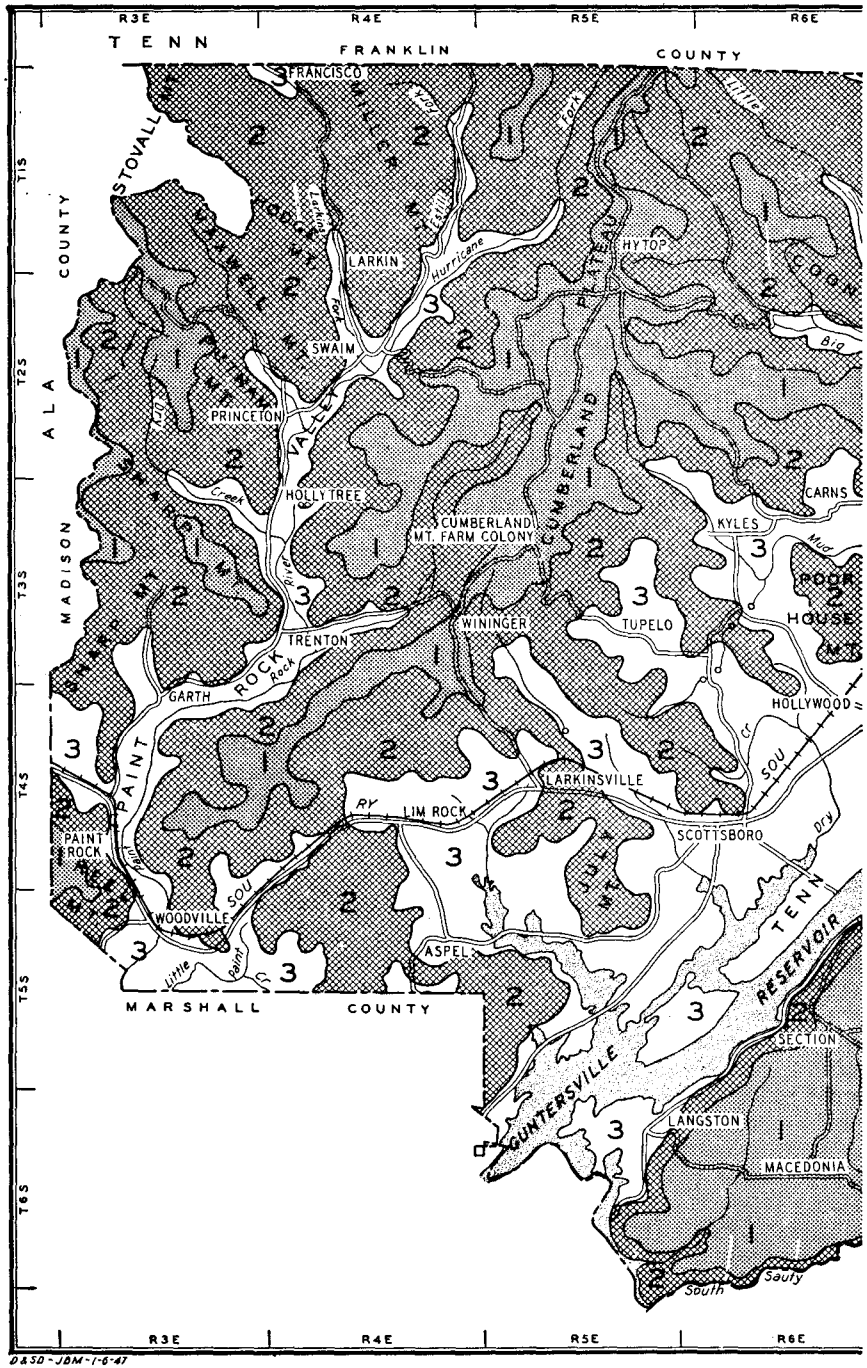
The sandstone plateaus include chiefly two areas, Sand Mountain in the southeastern part and Cumberland Plateau in the north central part. Smaller sandstone plateaus elsewhere in the county consist chiefly of smooth sandy soils moderately deep to sandstone bedrock. Much of the Sand Mountain area is cleared and farmed under a relatively high level of management. Parts of Cumberland Plateau are cleared and used for general farming, but extensive areas are still under forest. Elevations on the plateaus range from 1,300 feet on the southern part of Sand Mountain to 1,700 feet or more in the northern part.

Rough mountain slopes are widely distributed and constitute most of the area northwest of the Tennessee River Valley. These slopes are steep and stony or rocky. The rocks are chiefly of limestone and sandstone, although limestone predominates. The lower parts of the slopes are of limestone, whereas the upper parts are of sandstone. These steep areas are valued mainly for the production of timber and cedar posts.

The limestone valleys section (pl. 1, *A*) consists of valleys of the Tennessee and Paint Rock Rivers and the narrow valleys along the larger tributary streams. The Tennessee River valley is 4 to 5 miles wide and has a nearly level to strongly rolling surface interspersed with cherty ridges. More than half the nearly level first-bottom land along the Tennessee River, which ranges up to about 1 mile wide, is flooded by the Guntersville Reservoir. A large part of the Tennessee River valley is cleared, although some areas poorly suited to agriculture are in forest. Much of the Paint Rock River valley, which in most places is not more than a mile wide, is a smooth alluvial plain, parts of which are poorly drained.

The limestone valley areas are 700 to 1,000 feet below the general elevation of the sandstone plateaus (fig. 3). The point where the Paint Rock River leaves the county has the lowest elevation (about 560 feet), and the normal surface of the Guntersville Reservoir is approximately 595 feet. Bridgeport has an elevation of 662 feet; Scottsboro, 652; Hollywood, 637; Stevenson, 620; and Paint Rock, 599 (*5*).

[3] Italic numbers in parentheses refer to Literature Cited, p. 222.



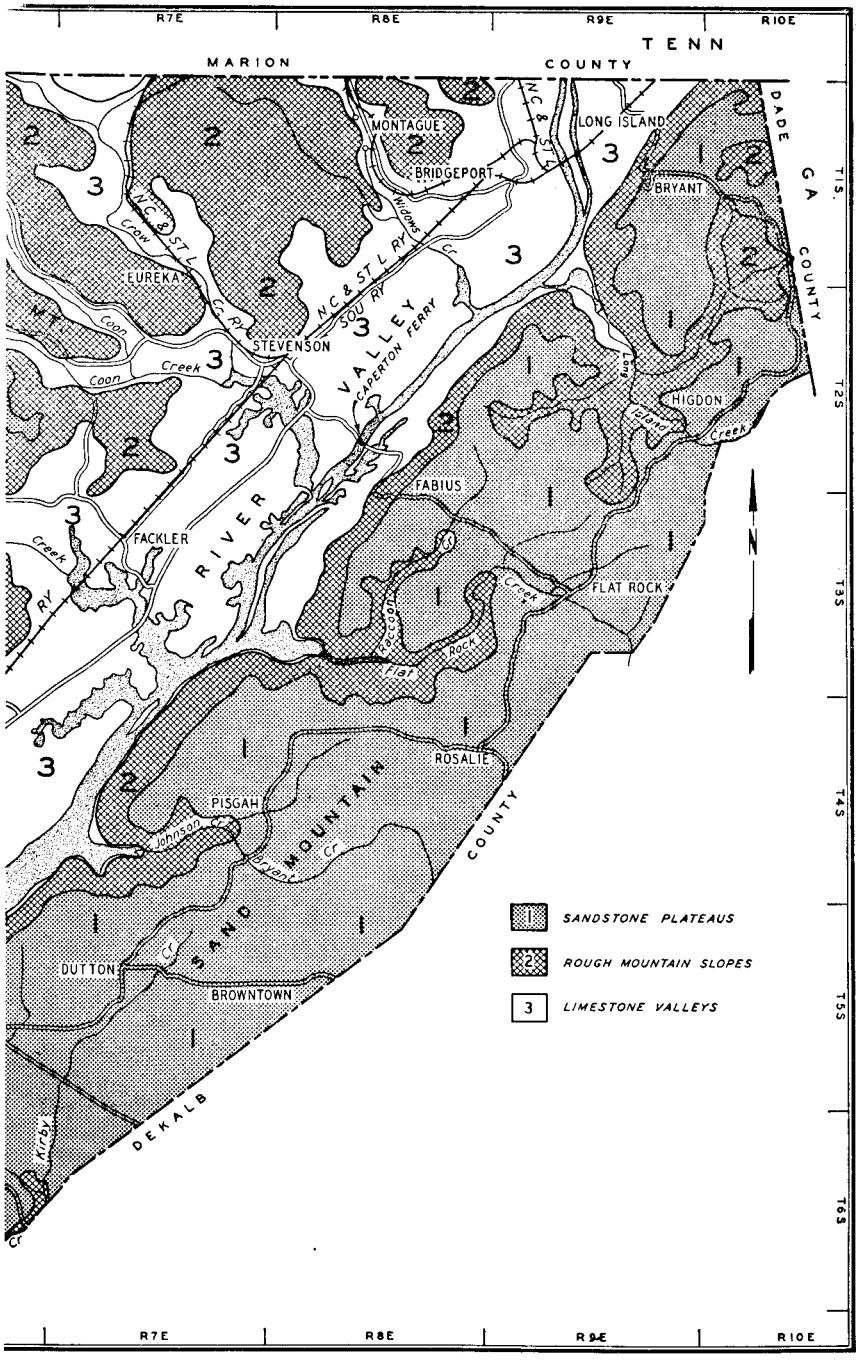


FIGURE 2.—Physiographic divisions of Jackson County, Ala.

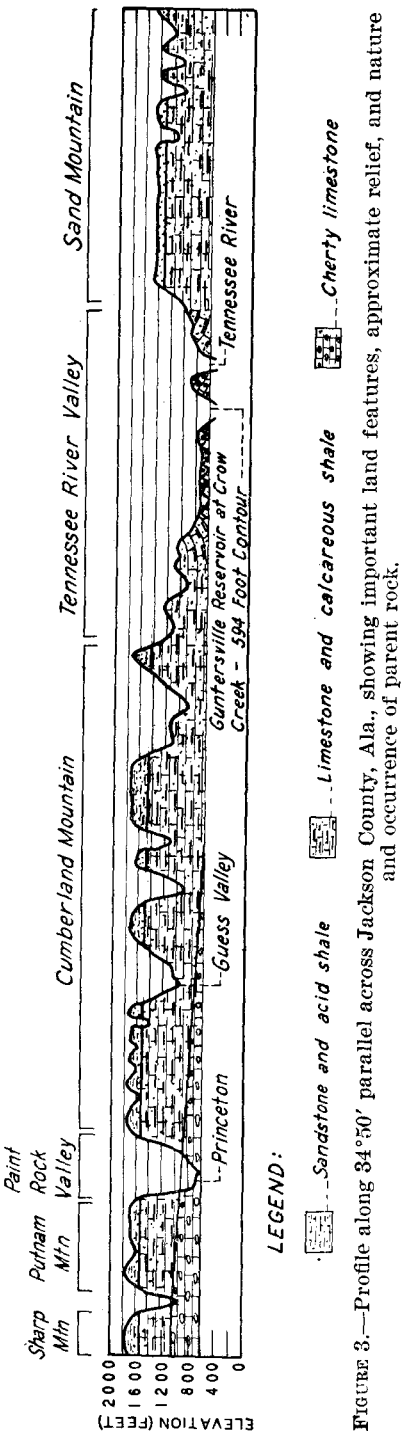


FIGURE 3.—Profile along 34°50′ parallel across Jackson County, Ala., showing important land features, approximate relief, and nature and occurrence of parent rock.

The county lies within the Tennessee River drainage basin. Most of the tributary streams originating in the plateau areas have cut deep gorges where they emerge from the plateaus. These channels form great V-shaped ravines or rock-walled gorges that separate the plateau. Except in the Tennessee River valley, the drainage pattern is dendritic. Drainage is generally well developed on the plateaus; most drainageways have rapid runoff, especially in the lower levels near the plateau rims where the waters go headlong down much steeper slopes. As the water cascades over the ledges and precipices, it breaks into smaller streams that may continue as individual streams to the slope base or may reunite farther down the slope. Occasionally the water in the drains empties into sinks and reappears at some lower point from springs or underground streams.

Surface drainage in the Tennessee River valley varies greatly. The cherty ridges and the higher stream terraces have well-developed drainage, whereas drainage is only weakly developed in extensive areas of low smooth upland over argillaceous limestone, low stream terraces, and first bottoms. A small part of the runoff in the cherty ridges ends in sinkholes. Although the flow of the Tennessee River is stabilized sufficiently to nearly eliminate overflow, tributary streams within the valley frequently overflow their banks.

The Paint Rock River, together with its branches, is the largest tributary of the Tennessee River in this area. It drains the western part of the county. Crow, Coon, Mud, Roseberry, and North Sauty are the main creeks emptying into the Tennessee River from the north-central and central parts of the county. Long Island, Raccoon, and Johnson Creeks from the east and South Sauty Creek in the south carry most of the drainage from Sand Mountain to the river. The streams under natural conditions are generally winding, with a slow speed of running water. The channels are seldom large enough to carry all the water during heavy or prolonged rains, and overflows are therefore common. Many stream channels have been straightened and deepened, and although overflows have not been eliminated, they seldom occur during the cropping season. Most first bottoms along these tributaries still are frequently inundated in winter.

GEOLOGY

The rocks of the county are sedimentary in origin, being sandstone, shale, and limestone. The high plateaus are capped with sandstone about 100 to 200 feet or more thick. Underlying the sandstone is a layer of partly indurated shale about 30 feet thick, which is underlain by successive layers of limestone that continue to a depth of about 600 feet with little interruption except for an occasional thin interbed of soft clay shale (pl. 1, *B*).

The Pottsville formation is of Pennsylvanian age (*1*) and is made up of a sandstone capping and the underlying shale bed. The capping is composed mainly of medium- to fine-grained sandstone, but in places it consists of conglomerates. Most of the sandstone is relatively hard and massive. In some places it consists of thin-bedded hard rock commonly called flagstone, but in other places it has a loose nearly friable structure. Locally, interbeds, or lenses, of soft clay shale or thinly bedded layers of clay, silt, and very fine sand occur in the sandstone.

The sandstone member of the Pottsville formation is largely the parent rock of the soils of the plateaus—the Hartsells, Crossville, Hanceville, Enders, Muskingum, and Pottsville soils. The shale member of this formation, which consists of partly indurated gray shale, in places carries one or more coal seams, some of which are of economic significance. In other places the shale is very dark gray to nearly black, owing to its high carbonaceous content. In this area, Pottsville shale is not important as a source of soil parent material, although some soils—mainly the Pottsville and Enders—are influenced by or derived from it. Pottsville shale is important chiefly as a carrier of coal seams.

The Bangor formation underlies the Pottsville and is mainly a blue coarsely crystalline or oolitic finely granular limestone with occasional shale strata or lenses. It is several hundred feet thick and occurs in beds or massive layers that outcrop chiefly on the mountainous slopes. The hilly and rough types of limestone rockland predominate on this rock. Soil material weathered in place over these rocks is relatively thin, apparently because of the predominantly strong slope and consequent rapid removal of the material by geologic erosion. This material, however, is an important component of the soils on the colluvium and alluvium of the valleys.

Other formations that have less extensive exposures in the deeper valleys and the chert ridges along the Tennessee River possibly are of Fort Payne chert. In the Paint Rock River valley, limestone, probably the Warsaw of the Mississippian system, outcrops on the lower slopes. The soil materials derived from these formations are distinguishable from those derived from the Bangor by their percentage of chert and fossils. The chert is especially noticeable on the surface, where it occurs as angular fragments ranging from gravel to blocks measuring more than 8 inches. Numerous rounded to dumbbell-shaped accretions of bluish-gray to nearly black flint up to 4 inches or more in diameter are intermixed with the chert fragments in places in the upper Paint Rock River valley. Fullerton soils have developed over the cherty limestone material.

In the Tennessee River valley, material of the Silurian, Ordovician, and possibly Upper Cambrian systems is exposed as a part of the Sequatchie anticline. The Red Mountain formation of the Silurian occurs as red serrated hills along the Tennessee River and gives rise to Armuchee and Tellico soils. Chickamauga limestone of the upper part of the Ordovician system is exposed as smooth uplands in a valley position west of the serrated hills. The heavy and plastic clay material weathered from this limestone is the source of Talbott and Colbert soils and those stony land types derived from limestone material. Longview limestone, part of the Knox dolomite of the Lower Ordovician or the Upper Cambrian system, is exposed as chert ridges from which the Fullerton, Clarksville, and limited areas of Dewey soils originate.

Many of the geologic formations outcropping in the valleys are covered by alluvium that varies greatly in age, depth, and composition. The formations of alluvium in the Tennessee River valley consist of mixed material transported from a broad area including considerable parts of the Cumberland Plateau, the Blue Ridge province, and that part of the Ridge and Valley province known as the Great Valley.

The higher lying stream terraces in general are old, and their mature soils vary in depth from a thin mantle to 20 or 30 feet. Other stream terraces are younger. The first bottoms along the Tennessee River are young and were subject to periodic floods until the system of dams was constructed by the Tennessee Valley Authority. The alluvium in the Paint Rock River valley and the tributary valleys generally is young and consists predominantly of a mixture of materials derived from sandstone and limestone.

CLIMATE

According to Koppen's classification (*12*), Jackson County lies within the humid mesothermal zone having a humid temperate climate with no dry seasons but hot summers. In general, the climate is humid, mild, temperate, and continental and has a wide range in temperature over a period of years. The extremes however, are not commonly reached or even approached annually.

At Scottsboro the average date of the last killing frost in spring is April 6 and the first in fall, October 31, giving an average frost-free period of 207 days. The latest recorded frost date in spring is May 10, and the earliest in fall, October 11. No temperature records are available for the plateaus.

The winters usually have temperatures below freezing at night in December, January, and February. Winter days with temperatures remaining below freezing are few. Snow is common on the plateaus. It usually does not remain long on the ground, but there have been a few seasons when it remained several weeks, even in the valleys. Summers are long and sometimes hot, but nights are generally cool. The average annual precipitation at Scottsboro is 52.65 inches. Floods are most common from December 15 to April 15, although they may occur any time.

The climate is favorable for most crops, but some may be damaged by too wet or too dry weather. The total loss of all crops, however, has never occurred. Short periods of very dry or very wet weather are common. Dry conditions prevail from midsummer to late fall, but severe droughts over long periods are unusual. Severe windstorms are relatively rare. Electrical storms are fairly common but seldom cause serious loss.

Winters are mild enough for the successful growth of some winter cover crops. The growing season is long enough to allow the cover crop to be turned under after it has developed a good growth in spring, and another crop can then be grown to maturity before killing frosts. Well-managed pasture is productive for 8 to 10 months. Native grasses in unimproved pastures seldom average more than 5 to 6 months of satisfactory growth, but where suitable varieties are selected and fertilizer is applied, longer growing periods can be obtained. The pasture season on the plateaus is about as long as in the Tennessee River valley. When the ground is not too wet, plowing and preparation of the ground for early seedbeds can be done in winter or early in spring, as the ground is seldom frozen long.

The normal monthly, seasonal, and annual temperature and precipitation, compiled from records of the United States Weather Bureau station at Scottsboro, are given in table 1.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Scottsboro, Jackson County, Ala.*

[Elevation, 652 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total for the driest year	Total for the wettest year	Average snowfall
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
December	43.5	77	4	5.47	3.15	10.61	0.6
January	42.7	78	−5	4.82	2.50	6.68	1.1
February	43.3	80	−16	4.84	3.05	5.66	1.2
Winter	43.2	80	−16	15.13	8.70	22.95	2.9
March	52.6	90	5	5.81	5.70	12.15	(1)
April	60.1	90	24	4.81	1.05	5.31	(1)
May	68.1	98	31	3.98	6.19	8.60	0
Spring	60.3	98	5	14.60	12.94	26.06	(1)
June	75.4	103	41	4.42	.85	3.49	0
July	78.3	109	49	4.97	1.35	2.72	0
August	77.4	104	49	4.14	1.92	.90	0
Summer	77.0	109	41	13.53	4.12	7.11	0
September	72.7	108	34	2.84	4.39	6.96	0
October	64.4	96	23	3.27	3.20	5.18	(1)
November	50.4	83	12	3.28	4.86	11.93	.1
Fall	62.5	108	12	9.39	12.45	24.07	.1
Year	60.8	109	−16	52.65	[2] 38.21	[3] 80.19	3.0

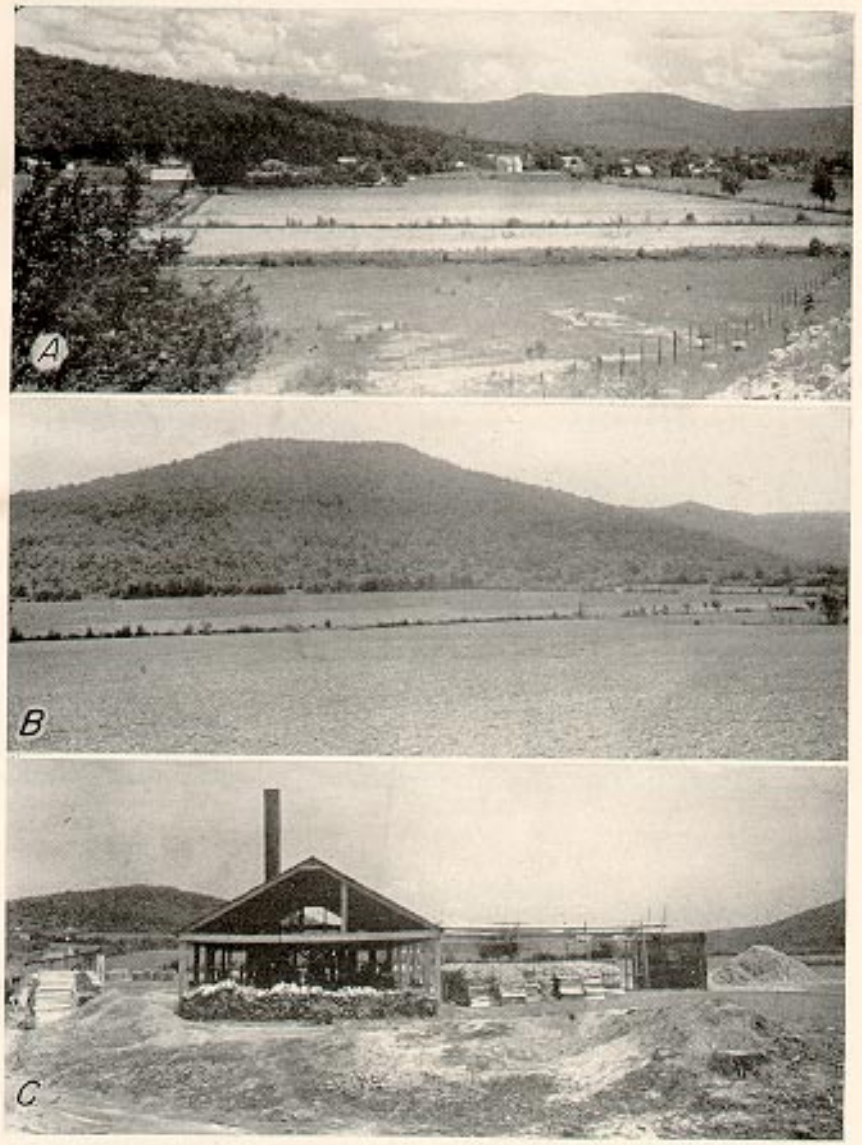
[1] Trace. [2] In 1930. [3] In 1929.

WATER SUPPLY

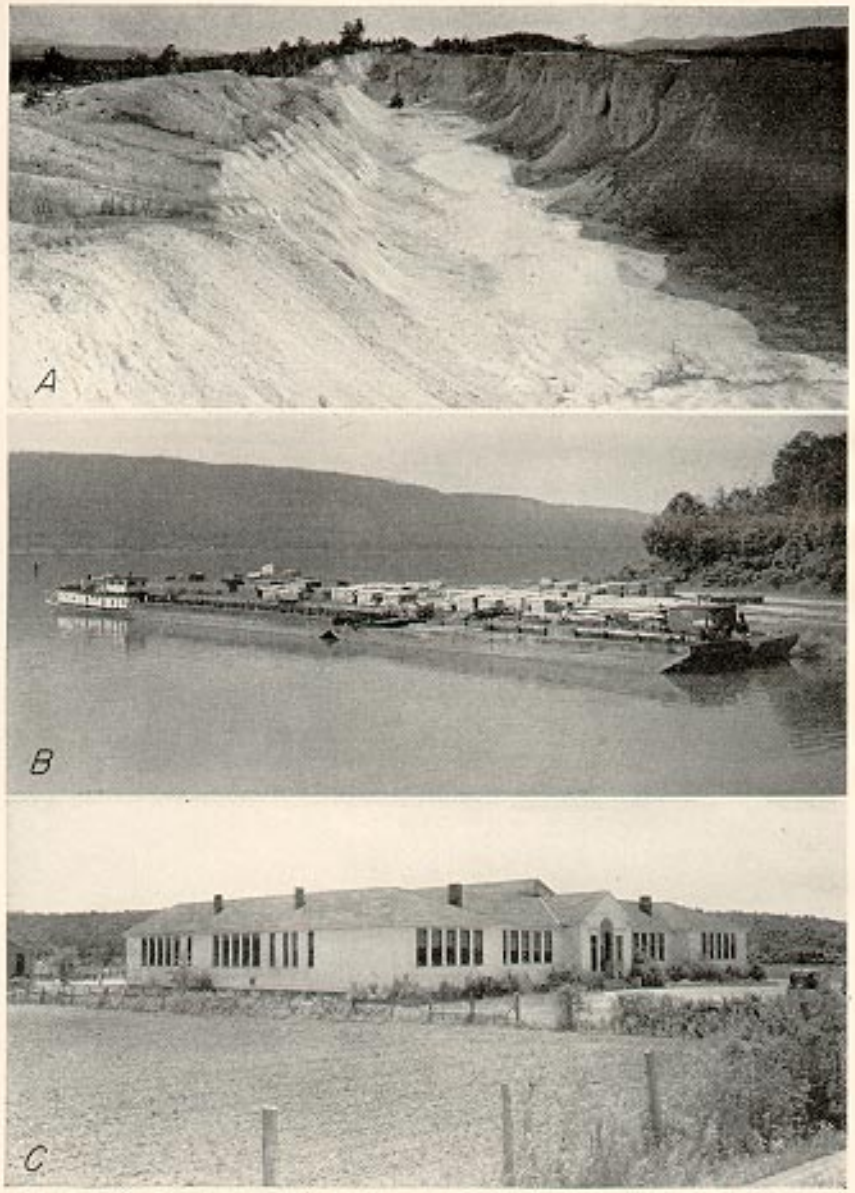
Potable water can be obtained in all parts of the county, but in a few localities only at considerable depths. The first white settlers selected home sites near springs, and some of the springs on Sand Mountain are still in use. Two flowing wells are on Sand Mountain; a 100-foot well at Pisgah supplies water for the boilers of a large cotton gin; and a somewhat shallower well is north of Rosalie. Most of the first dug wells were shallow and open, but later many were dug 50 to 60 feet deep. Most people use drilled wells now. The common depth range in the valleys is from 50 to 70 feet, but occasionally a good supply of water is reached at 20 to 40 feet. In other places, especially in the cherty ridges, it is frequently necessary to go 170 to 200 feet for good water. In these areas many farmers depend on cisterns. On the plateaus, especially the wider ones, the common depth is 25 to 40 feet.

Little, if any, irrigating is done, but in places an ample supply of water for small projects could be obtained from large springs or spring-fed streams on the slopes considerably above the valley level.

Soil Survey of Jackson County, Ala. PLATE I



A, Smooth tributary limestone valley with steep mountainous slopes in background; Colbert and Talbott soils in foreground; and Capshaw, Tupelo, and Etowah soils of stream terraces in main part of valley.
B, Rough stony land (Muskingum soil material) in background; Limestone rockland types on lower slopes in foreground.
C, Stave mill near Hollytree.



A, Excavation of cherty material in a Fullerton-Clarksville-Greendale soil association area.
B, Shipping lumber products on the Tennessee River.
C, Consolidated elementary school at Woodville.

Guntersville Reservoir serves for boating, fishing, swimming, and other water sports as well as water storage. Several small resorts, where boats can be rented, are on this lake.

VEGETATION

Jackson County is in the chestnut-chestnut oak-yellow poplar and the oak-pine subdivisions of the oak (southern hardwood forest) belt (*10*). Forest vegetation, mostly deciduous hardwood, covered practically all the county. The chief species were black, white, post, and chestnut oaks, hickory, beech, tuliptree (yellow-poplar), and maple. Cedar predominated over large areas of the land types consisting of limestone material. Some loblolly and shortleaf pines were intermixed with the deciduous forest, and Virginia pine was found in places, particularly on the stony areas. Shrubby growth and vines such as sumac, blackberry, greenbrier, grapes, rattan, and ivy were common.

WILDLIFE

According to the Forestry Relations Division of the Tennessee Valley Authority, squirrel, rabbit, quail, and mourning dove are the game most common. Duck are not so common. Predatory animals valued for pelts are skunk, fox, and weasel. The most common game fish are black bass, crappie, sauger (jack salmon), and sunfish; other edible fish include catfish, drum, sturgeon, carp, and buffalo. Most fishing is done in the Guntersville Reservoir and the Tennessee River.

ORGANIZATION AND POPULATION

The early history of this area is closely related to that of other counties in Tennessee Valley. Before the coming of white settlers, the upper part of the valley as far west as Muscle Shoals was occupied by the Cherokee Indians, who had been driven westward by the settlement of the Atlantic Coast. Other tribes also lived in the area, but they were associated with and dominated by the Cherokees (*9*).

The first attempt at settlement was probably that made by Lt. Henry Timberlake, who brought several families to the Tennessee River valley in 1763. His settlement was not permanent, and several later attempts failed also, partly because of the inability of the promoters to gain recognition as a settlement and partly because of conflicting claims of the English, Spanish, French, and Indians. The settlement of the land now forming the county, however, was not so adversely affected by overlapping claims as were many other parts of Alabama and Mississippi. Treaties with the Chickasaw Indians in 1805 and 1806 gave the United States Government title to most of the area west of the eastern boundary of Madison County and north of the Tennessee River. These treaties did not affect land now a part of Jackson County, but while Madison County was being settled many squatters moved into the area that is now Jackson County. In the Treaty of Washington, signed by the Cherokee Indians on February 27, 1819, however, all the country east of the Madison County line and north of the Tennessee River was ceded to the United States and subsequently was opened to settlers.

Most of the settlers came from the neighboring States of Tennessee, Georgia, North and South Carolina, Kentucky, and Virginia. They

were mainly of English and Scotch-Irish ancestry, although some were of German and a few of Indian descent. The first settlements were in the main valleys of the Tennessee and the Paint Rock Rivers and along some of the larger creeks. As more settlers arrived they pushed farther up into the small valleys and coves, but it was many years before any settlers chose the lands on the plateaus.

Named for Andrew Jackson, the county was created December 13, 1819, by an act of the Legislature of the Alabama Territory, which met at Huntsville. On the following day Alabama was admitted to the Union as the twenty-second State. Since that date the county seat and the boundaries of the county have been changed a number of times. Sauta, a Cherokee Indian village containing many white settlers, was made the first county seat, but with the creation of Decatur County from parts of Jackson and Madison Counties, the government was moved to Bellefonte. In 1824 Decatur County was dissolved and the land added to Jackson, Madison, and Marshall Counties. The part of the county south and east of the Tennessee River was added in 1836 as a result of a treaty with the Cherokee Indians. In 1868 Scottsboro was selected as the county seat.

The population of the county in 1950 was 38,998. Scottsboro, the largest town and easily accessible from all parts of the county, had a population of 4,731 in 1950. Bridgeport had a population of 2,386, and Stevenson, 927. Several villages are on Sand Mountain.

INDUSTRIES

A number of industries are established. In 1941 a stove factory and a hosiery mill were in operation in Bridgeport; a cotton textile mill, a flooring and woodworking factory, a stave mill, and sawmills were in Stevenson; a chenille factory, an underwear factory, a cheese factory, and two saw-and-planing mills in Scottsboro; a hosiery mill in Skyline Farms; a chair factory in Paint Rock; and a stave mill near Hollytree (pl. 1, *C*). Most of these enterprises are small, however, and employ few workers. In addition to the established sawmills, portable sawmills are frequently set up in the forested areas. Several small coal mines are in operation, the majority only to supply local demand, and there are a few larger commercial mines. In places the weathered material of the cherty ridges is excavated (pl. 2, *A*).

TRANSPORTATION FACILITIES

During the early history of the county, river transportation was at its height. Practically everything brought into or shipped from the area was carried, at least partly, by water. The first steamer came up the Tennessee River in 1828, and river transportation continued to be of great importance until about 1880. The railroads then took over an increasing part of the freight, and transportation by water diminished to such extent that it was abandoned. Since the development of the Tennessee Valley power and flood control system, however, transportation on the river has again increased, but no regular service has been established. A few private companies or individuals ship some timber products by water (pl. 2, *B*), and occasionally freight barges pass up or down the river. Water shipping facilities on the Tennessee River are at Guntersville in Marshall County and at Chattanooga, Tenn.

Two railroads serve the county. The Nashville, Chattanooga & St. Louis Railway, built between 1851 and 1853 from Nashville to Chattanooga, traverses the northeastern part of the county. The Southern Railway, which was originally the Memphis and Charleston Railroad completed in 1856, runs through the central part and forms the main line between Memphis and Chattanooga. Most of the valleys in the county have access to these railroads, but the upper Paint Rock River valley and the plateaus are less adequately served.

The most heavily traveled highways are hard-surfaced or paved. Relatively adequate highways accommodate the Sand Mountain area and the valleys of the Tennessee and the Paint Rock Rivers and their larger tributaries. Highway facilities are less adequate for the Cumberland Plateau area. Bus lines operate to outside points. Connections can be made from Scottsboro to Chattanooga, Huntsville, Guntersville, Rosalie, and Fort Payne. Motor freight service is also maintained over the main highways. Cotton, cottonseed, fertilizer, and other products are trucked into and from the county largely by commercial truckers, but many farmers do their own hauling. Most fertilizer dealers deliver to the farmers.

FARM, HOME, AND COMMUNITY IMPROVEMENTS

Dwellings in the rural areas, especially in the valleys, range from large fairly well-built houses on the larger plantations or more prosperous farms to poor or very poor houses on some of the smaller or tenant farms. Farm dwellings and other farm buildings on Sand Mountain are better than those in the valleys. On Cumberland Mountain farms the dwellings are a standard type constructed as a part of the resettlement project. The difference between the better and poorer homes is greater in the valleys than on the mountains. Some of the homes both in the valleys and on the plateaus are fairly well equipped with modern conveniences, especially where rural electric lines have been completed.

Electricity is available to farms in many parts of the county. Practically all small towns and local centers have telephone connections, and a few rural lines are in operation. All parts of the reasonably accessible areas are in reach of rural mail service, but some of the more remote coves or isolated plateaus have no mail delivery.

Schools and churches are well distributed. Recently many schools have been consolidated (pl. 2, *C*), but there are still a number of one-room elementary schools. There are 50 elementary schools, 17 junior high schools, and 6 senior high schools in the county.

AGRICULTURE

The Cherokee Indians raised corn, peas, beans, squash, pumpkins, other edible plants, and cotton before the settlement of the county. They also raised a large number of cattle. Clearing land of dense forest cover was slow and tedious work for the first white settlers. The first clearings were made by girdling the large trees and clearing and burning the undergrowth. Corn, peas, beans, squash, pumpkins,

and other vegetables were among the first crops planted. When land was available small patches of wheat and cotton were planted. Many farmers found that lands they first improved became depleted of productivity, so they abandoned them to volunteer reforestration and made new clearings.

The growing of cotton and the raising of cattle and hogs became sufficiently important soon after the county was settled to afford a marketable surplus. Cotton was ginned and baled by crudely constructed water-power gins. The bales were hauled by wagon or floated down the small streams on rafts or small flatboats to river ports where they were loaded on steamers and shipped to New Orleans or other markets. Some of the cotton raised in the upper valleys of the Paint Rock River and Crow Creek was hauled by wagon to Nashville, Tenn. Cattle and hogs were raised on the open range. Droves of 200 to 300 hogs were often taken overland to central and southern Alabama and sold to the owners of large plantations.

CROPS

Corn and cotton are the most important crops in the county, and according to local information they ranked first during early settlement, when oats and wheat were also grown on a large acreage. Crop acreages in 1939 are significant because they are the first obtained since the filling of the Guntersville Reservoir, which reduced the area of valley land. A large part of the flooded area was first-bottom land especially suited to corn. To gain some new fields, plateau lands on both Sand and Cumberland Mountains were opened by individual farmers and by resettlement projects.

Some plowing is done in fall, but most of the land is plowed late in winter or early in spring. When winter cover crops are grown the plowing is delayed until late in spring, generally the middle to end of April, to allow the cover crop to attain a desired growth.

In planting corn the field is laid off by plowing shallow furrows 3 to 4 feet apart across the field. If the crop is fertilized at the time of planting, both the seed and the fertilizer are placed in the furrow, but if the corn follows a cover crop or a previously well-fertilized crop, so that no fertilizer is necessary at planting time, only the seed is placed in the furrow.

Cotton is planted between April 1 and June 1, the bulk being planted between April 15 and May 15. Cotton picking usually starts between September 1 and September 15 and continues until late in December, although most of the crop is picked before November 1. Corn planting usually precedes cotton planting, but the dates of planting cover the same period. The better drained soils are planted early, but the lower lying first-bottom and other slowly drained soils cannot be planted until later, which may be late in May.

Soybeans are a relatively new crop and are used chiefly for hay. They are usually seeded, broadcast, or drilled between April 1 and June 1. The vines are cut for hay when the pods are one-third to one-half filled and before the leaves begin to drop. Only a small acreage is harvested for seed. The acreage in cowpeas has increased, and a little less than half of it is harvested for peas. In addition to the regular acreages, both cowpeas and soybeans are grown to some extent with other crops.

Sericea lespedeza is rapidly becoming one of the most important hay crops because it is a perennial and does not require planting annually. Also, it produces a large quantity of good, easily cured hay, is adapted to most soils of the county, and is good for grazing. Alfalfa is becoming more popular on the mountains as well as in the valleys. Medium red clover has been fairly widely used as a hay crop, especially in the Paint Rock River valley. Some is grown in other valleys and a little on the plateaus. A small part of the red clover crop is harvested for seed by small combines.

Potatoes, sweetpotatoes, and sorghum for sirup have varied in both acreage and yields. These crops have been of great importance as food in farm homes and as a supply for local demands. Recently the production of potatoes on Sand Mountain has increased, and on some farms potatoes are an important commercial crop (pl. 3, *A*).

Frequently two crops of potatoes are grown during the season. The spring crop is usually planted from February 15 to March 15, and the fall crop is planted from July 15 to August 15. Sweetpotatoes are most commonly planted between May 1 and June 1, but some, especially those grown from vine clippings, are planted up to June 15. The early potato crop is harvested in July and August and, at times, much later; the late crop is gathered in October and November. Sweetpotatoes are dug between November 1 and November 15.

Most fruits are produced for home consumption, but a small surplus is sold locally. A few apple orchards ranging up to about 200 trees are on Sand Mountain, especially in the northern part, and a few peach and plum orchards, both in the valley and on the plateau, are operated on a semicommercial scale. The trees in these areas are given better care than average. The fruit is gathered and sold wherever a satisfactory market can be obtained. Cultivated strawberries, youngberries, and wild blackberries and huckleberries are gathered in season and sold at local markets or peddled from house to house in the small towns.

Truck farming is practiced in the northern part of Sand Mountain, the crops being marketed mainly in Chattanooga. Sweet corn, peas, beans, onions, cabbage, squash, okra, greens, and other vegetables are grown. Home gardens are planted in spring by most farm families. Some fall gardens, which are fairly productive when moisture conditions are favorable, are also planted. Watermelons, muskmelons, and cantaloups are grown on most farms and are especially common on the sandy plateaus.

The acreage of the principal crops and number of fruit trees and grapevines in stated years are shown in table 2.

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TABLE 2.—*Acreage of principal crops and number[1] of fruit trees and grapevines in Jackson County, Ala., in stated years*

Crop	1919	1929	1939	1944
	Acres	*Acres*	*Acres*	*Acres*
Cotton	41, 615	56, 426	33, 103	36, 483
Corn	89, 932	64, 334	78, 871	81, 477
Wheat	798	131	114	920
Oats	583	60	191	82
Rye	20	16	10	79
Soybeans	(2)	9, 508	12, 719	14, 962
Cowpeas	632	1, 809	1, 967	2, 679
Peanuts	66	117	240	474
All hay	19, 998	17, 684	25, 866	23, 126
Annual legume hay	8, 954	12, 990	[3] 13, 348	[3] 15, 277
Lespedeza	(2)	(2)	10, 750	6, 410
Clover and timothy alone or mixed	(2)	1, 373	383	416
Alfalfa	(2)	61	116	96
Small-grain hay	3, 496	478	126	88
All other tame hay	6, 601	1, 147	222	552
Wild hay	947	1, 000	237	287
Potatoes	547	686	1, 330	1, 629
Sweetpotatoes	506	402	663	422
Sorghum for sirup	853	424	944	(2)
	Number	*Number*	*Number*	*Number*
Apples—trees	59, 463	33, 941	23, 361	37, 864
Peaches—do	29, 970	36, 569	29, 899	47, 759
Pears—do	2, 612	2, 230	2, 693	3, 944
Plums and prunes—do	4, 847	1, 506	1, 900	1, 378
Grapevines	4, 900	5, 118	6, 725	12, 439

[1] Number of fruit tree and grapevines of bearing age given for all years except 1944; the 1944 figures are for trees of all ages.
[2] Not reported.
[3] Soybeans and cowpeas harvested for hay.

CROP ROTATION AND FERTILIZER

Few farmers follow a particular program of crop rotation. Some rotation is practiced, however, on the well-drained valley and sandy mountain soils. Many farmers follow cotton with a winter cover crop, which is turned under in spring and followed by corn. This 2-year rotation is varied by seeding a crop of winter oats, wheat, or rye and following it with a summer legume. Another practice is to summer-fallow the land and then seed crimson clover, alfalfa, or some other legume.

The quantity of fertilizer used annually has steadily increased. In 1920, 69.1 percent of the farmers reported using fertilizer to some extent, whereas in 1940 the percentage rose to 87. About 95 percent or more of the fertilizer used in the area is factory-mixed. Some basic slag and acid superphosphate are used for permanent pasture, lespedeza hay (pl. 3, *B*), and soybeans. Most corn and some cotton are side-dressed with a nitrogen fertilizer 4 to 5 weeks after planting. Oats and other winter grains are fertilized in spring by being top-dressed with 100 to 200 pounds of sodium nitrate or its equivalent in other nitrogen fertilizer. Because oats usually follow cotton or potatoes, crops that have been fairly heavily fertilized with phosphate and potash fertilizer, they do not receive applications of complete fertilizer.

PERMANENT PASTURE

Much permanent pasture is on land not well suited to crops, and only a small part is on land suitable for tillage. In the valleys the pasture is usually on erodible areas bordering the rough limestone slopes, low limestone ridges or stony land of limestone origin, steep slopes, eroded rough gullied lands, and wet lands or first bottoms subject to severe flood hazard. Inaccessible plowable lands, as those bordering the Guntersville Reservoir, are also used for permanent pasture. On the other hand, many farmers are using some of their best cornland for pasture.

In the chert-ridge areas, pastures include practically all except the better situated plowable lands on the more gentle slopes and the wider ridge tops. The lower shaly slopes of the red hills along the Tennessee River and in places the entire hills are used for permanent pasture. The crests and upper slopes, however, are usually wooded. The permanent pasture is on the steeper slopes on the mountain or plateau areas; on bottom lands along the drains, especially those that remain wet most of the time; on benchlands below the escarpments; and on shallow stony lands. In great part the mountain slopes, however, are under forest and are not used for pasture.

Most of the permanent pasture has been cleared of underbrush and trees and supports a mixed growth of native grasses and plants, especially wild legumes, or introduced grasses and plants that have become so well established that they can be considered native. The varieties of plants differ according to the dominant moisture condition. The low wet areas support more water-loving plants. Some difference in varieties can be traced to the absence or presence of lime in the soil.

Among the more common pasture plants and grasses in the cleared but otherwise unimproved pastures are broomsedge, crabgrass, Bermuda grass, Dallis grass, Johnson grass, hurrah grass and other water-loving grasses, and common lespedeza, partridge-pea, wild sericea lespedeza, and other wild legumes. Under favorable conditions, small patches of sweetclover, white clover, and Kentucky bluegrass may occur in unimproved pasture, but these plants seldom maintain a good stand except when the pastures are improved with fertilizer and amendments.

Many permanent pastures have been, and some still are, badly infested with noxious weeds, some of which not only crowd out the better pasture grasses and plants but are very objectionable for their effect on dairy products. The more common weeds or pests are bitterweed, wild onion, dogfennel, yellowtop, ox-eye daisy, bullgrass, and bullnettle. Broomsedge is usually considered more as a pest than a pasture grass, but some forage is obtained from the young shoots.

Although most of the pastures are classed as unimproved, progressive farmers and agricultural workers have done a considerable amount of work to establish improved permanent pastures. Many farmers mow their permanent pastures late in summer and early in fall to remove coarse weeds and briers. The acreage in improved pasture

is not large but is well distributed over the county so that the results can be observed by all farmers. Some improved pastures are on sandy soils of the plateaus (pl. 3, *C*), and some are on various valley soils.

The program recommended for the sandy soils on the mountains differs only partly from that recommended for the soils of the valleys. In general it calls for a well-prepared seedbed fertilized with 1 ton of basic slag or 1,000 pounds of 16-percent superphosphate and 1 to 3 tons of finely crushed limestone. The recommended seed mixture consists of 10 pounds of common lespedeza, 5 pounds of Kentucky bluegrass, 5 pounds of orchard grass, 5 pounds of Dallis grass, and 2 pounds of common white clover an acre. To this mixture is added 5 pounds of redtop when low wet areas or wet seepy slopes on the mountains are to be seeded. Fescue may be good, particularly for wetter places.

LIVESTOCK AND LIVESTOCK PRODUCTS

The early settlers found the soils in the valleys suitable for pasture grasses and feed crops and recognized the value of raising cattle and hogs both for home supply and market. Large droves of hogs were taken overland to central and southern Alabama for sale to large-plantation owners. Most farmers used oxen for breaking and plowing fields as well as for much of the hauling, but in time they began to substitute horses for many farm purposes. Later, mules replaced most of the oxen, and some of the horses used in field work were used for hauling heavy loads. The advent of the automobile further reduced the number of horses, and the increased use of farm tractors reduced the number of mules. Most of the replacement stock for horses and mules is brought from Tennessee, although the farmers raise a higher percentage of replacement stock than those in most other Alabama counties.

The most popular hog breeds are Poland China, Duroc, Ohio Improved Chester, and Hampshire. Chattanooga, Tenn., is the main market. Many hogs and pigs are bought and sold or traded in Scottsboro, where farm products, cattle, horses, mules, and farm machinery are also sold or traded.

About equal numbers of beef and dairy cattle are raised. Some of the milk cows, however, are grades of beef types. Most farmers keep one or more cows to supply the dairy products needed for home use, and some have a small surplus for sale. Approximately 90 percent of the milk produced is used on the farms or retailed as whole milk and other dairy products direct to consumers by dairies; 3 to 5 percent is churned and sold as butter; a small percentage is sold as butterfat to cream stations; and about 5 percent is sold to the local cheese factory. Dairies supplying the whole-milk retail market in the small towns and villages keep herds of 20 to 40 cows. The cheese factory at Scottsboro bought about 177,000 pounds of milk from approximately 200 farms in March 1942.

Milk production has risen from 1,839,847 gallons in 1919 to 3,423,050 gallons in 1944, and although no figures were available for butter production in 1944, there was an increase in the quantity sold from 37,781 pounds in 1919 to 87,796 pounds in 1944.

The most popular beef breeds are Hereford, Shorthorn, Aberdeen Angus, and Red Polled. The grade cows are usually bred to purebred bulls. Farmers often start with scrub cows, and as the new stock matures, heifers of better grade are retained to make up the future breeding stock. Some breeders have therefore developed fine herds. The herds of breeding stock vary from 1 to more than 150 cows, the common range among the small breeders being from 5 to 10 cows, and among the large breeders, 20 to more than 150. In addition to the number of cows kept for breeding purposes, young stock of various ages are kept. Some breeders add to their herd by buying stock and feeders, principally from other producers in the area who have become overstocked in proportion to the area of pasture or quantity of feed available. The principal market for beef cattle is Chattanooga. Most of the cattle are sold direct from farms to market and are transported by truck.

With the increase in the number of chickens from 172,871 in 1920 to 245,577 in 1945, egg production rose from 714,562 dozen to 1,630,467 dozen.

The number of livestock on farms in the county in stated years is given in table 3.

TABLE 3.—*Number of livestock on farms in Jackson County, Ala., in stated years*

Livestock	[1] 1920	[1] 1930	1940	[1] 1945
Horses	3, 731	1, 699	[2] 1, 767	1, 765
Mules	8, 358	8, 287	[2] 6, 789	6, 516
Cattle	20, 560	13, 125	[2] 11, 906	17, 943
Sheep	2, 648	1, 367	[3] 612	966
Goats	2, 516	1, 414	[4] 722	1, 249
Swine	37, 634	14, 100	[4] 15, 060	16, 417
Chickens	172, 871	154, 744	[4] 179, 618	245, 577

[1] Animals of all ages.
[2] Over 3 months old, Apr. 1.
[3] Over 6 months old, Apr. 1.
[4] Over 4 months old, Apr. 1.

LAND USE, TENURE, TYPES, AND SIZES OF FARMS

After removal of the Guntersville Reservoir area from farming, the number of farms in 1944 was 5,013, as compared with 5,337 in 1929. The average size of farms, about 75 acres, and the improved land per farm, about 38 acres, has not varied much since 1929. Farm land in Jackson County in stated years is shown in table 4.

TABLE 4.—*Farm land in Jackson County, Ala., in stated years*

Farm land	1929	1939	1944
	Acres	*Acres*	*Acres*
All land in farms	381, 969	371, 212	380, 063
Cropland harvested	142, 498	146, 157	155, 092
Crop failure	16, 723	1, 856	3, 587
Cropland, idle or fallow	18, 683	8, 229	15, 818
Plowable pasture	18, 563	25, 090	13, 236
Woodland	164, 721	171, 697	153, 728
All other land	20, 781	18, 183	38, 602

The percentages of owner-operated farms and tenant-operated farms vary in different parts of the county. In 1945, 54.7 percent of the farms were operated by owners, 45.2 percent by tenants, and 0.1 percent by managers. The total number of tenants in 1940 was 2,602, of which 2,171 were share tenants and croppers, 301 cash tenants, 18 share-cash tenants, and 112 other tenants. According to local information most of the leases are made verbally for 1 year. Longer term written leases are recommended by agricultural workers, but have not come into common use.

In 1945, 2,907 farms derived their major source of income from field crops; 1,463, from farm products used by farm households; 256, from general products; 145, from livestock; 87, from poultry products; 45, from forest products; 39, from dairy products; 8, from vegetables; 5, from fruits and nuts; and 3, from horticultural specialties. There were 55 unclassified farms.

Although there were a few large farm properties in 1945, more than 80 percent of the farms consisted of less than 100 acres, and more than 50 percent were under 50 acres. Farms of 30 to 50 acres accounted for the largest single grouping.

FARM EQUIPMENT

In 1945 farmers reported a total of 576 tractors. Most of these farmers probably also had tractor plows, harrows, disks, two-row planters with fertilizer and planting attachments, two-row cultivators, and mowers. Some had small combines or access to the use of combines. Most of the farms without tractors are equipped with one- or two-horse moldboard plows, harrows, cultivators or shovel plows, one-horse fertilizer distributors, and one-horse planters and mowers. Some have hay rakes and disk harrows. A few use a combined fertilizer distributor and seeder pulled by a horse or mule.

FARM EXPENDITURES

In 1944, 29.5 percent of the farms spent $261,233 for hired farm labor. Experienced farm help is usually plentiful. On the mountains and in parts of the valleys all hired labor is white, but in some parts of the valleys it is mostly Negro. Approximately 10 percent of the farmers use hired help throughout the year; 85 percent, during planting and cultivating time in spring; 50 percent, in summer; and 90 percent, in fall, especially for picking cotton.

In 1939, 4,095 farms reported an expenditure of $229,046 for 8,388 tons of commercial fertilizer.

The amount spent for feed on 2,795 farms was $346,875 in 1944. The increased production of hay should decrease the quantity of feed brought into the county.

SOIL SURVEY METHODS AND DEFINITIONS

Soil surveying consists of the examination, classification, and mapping of soils in the field. The soil scientist walks over the area at intervals not more than one-quarter mile apart and bores into the soil with an auger or digs holes with a spade. Each boring or hole shows the soil to consist of several distinctly different layers, or horizons, termed collectively the soil profile. Each of these layers is studied carefully for the physical and chemical characteristics that affect plant growth.

The color of each layer is noted. The darkness of the surface layer is usually related to its content of organic matter; streaks and spots of gray, yellow, and brown in lower layers generally indicate poor drainage and poor aeration. Texture, or the content of sand, silt, and clay in each layer, is determined by the feel and is checked by mechanical analysis in the laboratory. Texture has much to do with the quantity of moisture the soil will hold available to plants, whether plant nutrients or fertilizers will be held by the soil in forms available to plants or will be leached out, and how difficult the soil may be to cultivate.

Structure, or the way the soil granulates, and the quantity of pore, or open space between particles indicate how easily plant roots can penetrate the soil and how easily water enters it. Consistence, or the tendency of the soil to crumble or to stick together, indicates how difficult it it to keep the soil open and porous under cultivation. The kind of rock and the parent material from which the soil has been developed affect the quantity and kind of plant nutrients the soil may contain. Simple chemical tests show how acid the soil may be.[4]

The depth to bedrock or to compact layers is determined. The quantity of gravel or rocks that may interfere with cultivation, the steepness and kind of slope, the quantity of soil lost by erosion, and other external features are observed.

On the basis of all these characteristics, soil areas much alike in the kind, thickness, and arrangement of layers are mapped as one soil type. Some soil types are separated in two or more phases. For example, if a soil type has slopes that range from 2 up to 20 or 25 percent, the type may be mapped in three phases: An undulating phase with slopes between 2 and 5 percent, a rolling phase with slopes between 5 and 10 or 12 percent, and a hilly phase with slopes between 10 or 12 and 20 or 25 percent. A soil with slopes above 20 or 25 percent will constitute a steep phase. The slope ranges for the rolling, hilly, and steep phases in this county vary according to the nature of the soil, particularly with regard to its susceptibility to erosion.

A soil type will be divided into phases primarily because of differences in the soil other than those of kind, thickness, and arrangement of layers. The slope of a soil, the frequency of outcropping bedrock, the extent of erosion, or artificial drainage are examples of characteristics that might cause such division.

Two or more soil types may have similar profiles; that is, the soil layers may be nearly the same but the texture, especially of the surface layer, differs. As long as the other characteristics of the soil

[4] The reaction of a soil is its degree or acidity of alkalinity expressed mathematically as the pH value. A pH value of 7 indicates precise neutrality; higher values, alkalinity; and lower values, acidity. The following terms (*6*) are used to describe the reaction of soils of known pH:

	pH		pH
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		

layers are similar, these soils are considered to belong in the same soil series. A soil series therefore consists of all the soil types that have about the same kind, thickness, and arrangement of layers, except for texture, particularly of the surface layer, whether the number of such soil types be only one or several.

The name of a place near where a soil series was first found is chosen as the name of the series. Thus, Hartsells is the name of a series of well-drained friable strongly acid yellowish-gray soils of moderate to shallow depth to sandstone bedrock. These soils are well distributed over sandstone upland plateaus. Hartsells soils were first recognized and named in Cherokee County, Ala.

When very small areas of two or more kinds of soil are so intricately mixed that they cannot be shown separately on a map of the scale used, they are mapped together and called a soil complex. Thus, Philo-Atkins silt loams is a complex of Philo silt loam and Atkins silt loam.

Areas such as stony, rocky, gullied, and rough lands that have little true soil are not designated with series and type names but are given descriptive names, as Limestone rockland, hilly; Rough stony land (Muskingum soil material); and Rough gullied land (Muskingum soil material).

The soil type, or where the type is subdivided, the soil phase, is the unit of mapping in soil surveys. It is the unit or the kind of soil most nearly uniform and narrowest in range of characteristics. For this reason land use and soil management practices can be more definitely specified for it than for broader groups of soils that contain more variation. One can say, for example, that soils of the Hartsells series are generally well suited to the production of most crops common to the region, that they require lime for best results with legumes, and that they respond well to good management. Hartsells fine sandy loam, undulating phase, in addition, has gentle slopes, is sufficiently deep to bedrock to store and hold an adequate water supply available for plants, is relatively easy to conserve, and is not seriously erosive. Hartsells fine sandy loam, rolling shallow phase, occupies stronger slopes, is so shallow to bedrock that the storage capacity for water is limited, is relatively difficult to conserve especially with regard to retarding erosion, and is often considered unfavorable for cropland.

SOILS

In this county two factors of soil formation—climate and vegetation—are relatively uniform. The climate has been moderately warm and humid, and the natural vegetation was predominantly oak and chestnut with some pine intermixed. The other three factors of soil formation—parent material, slope, or lay of the land, and age—vary greatly among the soils.

On the higher areas most of the parent material has remained in place where it was weathered from the rock. Soils formed under these conditions are commonly designated as soils of the upland and are classified as soils of limestone valley uplands or sandstone plateaus.

In general, the soils over sandstone, shale, interbedded shale and limestone, and interbedded shale and sandstone are shallow to bedrock and moderate to low in fertility. Their slope ranges from undulating to very steep. Those over high-grade limestone are deep to bedrock and high in natural fertility. Their slope is predominantly undulating to rolling, but small areas are hilly. Where the soils occur over cherty limestone, they are deep to bedrock and medium to low in fertility. Their surface ranges from undulating to hilly. The soils over argillaceous limestone have compact plastic clay subsoil and a shallow depth, 1½ to 5 feet, to bedrock. They are predominantly smooth and moderately fertile.

During geologic time soil material has been moved by water and gravity from the place it weathered from the rock. Material that has been moved a short distance either by water or gravity and deposited on adjacent lower slopes and along the heads of drains is designated as local alluvium, and soils on it are commonly designated as soils of the colluvial slopes. The soil material in such areas, therefore, is inherently similar in some respects to that of the soils of the immediately surrounding upland.

Material moved great distances by water and deposited by streams is known as general alluvium and commonly consists of various rock materials. Several kinds of rock are exposed, and some of the alluvium originated in places far removed from the county. General alluvium may be young or old.

Old alluvium, which occurs in the form of benches or stream terraces, represents very old flood plains left by the streams as they cut to lower levels. Soils on these benches are commonly designated as soils of the stream terraces. Being old enough to have formed a well-defined surface layer and subsoil, these soils have profiles that in some respects resemble those of the older soils of the upland.

Young alluvium occurs as first bottoms along streams, and soils on it are commonly designated as soils of the first bottoms. All these soils, like some of those of the colluvial slopes, are young and have not formed a well-defined surface layer and subsoil. Except where protected, they are subject to overflow and further deposition of alluvium.

The slopes in the county range from nearly level to steep; some are 60 percent or more. The most extensive smooth areas are on Sand Mountain; other less extensive ones are in the Paint Rock River valley. The smooth areas on the mountains are ridge tops of variable width that break rapidly to the steep stony valley walls. The first bottoms and lower stream terraces adjacent to the Tennessee River and its larger tributaries are nearly level to gently undulating; the older terraces and cherty ridges, undulating to hilly; and the few shaly ridges, strongly sloping to steep. Most of the steep areas are on the long rugged mountainous slopes that separate the high smooth areas of the sandstone plateaus from the lower smooth areas of the limestone valleys.

Stoniness is a common characteristic. All the stony and cherty soil phases are sufficiently stony to interfere materially with tillage operations, although not stony enough to make tillage impractical under average conditions. The stony land types in general are sufficiently stony to make tillage impractical. Much of the area consisting of the stony soils and land types is on mountainous slopes. The other soils generally are relatively free of stone.

The thickness of the soil over bedrock ranges from a thin layer on the limestone rockland types to 40 feet or more for some areas of first bottom soils, stream terrace soils, and Fullerton and Clarksville soils. In great part the shallowest soils are on the steep mountainous slopes. Practically all the plateau areas—Sand Mountain and Cumberland Plateau—consist of soils of medium depth (2 to 5 feet). In general, the soils on first bottoms, colluvial slopes, and stream terraces have greater depth over the bedrock than do the soils of the upland, although the Clarksville and Fullerton soils commonly have great depth to bedrock.

Most of the soils, including all those on the sandstone plateaus and most of those in the limestone valleys, are medium to strongly acid. Those that are only slightly acid to slightly alkaline are chiefly on first bottoms and along drainageways subject to seepage or flooding by lime-bearing water. The Huntington, Egam, Lindside, Melvin, Bruno, Sturkie, Dunning, Prader, and Hollywood soils are those slightly acid to slightly alkaline. The Hermitage, Greendale, Abernathy, and Ooltewah soils in general range from slightly to medium acid.

Soils having a silt loam or silty clay loam surface soil or plow layer are common. They are mainly in the limestone valleys, although some are on the smooth parts of the sandstone plateaus. Soils having a sandy loam or sandy clay loam surface soil or plow layer are also abundant and are mostly on the sandstone plateaus, mountain slopes, and stream terraces. A small acreage on the natural levees along the largest streams of the limestone valleys has a loamy fine sand texture. Soils having a silty clay or clay surface soil or plow layer occur over argillaceous or clayey limestone on the lower mountain slopes.

Some soils have a very friable to moderately firm consistence to a depth of 2 feet or more. In this respect, they are well suited to most crops. Other soils, although considered suitable for crops requiring tillage, have a very firm or plastic consistence and are less well suited. The drainage of the soils, from the standpoint of suitability for crops, ranges from poor to excessive.

SOIL SERIES AND THEIR RELATIONS

The soils of Jackson County are grouped according to their topographic position as (1) soils of limestone valley uplands, (2) soils of sandstone plateaus, (3) soils of colluvial slopes, (4) soils of stream terraces, and (5) soils of first bottoms.

The areas classified as uplands and plateaus lie above the stream bottoms and consist of materials derived directly from the decay of the underlying rocks. Strictly residual soils are not common in the limestone valley uplands, because practically all the soils are modified by or derived from parent material accumulated as alluvium or colluvium. Colluvial slopes are foot slopes derived from material accumulated from the higher slopes. Stream terraces are water-laid benchlike areas bordering stream bottoms but are higher than the bottoms and not subject to flooding. First bottoms are bottom lands formed from water-borne material near streams and are subject to overflow.

The soil series of the county are classified according to topographic position in table 5, and the main characteristics of each are given.

TABLE 5.—*Major characteristics of the soil series of Jackson County, Ala.*

SOILS OF LIMESTONE VALLEY UPLANDS

Soil series	Parent rock	Dominant relief	Internal drainage [1]	Depth of profile [2]	Surface soil			Subsoil			Reaction
					Color [3]	Consistence	Approximate thickness [4]	Color [3]	Consistence	Texture	
				Inches			*Inches*				*pH*
Dewey	High-grade dolomitic limestone.	Undulating to hilly.	Moderate	42–80	Brown to light brown.	Friable	8–12	Yellowish red	Friable to firm	Silty clay	5.8–5.0
Fullerton	Cherty dolomitic limestone.	do	do	120–480	Grayish brown	do	8–12	Reddish yellow to yellowish red.	do	Cherty silty clay.	5.8–4.5
Clarksville	Very cherty dolomitic limestone.	do	do	120–480	Light gray	do	10–14	Pale yellow to brownish yellow.	do	do	5.8–4.5
Talbott	Argillaceous or clayey limestone.	Undulating to rolling.	Moderately slow.	24–72	Brown	do	6–10	Yellowish brown to reddish yellow.	Very firm	Clay	5.0–6.2
Colbert	do	do	Slow	18–48	Dark yellowish brown.	Firm	4–8	Yellowish brown, some mottling.	Extremely firm.	do	5.5–6.8
Tellico	Mixed shale, sandstone, and limestone.	do	Moderate	36–72	Reddish brown.	Friable	5–8	Reddish brown grading to yellowish red.	Friable to very friable.	Silty clay	5.2–4.8
Armuchee	do	Hilly to steep	do	20–40	Brownish yellow.	do	4–7	Reddish yellow, some mottling.	Firm	do	5.0–4.8

See footnotes at end of table.

TABLE 5.—*Major characteristics of the soil series of Jackson County, Ala.*—Continued

Soil series	Parent rock	Dominant relief	Internal drainage [1]	Depth of profile [2]	Surface soil			Subsoil			Reaction
					Color [3]	Consistence	Approximate thickness [4]	Color [3]	Consistence	Texture	
				Inches			*Inches*				*pH*
SOILS OF SANDSTONE PLATEAUS											
Hartsells	Sandstone, some conglomerate and shale.	Nearly level to rolling.	Moderate to rapid.	26–50	Pale brown or brownish gray.	Very friable	8–12	Very pale brown or brownish yellow.	Friable	Sandy clay loam	4.8–5.5
Enders	Shale and sandstone.	Undulating to rolling.	Moderate	20–45	Light brown to pale yellow.	do	8–12	Pale yellow to reddish yellow.	do	Silty clay	4.5–5.0
Hanceville	Sandstone and conglomerate.	do	do	36–84	Reddish brown to yellowish red.	do	8–12	Yellowish red to reddish brown.	do	Sandy clay	4.8–5.5
Crossville	Sandstone, some shale.	Undulating	Moderate to slow.	12–24	Yellowish brown or brown.	do	7–10	Brown to dark yellowish brown.	do	do	4.5–5.0
Muskingum	Sandstone, some conglomerate and shale.	Hilly to steep	Rapid	12–36	Pale brown or brownish gray.	do	4–6	Very pale brown or brownish yellow.	Very friable	do	4.8–5.5
Pottsville	Shale, some sandstone.	Hilly	Slow	10–30	Light brownish gray or yellowish gray.	Friable	4–10	Pale yellow to yellowish red.	Friable	do	5.2–4.6
SOILS OF COLLUVIAL SLOPES											
Hermitage	Limestone and cherty limestone.	Gently sloping to strongly sloping.	Moderate	36–120	Brown or brownish gray.	Friable	8–12	Yellowish brown to reddish brown.	Firm	Silty clay loam.	5.8–6.4
Greendale	Cherty limestone.	Gently sloping	do	30–60	Grayish brown to light yellowish brown.	do	6–16	Light yellowish brown.	Friable	Silt loam to clay loam.	4.8–5.6
Swaim	Argillaceous limestone.	Gently sloping to sloping.	Moderately slow.	24–60	Yellowish brown to grayish brown.	do	5–8	Yellowish brown to reddish brown.	Very firm	Silty clay	6.8–5.4
Hollywood	do	Gently sloping to nearly level.	Slow to very slow.	12–60	Dark gray to very dark gray.	Firm to very firm.	10–20	Light gray to gray mottled with yellowish brown.	do	Clay	6.8–7.4
Abernathy	Limestone	Nearly level to very gently sloping.	Moderate to slow.	24–72	Dark reddish brown.	Friable	12–32	Dark brownish red.	Friable	Silt loam to silty clay loam.	5.6–5.0
Ooltewah	do	Nearly level	Slow	24–60	Grayish brown	do	12–24	Light gray mottled with gray, yellow, and brown.	Firm	Silty clay loam.	5.6–5.0
Guthrie	do	do	Very slow	18–60	Light gray	do	1–8	do	Firm to very firm.	Silty clay	4.8–5.2
Allen	Sandstone, some limestone and shale.	Undulating to hilly.	Moderate	48–80	Light grayish brown to light brown.	do	8–12	Yellowish red grading to brownish red.	Friable	Sandy clay	5.8–4.8
Jefferson	Sandstone, some shale and limestone.	do	do	48–80	Brownish gray to grayish brown.	do	8–12	Light yellowish brown to brownish yellow.	Firm	do	4.6–5.8
Barbourville	Sandstone and shale.	Nearly level to gently sloping.	do	24–72	Light yellowish brown.	do	7–12	Yellowish brown mottled at about 30 inches.	Friable	Fine sandy loam to clay loam.	5.0–4.6
Cotaco	do	do	Slow	24–72	Brownish gray to pale yellow	do	7–12	Light yellowish brown mottled with yellow, brown and gray; becomes grayer with depth.	do	do	5.0–4.6
SOILS OF STREAM TERRACES											
Cumberland	Limestone with some sandstone and shale.	Undulating to hilly.	Moderate	24–180	Reddish brown.	Friable	6–12	Red	Firm	Silty clay loam.	4.8–6.0
Etowah	do	Nearly level to rolling.	do	24–80	Brown to grayish brown.	do	8–12	Yellowish red or yellowish brown.	Friable	do	5.0–4.6
Capshaw	do	Nearly level to gently undulating.	Slow	24–72	Pale brown	do	8–12	Pale yellow mottled below 30 inches.	do	Silty clay	5.2–4.6
Wolftever	do	Nearly level to gently rolling.	do	48–80	Brown or grayish brown.	do	12–16	Yellowish brown.	Firm	do	5.0–6.0
Tupelo	do	Nearly level to gently undulating.	do	24–72	Light gray to yellowish gray.	do	5–7	Mottled yellow, brown, and gray.	Very firm or tight.	Silty clay to clay.	5.0–4.6

See footnotes at end of table.

TABLE 5.—*Major characteristics of the soil series of Jackson County, Ala.*—Continued

SOILS OF STREAM TERRACES—Continued

Soil series	Parent rock	Dominant relief	Internal drainage [1]	Depth of profile [2]	Surface soil			Subsoil			Reaction
					Color [3]	Consistence	Approximate thickness [4]	Color [3]	Consistence	Texture	
				Inches			*Inches*				*pH*
Taft	Limestone with some sandstone and shale.	Nearly level	Slow to very slow.	36–72	Light brownish gray.	Friable	8–12	Pale yellow grading to mottled yellow and gray.	Firm	Sticky clay	5.0–4.6
Robertsville	do	do	Very slow	24–42	Gray to light gray.	do	6–10	Light gray mottled with yellow and brown.	Firm to very firm.	Silty clay	5.2–4.8
Waynesboro	Sandstone, shale, and limestone.	Undulating to hilly.	Moderate	24–180	Pale brown or grayish brown.	do	6–12	Yellowish red grading to deep red.	Friable	Clay loam	5.8–4.8
Sequatchie	Sandstone, some shale and limestone.	Nearly level to undulating.	Moderate to rapid.	36–180	Yellowish brown or grayish brown.	do	6–12	Light yellowish red or yellowish brown.	do	Sandy clay	6.0–4.5
Holston	do	do	Moderate	36–180	Pale brown to light brownish gray.	do	6–12	Light yellowish brown or yellowish brown.	Friable to firm	Sandy clay loam to sandy clay.	6.0–4.5
Monongahela	do	do	Slow	36–180	Pale brown to light gray.	do	6–12	Pale brown to pale yellow, some mottling.	Friable	Sandy clay	6.0–4.5
Tyler	do	Nearly level	Very slow	48–180	Very light gray.	do	6–10	Mottled gray and yellow.	Firm to very firm.	Silty clay to clay.	5.4–4.8
SOILS OF FIRST BOTTOMS											
Huntington	Limestone mainly.	Nearly level to gently undulating.	Moderate	60+	Brown or dark grayish brown.	Friable	7–12	Dark yellowish brown.	Moderately firm.	Silty clay loam.	6.8–6.0
Egam	do	do	Slow	60+	Grayish brown or pale brown.	do	8–10	Very dark grayish brown.	Very firm	do	7.2–6.5
Lindside	do	Nearly level	do	60+	Grayish brown to dark grayish brown.	do	8–10	Mottled olive or gray, brown, and yellow at about 18 inches.	Firm	do	7.2–6.8
Melvin	do	do	Very slow	60+	Light gray to brownish gray.	do	8–10	Gray mottled with yellow and brown from 8 to 24 inches.	Very firm	Silty clay	7.2–5.0
Dunning	do	Nearly level to slightly depressed.	do	30+	Dark gray to very dark gray.	Firm to very firm.	3–10	Mottled gray, brown, and yellow grading at 10 inches to dark gray or olive.	do	Clay	7.2–6.5
Bruno	Sandstone, some limestone and shale.	Nearly level	Rapid	60+	Grayish brown or dark yellowish brown.	Friable	8–10	Yellowish brown to reddish brown.	Friable	Sandy clay loam over sand at 20 inches.	7.2–6.5
Sturkie	do	do	Slow	30+	Pale brown to brownish gray.	Very friable	8–10	Brownish yellow mottled with gray, yellow, and brown at 16 to 20 inches.	do	Sandy clay loam.	7.2–6.5
Prader	do	do	Very slow	30+	Light gray to dark gray.	Friable	8–10	Bluish or olive gray, mottled with brown, reddish brown and yellow.	Very firm	Clay at 24 inches.	7.2–6.5
Pope	Sandstone, some shale.	do	Moderate	24+	Grayish brown or pale brown.	do	8–10	Brown to yellowish brown, lighter with depth and mottled with gray and brown.	Friable	Sandy loam below 24 inches.	5.0–4.5
Philo	do	do	Slow	24+	Grayish brown to yellowish gray.	do	3–8	Mottled yellow, brown, and gray.	do	Sandy clay at 18 inches.	5.0–4.5
Atkins	do	do	Very slow	24+	Gray	do	2–6	do	Very firm	Silty clay at 6 inches.	5.0–4.5

[1] Moderate internal drainage refers to the optimum condition of internal drainage for most crops grown in the county.
[2] Depth in inches to bedrock, partly weathered bedrock, or to material distinctly different from that parent to the soil, as a bed of gravel.
[3] Color of the air-dry material.
[4] Uneroded surface layer.

In addition to the 47 soil series listed in table 5, several miscellaneous land types are mapped: Hilly stony land (Muskingum soil material), Limestone rockland (hilly), Limestone rockland (rough), Rolling stony land (Colbert soil material), Rolling stony land (Muskingum soil material), Rough gullied land (Dewey, Cumberland, and Colbert soil materials), Rough gullied land (Muskingum soil material), Rough stony land (Muskingum soil material), and Stony alluvium (Muskingum and Colbert soil materials).

The stony lands include all areas that have a great many outcrops of sandstone or limestone bedrock or a cover of rocks ranging from small pieces to boulders or larger. There is only a relatively small quantity of soil or soil material among the rocks. These stony lands occupy almost all the area between the rock escarpments along the rim of the sandstone plateaus and the valley floors except the nearly stone-free and cherty colluvial foot slopes. Most of the stony lands are unsuitable for tillage.

The rough gullied lands occur chiefly in the limestone valleys. They consist of land that is severely eroded and deeply gullied, apparently as a result of poor management. These lands are mainly red, although a few areas are yellow or yellowish brown. They are widely distributed throughout the limestone valleys in areas 1 to 20 acres or more in size, the largest being in the red serrated hills that border the Tennessee River almost continuously from Bridgeport into Marshall County. In other parts of the limestone valleys very few areas contain more than 5 acres. These rough gullied lands are practically free of stone but are so eroded they are nearly everywhere unsuitable for tillage.

SOIL TYPES AND PHASES

In the following pages the soils, identified by the same symbols as those on the soil map, are described in detail and their agricultural relations discussed. Their location and distribution are shown on the soil map, and their acreage and proportionate extent are given in table 6.

TABLE 6.—*Acreage and proportionate extent of the soils mapped in Jackson County, Ala.*

Soil	Acres	Percent
Abernathy fine sandy loam	853	0.1
Abernathy silt loam:		
Level phase	1,379	.2
Undulating phase	2,098	.3
Allen fine sandy loam:		
Eroded hilly phase	429	.1
Eroded rolling phase	2,608	.4
Eroded undulating phase	910	.1
Rolling phase	261	(1)
Undulating phase	779	.1
Allen loam:		
Severely eroded hilly phase	792	.1
Severely eroded rolling phase	1,329	.2
Armuchee silty clay loam, eroded steep phase	303	(1)
Armuchee-Tellico silty clay loams:		
Eroded hilly phases	374	.1
Severely eroded hilly phases	228	(1)
Barbourville-Cotaco fine sandy loams	2,711	.4
Bruno fine sandy loam	4,567	.7
Bruno loamy fine sand	331	.1
Capshaw silt loam:		
Level phase	1,896	.3
Undulating phase	5,716	.8
Clarksville cherty silt loam:		
Eroded hilly phase	512	.1
Eroded rolling phase	426	.1
Eroded undulating phase	108	(1)
Hilly phase	341	.1
Rolling phase	360	.1
Undulating phase	586	.1
Colbert silty clay:		
Eroded rolling phase	1,530	.2
Eroded undulating phase	2,155	.3
Severely eroded rolling phase	948	.1
Severely eroded undulating phase	147	(1)
Colbert silty clay loam:		
Rolling phase	319	.1
Undulating phase	2,912	.4
Colbert-Talbott stony silty clay loams, severely eroded rolling phases	455	.1
Crossville loam	4,628	.7
Cumberland loam, undulating phase	202	(1)
Cumberland silt loam:		
Rolling phase	145	(1)
Undulating phase	747	0.1
Cumberland silty clay loam:		
Eroded hilly phase	208	(1)
Eroded rolling phase	1,769	.2
Eroded undulating phase	1,984	.3
Severely eroded hilly phase	685	.1
Severely eroded rolling phase	1,582	.2
Dewey cherty silt loam:		
Eroded rolling phase	93	(1)
Eroded undulating phase	80	(1)
Dewey cherty silty clay loam, severely eroded rolling phase	188	(1)
Dewey silt loam:		
Hilly phase	137	(1)
Rolling phase	129	(1)
Undulating phase	445	.1
Dewey silty clay loam:		
Eroded hilly phase	98	(1)
Eroded rolling phase	736	.1
Eroded undulating phase	1,122	.2
Severely eroded hilly phase	237	(1)
Severely eroded rolling phase	787	.1
Dunning silty clay	1,384	.2
Egam silt loam	4,347	.6
Egam silty clay loam	2,817	.4
Enders silt loam:		
Eroded rolling phase	1,509	.2
Eroded rolling shallow phase	422	.1
Eroded undulating phase	485	.1
Rolling phase	2,233	.3
Rolling shallow phase	203	(1)
Undulating phase	2,337	.3
Etowah loam:		
Level phase	709	.1
Undulating phase	4,921	.7
Etowah silt loam:		
Level phase	316	.1
Rolling phase	191	(1)
Undulating phase	6,865	1.0
Etowah silty clay loam:		
Eroded rolling phase	941	.1

See footnote at end of table.

TABLE 6.—*Acreage and proportionate extent of the soils mapped in Jackson County, Ala.*—Continued

Soil	Acres	Percent
Etowah silty clay loam—Continued		
Eroded undulating phase	1, 197	0. 2
Severely eroded rolling phase	513	. 1
Fullerton cherty silt loam:		
Eroded hilly phase	3, 583	. 5
Eroded rolling phase	5, 808	. 8
Eroded steep phase	1, 377	. 2
Eroded undulating phase	1, 138	. 2
Hilly phase	2, 237	. 3
Rolling phase	2, 130	. 3
Steep phase	3, 013	. 4
Undulating phase	1, 038	. 2
Fullerton cherty silty clay loam:		
Severely eroded hilly phase	2, 493	. 4
Severely eroded rolling phase	1, 789	. 3
Fullerton silt loam:		
Eroded rolling phase	166	(1)
Eroded undulating phase	127	(1)
Undulating phase	193	(1)
Greendale cherty silt loam:		
Eroded rolling phase	264	(1)
Eroded undulating phase	166	(1)
Level phase	553	. 1
Undulating phase	3, 592	. 5
Guthrie silt loam	544	. 1
Hanceville fine sandy loam:		
Eroded rolling phase	226	(1)
Eroded undulating phase	74	(1)
Rolling phase	875	. 1
Undulating phase	750	. 1
Hartsells fine sandy loam:		
Eroded rolling phase	9, 255	1. 3
Eroded rolling shallow phase	5, 689	. 8
Eroded undulating phase	2, 514	. 4
Eroded undulating shallow phase	519	. 1
Rolling phase	43, 395	6. 3
Rolling shallow phase	23, 984	3. 4
Undulating phase	47, 152	6. 8
Undulating shallow phase	7, 338	1. 1
Hermitage cherty silty clay loam:		
Eroded hilly phase	273	(1)
Severely eroded hilly phase	196	(1)
Hermitage silty clay loam:		
Eroded rolling phase	178	(1)
Eroded undulating phase	288	(1)
Hilly stony land (Muskingum soil material)	3, 059	0. 4
Hollywood silty clay:		
Level phase	2, 104	. 3
Undulating phase	1, 300	. 2
Holston loam:		
Level phase	1, 787	. 3
Undulating phase	3, 246	. 5
Huntington silt loam	6, 182	. 9
Jefferson-Allen loams:		
Eroded hilly phases	443	. 1
Eroded rolling phases	360	. 1
Hilly phases	487	. 1
Severely eroded hilly phases	1, 433	. 2
Severely eroded steep phases	171	(1)
Steep phases	303	(1)
Jefferson fine sandy loam:		
Eroded rolling phase	957	. 1
Eroded undulating phase	1, 104	. 2
Rolling phase	536	. 1
Undulating phase	3, 597	. 5
Limestone rockland:		
Hilly	17, 942	2. 6
Rough	135, 210	19. 5
Lindside silt loam	7, 622	1. 1
Lindside silty clay	588	. 1
Lindside silty clay loam	3, 862	. 6
Melvin silt loam	9, 938	1. 4
Melvin silty clay	977	. 1
Melvin silty clay loam	13, 796	2. 0
Monongahela loam:		
Level phase	697	. 1
Undulating phase	921	. 1
Muskingum fine sandy loam:		
Eroded hilly phase	3, 369	. 5
Hilly phase	19, 887	2. 9
Muskingum stony fine sandy loam:		
Hilly phase	25, 380	3. 7
Steep phase	9, 267	1. 3
Ooltewah silt loam	2, 136	. 3
Philo-Atkins silt loams	8, 208	1. 2

See footnote at end of table.

TABLE 6.—*Acreage and proportionate extent of the soils mapped in Jackson County, Ala.*—Continued

Soil	Acres	Percent
Pope fine sandy loam	190	(1)
Pottsville loam:		
Eroded hilly phase	338	0. 1
Hilly phase	609	. 1
Prader very fine sandy loam	2, 254	. 3
Robertsville silt loam	4, 726	. 7
Rolling stony land:		
Colbert soil material	8, 462	1. 2
Muskingum soil material	7, 792	1. 1
Rough gullied land:		
Dewey, Cumberland, and Colbert soil materials	1, 346	. 2
Muskingum soil material	94	(1)
Rough stony land (Muskingum soil material)	88, 911	12. 8
Sequatchie fine sandy loam:		
Level phase	1, 268	. 2
Undulating phase	4, 802	. 7
Stony alluvium (Muskingum and Colbert soil materials)	1, 062	. 2
Sturkie fine sandy loam	1, 838	. 3
Swaim silty clay loam:		
Eroded rolling phase	844	. 1
Eroded undulating phase	369	. 1
Rolling phase	324	. 1
Severely eroded rolling phase	268	(1)
Undulating phase	802	. 1
Taft silt loam	1, 346	0. 2
Talbott silt loam, undulating phase	859	. 1
Talbott silty clay loam:		
Eroded rolling phase	724	. 1
Eroded undulating phase	2, 506	. 4
Severely eroded rolling phase	745	. 1
Tellico clay loam:		
Eroded rolling phase	293	(1)
Severely eroded rolling phase	150	(1)
Tupelo silt loam:		
Level phase	4, 806	. 7
Undulating phase	2, 995	. 4
Tyler very fine sandy loam	3, 133	. 5
Waynesboro fine sandy loam:		
Eroded hilly phase	119	(1)
Eroded rolling phase	1, 102	. 2
Eroded undulating phase	433	. 1
Rolling phase	153	(1)
Undulating phase	434	. 1
Waynesboro loam, severely eroded rolling phase	725	. 1
Wolftever silt loam:		
Level phase	836	. 1
Undulating phase	561	. 1
Total	693, 760	100.0

[1] Less than 0.1 percent.

Abernathy silt loam, level phase (0–2% slopes) (Asv).—This young soil occurs in small saucerlike depressions, in drainheads, and along foot slopes. It consists of recently accumulated local colluvium and alluvium washed from the higher lying well-drained reddish limestone soils, as those of the Dewey and Cumberland series. Erosion is no problem because the phase occurs on relatively level areas, but in places young crops are injured at times by excessive deposition of new material. Runoff is generally slow and in places could be improved by artificial drainage. Internal drainage is ordinarily good. Like all soils derived from recently accumulated parent material, this one has no true native vegetation. The trees, underbrush, briers, and other shrubs present in some areas are commonly native to the buried soil.

Profile description:

0 to 8 inches, brown to reddish-brown friable silt loam to moderately friable silty clay loam; readily crushed to soft rounded crumbs at favorable moisture content; somewhat sticky and plastic when wet; relatively high in well-incorporated organic matter; slightly to medium acid.
8 to 18 inches, dark-brown to reddish-brown or dark brownish-red friable silty clay loam; slightly redder and lower in organic content than surface layer; medium to slightly acid.
18 to 30 inches, brown to reddish-brown heavy silty clay loam faintly mottled with gray and rust brown, grading with depth to more mottled silty clay.
30 to 36 inches +, yellowish-brown heavy plastic silty clay mottled with gray, reddish brown, and yellowish brown; moderately friable under optimum moisture content; medium to strongly acid.

The texture ranges from heavy very fine sandy loam to silty clay loam. Several areas east and northeast of Hollywood have a heavy silty clay loam texture, and in a few places east and south of Goose Pond Church the surface soil contains some fine sand.

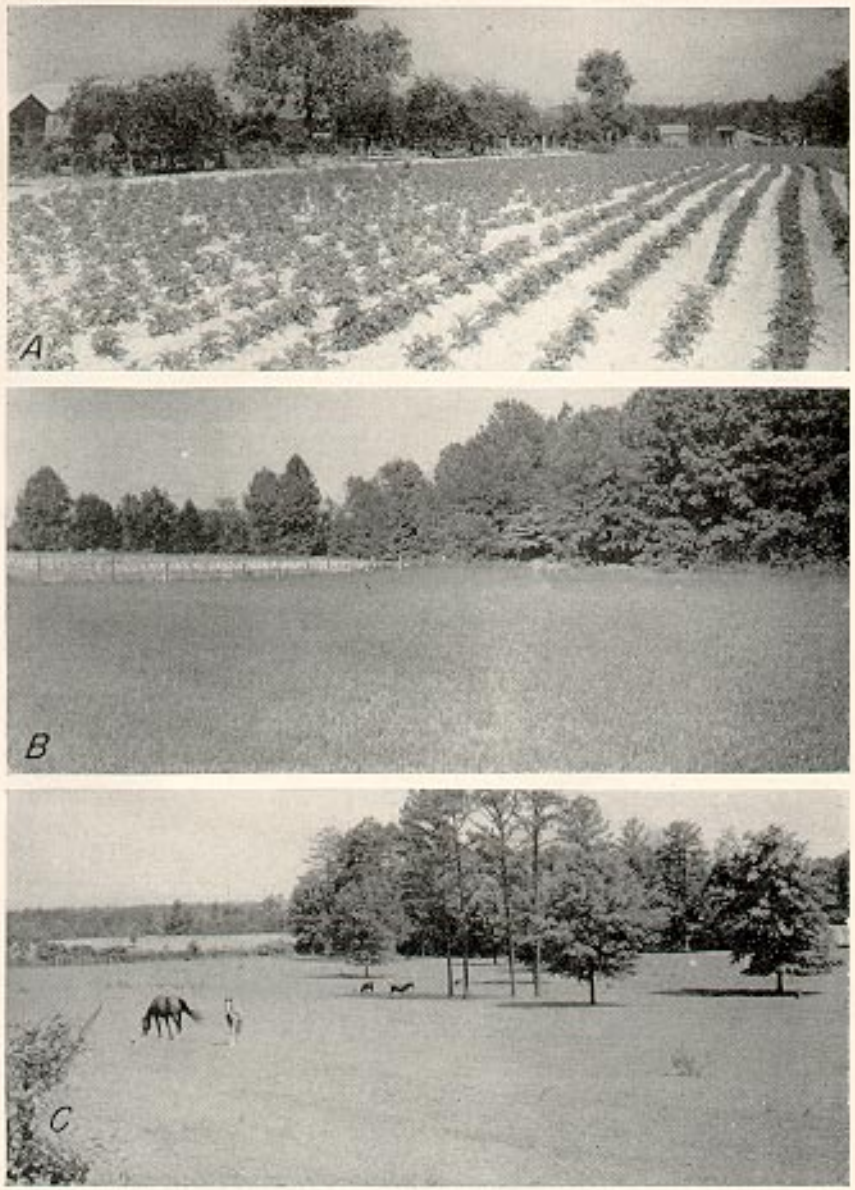
Use and management.—Abernathy silt loam, level phase, is very productive, especially where the material consists of wash from well-fertilized areas. From time to time the soil receives additional soil materials, organic matter, and plant nutrients, which are deposited by runoff waters and are similar to depositions made by floodwaters on first bottom lands. The workability and moisture-absorption and moisture-holding qualities of this phase are good. The soil is easily penetrated by roots and moisture and has excellent aeration, but at lower levels it can be penetrated only slowly or very slowly by either roots or moisture.

Some areas, especially the better drained, are worked with the surrounding soils, but the majority, even though they are small, are worked as separate units. The soil is especially well suited to corn, soybeans, and hay crops. Probably more than half the acreage is planted each year to corn, which yields 30 to 60 bushels an acre depending on the season and management. Soybean hay is the second most important crop (pl. 4, *A*). Other crops are lespedeza, oats, sorghum, and cotton, although some areas of cotton produce too much foliage for good bearing. Cotton yields usually range from poor to more than 1 bale an acre. Fairly satisfactory average yields are obtained in relatively high areas that are not too rich in organic matter. Oats may lodge late in spring before they mature.

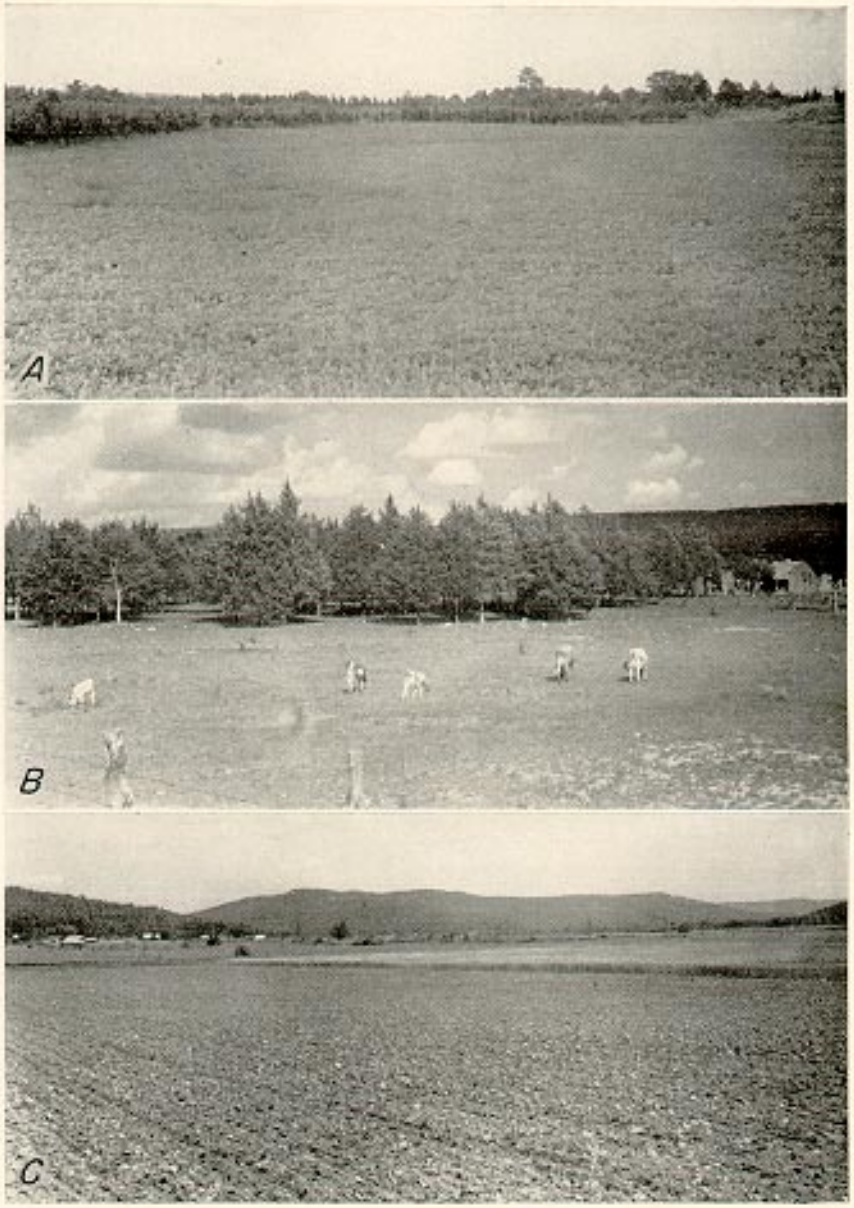
Little or no fertilizer is used in the production of corn, soybean hay, sorghum, pasture grasses, hay, and leafy vegetables. Areas that are seldom affected by standing water and receive little or no sediment during the growing season are very satisfactory for home gardens, sweetpotatoes, and potatoes. Rotations that include winter legumes are not well suited, because the water table may be too high in winter for the successful growth of such crops.

Abernathy silt loam, undulating phase (1–4% slopes) (Asu).—This phase differs from the level phase in being a little better drained and in occurring on foot slopes. It usually is in long narrow strips on the lower slopes and in narrow bands bordering the adjoining lower lying bottom or terrace soils. External drainage is good but may be slightly rapid on slopes above 3 percent. Internal drainage also is usually good but is somewhat slow in areas where the deposit overlies poorly drained soil material.

Soil Survey of Jackson County, Ala. PLATE 3



A, Potatoes on Hartsells fine sandy loam, undulating phase.
B, Lespedeza on Hartsells fine sandy loam soils that have been properly fertilized and limed.
C, Hartsells fine sandy loam soils are fairly good for grazing.



A, Excellent crop of soybean hay on Abernathy silt loam, level phase.
B, Pasture on Colbert silty clay loam, undulating phase, showing cedar growth and a few limestone rock outcrops in background.
C, Cotton and fall-sown wheat on Cumberland silt loam, undulating phase.

Profile description:

0 to 8 inches, grayish-brown to weak reddish-brown heavy very friable silt loam; contains considerable organic matter; crushes to soft fine crumbs; medium acid.
8 to 18 inches, dark reddish-brown heavy silt loam or friable silty clay loam; crushes to a powdery mass when dry; strongly to medium acid.
18 to 26 inches, brownish-red friable heavy silt loam to silty clay loam; somewhat brighter red and more compact in places than the layer above but breaks readily to soft crumbs when disturbed; moderately sticky and plastic when wet; strongly acid.
26 to 36 inches, yellow to reddish- or brownish-yellow friable silty clay loam to silty clay mottled with brown, yellow, red, and gray.

The depth of the profile depends on the depth of the recently accumulated soil material. The organic content is relatively high throughout the recently deposited material. In most areas the color remains fairly uniform in the upper layers.

Use and management.—Abernathy silt loam, undulating phase, is practically all under cultivation. It is better suited than the level phase to a wide variety of crops. The crops are never lost because of flooding. The soil has good workability and moisture-absorption and moisture-holding qualities and it is productive. In general the organic content is ample to give mellow consistence and good tilth.

Corn, the dominant crop, usually yields 40 to 60 bushels an acre, depending mainly on the weather and management. Many areas are frequently used for cotton and produce good crops. Yields range from ½ to 1 bale an acre under common practices but may be expected to average about 1¼ bales under recommended practices. Cotton may produce too much leaf and stalk and set little fruit in some of the areas. Soybeans and lespedeza are the main hay crops. Johnson grass produces abundantly, but many farmers prefer not to use it for hay because of its tendency to become a pest.

This is one of the best soils in the county for alfalfa. In preparing the soil for alfalfa, the soil should be thoroughly mixed with 3 tons an acre of agricultural ground limestone, 50 pounds of muriate of potash, and 500 pounds of superphosphate or 1,000 pounds of basic slag. Seeding is usually at the rate of 25 pounds or more an acre of the Kansas Common nonirrigated variety. The soil is top-dressed annually with 50 pounds of muriate of potash and 500 pounds of superphosphate or 1,000 pounds of basic slag an acre.

The experiment substation at Bella Mina, Limestone County, considers this as one of the best pasture soils in Alabama. The station recommends an annual application of 500 pounds of basic slag or 500 to 1,000 pounds of lime and 300 pounds of superphosphate an acre for good pasture. Seeding rates should be 10 pounds of Dallis grass, 10 pounds of annual lespedeza, 2 pounds of common white clover, 5 to 15 pounds of Kentucky bluegrass, and 5 to 10 pounds of orchard grass.

Abernathy fine sandy loam (0–2% slopes) (Af).—This soil is similar to Abernathy silt loam, level phase, in color, origin, distribution and association. Although most of it occurs in gentle depressions, some areas are on gentle foot slopes. It has a predominantly loose fine sandy loam texture. In this respect, however, it is less uniform than Abernathy silt loam, undulating phase, especially in the surface layer, and in places has a heavy fine sandy loam texture. Because the sandy material is more spotted in deposition than the finer silts and

clays, the resulting soil is spotted and varies from loamy sand to fine sandy clay loam, even in the same area.

Profile description:

0 to 8 inches, grayish-brown to reddish-brown very friable fine sandy loam; contains a fairly high percentage of organic matter; slightly to medium acid.

8 to 18 inches, reddish-brown friable fine sandy loam grading to fine sandy clay loam with depth; both color and texture more variable in areas where the soil material is still partly stratified than where it is more uniformly mixed; medium acid.

18 inches +, grayish-brown and reddish-brown partly stratified material ranging from friable fine sandy loam to fine sandy clay loam; usually rests on very dark grayish-brown relatively tight very fine sandy clay or silty clay at depths of 24 to 36 inches or more; medium to strongly acid.

Use and management.—Abernathy fine sandy loam has a wide optimum moisture range that enables it to be worked satisfactorily under varied moisture conditions. It has very high moisture-absorbing qualities, good internal drainage, and good aeration and is very permeable to roots. Internal drainage is usually better than that of the silt loam, as is indicated by the browner buried soil. The soil is only slightly less efficient in holding moisture and retaining organic matter than the silt loam. The heavier areas are approximately as productive as the silt loam, but the lighter ones usually produce less, particularly in exceptionally dry seasons. Some areas are not so well drained as normal.

More than 90 percent of this soil is cultivated and is desirable for general farming. It is commonly preferred to the silt loam for home gardens, sorghums, and potatoes. General field crops give yields similar to those grown on the silt loam, but because there are such wide variations in most areas, the yields of most crops average somewhat less.

Allen fine sandy loam, undulating phase (2–5% slopes) (ADU).—Areas of this soil occur on crests of severely dissected old colluvial fans and on very gently sloping foot slopes in the limestone valley, where they have formed from colluvial material mostly of sandstone origin. This material has accumulated at the base of long rough stony limestone slopes over which the sandstone material from the higher plateau areas has moved. This phase resembles the associated Jefferson fine sandy loam, undulating phase, in mode of formation and character of parent material but it has a red rather than a yellow subsoil.

Profile description:

0 to 8 inches, light grayish-brown to brownish-gray very friable loose fine sandy loam; some sandstone and chert fragments on the surface and through the soil; strongly to medium acid.

8 to 12 inches, grayish-brown to reddish-brown very friable heavy fine sandy loam to fine sandy clay loam; grades to yellowish-red fine sandy clay; strongly acid.

12 to 30 inches, yellowish-red to dark brownish-red friable heavy very fine sandy clay loam to very fine sandy clay that breaks into angular and subangular fragments; strongly acid.

30 to 54 inches, dark brownish-red friable very fine sandy clay; similar in color and structure to the overlying material but more friable in the lower part; strongly to very strongly acid.

The layers of the profile vary somewhat. In many places the subsoil reaches a depth of 72 to 96 inches and is underlain by yellowish-brown or brownish-yellow soil material.

Use and management.—Allen fine sandy loam, undulating phase, may be worked under a wide range of moisture conditions. It has good moisture-absorbing qualities, except where erosion has removed a considerable part of the original surface soil. In general, however, erosion has not been serious, and less than half the virgin surface soil has been lost. Small sheet-eroded or gullied areas, in which erosion is common, are designated on the soil map by symbol. Rock fragments on the surface and in the soil generally do not interfere greatly with cultivation, although in places they may hinder tillage.

Although most areas are small, this soil is desirable for general farming, including home gardens and home orchards. Most of it is cultivated, usually to cotton, corn, cowpeas, soybeans, and lespedeza. It is well suited to cotton and where well managed produces ⅔ to 1 bale or more an acre. The soil is suited to winter legumes for green manure. It is very responsive to good management, which includes measures for controlling erosion where necessary, fairly heavy applications of fertilizer, and the use of winter legumes in the rotation. It gives fair to very satisfactory returns when planted to corn, and where limed should prove satisfactory for alfalfa.

Allen fine sandy loam, eroded undulating phase (2–5% slopes) (ADE).—This phase consists of areas of the undulating phase that have lost half to nearly all the original surface soil through accelerated erosion. The soil to plow depth consists of a mixture of surface soil and subsoil. It is reddish brown and comparatively heavy, has become somewhat difficult to till, and has lost some of its water-absorbing capacity. In small severely eroded areas it is chiefly reddish-brown or brownish-red friable fine sandy clay loam subsoil material to plow depth.

Use and management.—Most of Allen fine sandy loam, eroded undulating phase, is used for crops although it is somewhat less desirable than the undulating phase. It responds well to good management, is good for general farm use, and is well suited to cotton, oats, and lespedeza and other hay. In its eroded condition it is less well suited to corn than the undulating phase. It will produce fair yields when corn follows winter legumes, especially if erosion has been checked.

Allen fine sandy loam, rolling phase (5–12% slopes) (ADO).—This phase is similar to the undulating phase in color, texture, structure, and consistence but differs in having steeper slopes. It occurs in small scattered areas associated with other Allen soils, Jefferson soils, and soils of first bottoms.

Use and management.—About half of Allen fine sandy loam, rolling phase, is in forest and permanent pasture; the rest is used largely for general farm crops. It is used for about the same crops as the undulating phase, but crop yields are 10 to 50 percent less. It is best suited to close-growing crops. If clean-cultivated crops are grown, the soil should be protected by terracing and by planting the row-cultivated crops on the contour. The soil erodes readily when cul-

tivated, so one of the main management requirements is erosion control.

Allen fine sandy loam, eroded rolling phase (5–12% slopes) (ADN).—In practically all parts of the limestone valleys this soil occurs in association with other phases of the Allen series and with the Jefferson, Waynesboro, Dewey, and Cumberland soils. Most areas are in the upper part of small valleys and coves, but a few are on benches below rough stony slopes, generally somewhat below the level of the sandstone formations.

The soil is similar to the rolling phase in position and in slope range but differs in the quantity of surface material lost through erosion. It is also similar to Waynesboro fine sandy loam, eroded rolling phase, in slope, color, and texture but is derived from colluvial rather than alluvial material.

Approximately 70 percent of the original surface soil has been lost through accelerated erosion, although the loss may vary from 50 to nearly 100 percent. Small areas of severely eroded soil are designated on the soil map by symbol.

To plow depth the phase consists of mixed surface soil and subsoil materials. This mixture is slightly reddish gray to reddish brown and has a friable fine sandy loam to fine sandy clay loam texture. The subsoil is essentially the same as that of the undulating phase.

Use and management.—Allen fine sandy loam, eroded rolling phase, is in general well suited to crops requiring tillage, although its stronger slope makes it somewhat less desirable than the undulating phase. The slower moisture-absorption and the lower moisture-holding capacity of the surface soil and subsoil increase runoff, especially during heavy showers or prolonged heavy rains, and consequently the erosion hazard is greater. Permeability to moisture and root penetration in the subsoil are practically the same as for the undulating phase.

All of this phase has been cultivated. About 65 percent is now cultivated, and of this approximately 30 percent is in permanent pasture. About 5 percent has returned to forest vegetation. Cotton is the main crop, but corn, cowpeas, soybeans, lespedeza, and sorghum are grown. Sericea lespedeza is a good crop. Cotton yields ¼ to ½ bale or more an acre, depending on management and season. Corn yields 7 to 30 bushels, the higher yields being obtained under good management on the more favorably situated areas. Yields of all crops have a relatively wide range, depending on the slope and the degree of erosion.

Allen fine sandy loam, eroded hilly phase (12–25% slopes) (ADH).—This phase occurs on the steeply sloping foothills, and in some areas is badly dissected by deep drainageways. It has brownish-gray to grayish-brown fine sandy loam surface soil on which are varying quantities of sandstone fragments. The subsoil is yellowish-red to brownish-red friable fine sandy clay. The thickness of the surface soil and subsoil is more variable than in the undulating and rolling phases. The soil differs from the eroded rolling phase mainly in having stronger steeper slopes.

Use and management.—Allen fine sandy loam, eroded hilly phase, is best used for permanent pasture and forest. Most of it has been cleared and used for pasture or crops, but its susceptibility to erosion and the nature of its slopes make tillage operations and erosion control practices difficult. Small scattered areas, however, may be tilled for 1 or 2 years every 5 to 10 years if properly managed. At present the phase is largely in pasture. Some areas are abandoned fields, and others have reverted to forest vegetation. Probably no native or introduced crops are better suited than sericea lespedeza or kudzu for forage on steeply sloping, eroded, and severely eroded soils.

Allen loam, severely eroded rolling phase (5–12% slopes) (ALD).—Small areas of this phase are distributed over the foothills bordering valleys and coves. Slope, texture, color, and other physical characteristics were once the same as for Allen fine sandy loam, rolling phase, but the soil now differs from that phase and from Allen fine sandy loam, eroded rolling phase, in degree of erosion. Practically all of the original surface soil and subsurface soil has been removed by sheet erosion, and the soil to plow depth consists almost entirely of subsoil material. In addition to losses through sheet erosion, some subsoil material has been lost through gully erosion.

To plow depth the soil consists of red to reddish-brown friable loam to fine sandy clay loam. Below this is friable yellowish-red to brownish-red fine sandy clay subsoil that breaks readily into small angular to subangular fragments. The thickness of the subsoil varies from about 36 to 60 inches, and the material becomes paler red or yellower with increasing depth. The loss of considerable fine surface soil material through erosion, without the loss of the rock fragments, has made the surface more stony than in virgin areas, although in some places the stones have been removed.

Use and management.—Almost all of Allen loam, severely eroded rolling phase, has been cultivated, but only a small part is still cultivated. Much is used for pasture. It is less well suited to crops than Allen fine sandy loam, eroded rolling phase. Sericea lespedeza has been established on many areas and its use is increasing. Occasionally areas that have been in pasture for a number of years are plowed and placed in cultivation for a couple of years. Cotton and corn are the chief cultivated crops. The average yields are relatively low, but fairly satisfactory yields can be obtained when the land is cropped for 1 or 2 years and then allowed to remain idle for a period of 3 years or more. Several areas have reverted to forest.

Allen loam, severely eroded hilly phase (12–25% slopes) (ALR).—This phase occupies areas similar in position, slope, and distribution to those occupied by Allen fine sandy loam, eroded hilly phase, but differs in being severely eroded. The soil to plow depth consists largely of subsoil material and is reddish-brown friable loam or friable fine sandy clay loam. Practically none of the virgin surface soil remains, and some of the subsoil has been removed by gully erosion.

Use and management.—All of Allen loam, severely eroded hilly phase, has been cleared for pasture or for crops. Nearly half the soil has reverted to forest vegetation by natural reseeding; some has been replanted to pines, black locust, or other suitable trees; and most of the rest is used for pasture. Strong slopes, severe erosion, and the difficulty of controlling erosion make this soil poorly suited to

cultivated crops. Its most feasible use is forest or pasture consisting of either annual or sericea lespedeza.

Armuchee silty clay loam, eroded steep phase (25%+slopes) (AHF).—This phase occurs mainly on the steeply sloping red hills that border the Tennessee River. It is closely associated with the Tellico soils, which are reddish colored and derived from the same shale formation. It also is closely associated with Fullerton and Clarksville on the higher slopes and with Dewey, Talbott, Cumberland, and Etowah soils and rough gullied lands on lower slopes.

Profile description:

0 to 6 inches, yellowish-brown to weak-orange heavy silty clay loam, faintly mottled with pale grayish yellow, light reddish brown, and dark brown; friable when moderately dry to moderately moist, hard when dry, and sticky and plastic when wet; strongly acid.
6 to 18 inches, light yellowish-brown to yellowish-red heavy silty clay loam to silty clay with shades of yellow, brown, and red; strongly acid.
18 to 30 inches, yellowish-brown and reddish-brown silty clay breaking into angular to subangular fragments ¼ to ¾ inch in diameter; friable when moderately moist but sticky and plastic when wet; in places contains partly weathered shale in the lower part; strongly acid.
30 to 36 inches, faintly mottled to highly mottled bright-yellow, reddish-yellow, and reddish-brown silty clay material; stratified in places; strongly to very strongly acid.

Because of its steep slopes and variation in parent rock and degree of erosion there are variations in the soil. The soil may contain a fairly high percentage of chert fragments on the surface and throughout the profile. In some places partly weathered rock material is near the surface.

Use and management.—Early settlers laid out fields on relatively steep slopes of Armuchee silty clay loam, eroded steep phase. The soil is moderately productive but highly erosive. Little is cultivated and much is in forest. Many wooded areas have been fenced for pasture. The best use is forest or some perennial crop.

Armuchee-Tellico silty clay loams, eroded hilly phases (12–25% slopes) (ATH).—This complex, which occurs in the red hills, is made up of closely associated areas of Armuchee silty clay loam, eroded hilly phase, and Tellico silty clay loam, eroded hilly phase. These soils are derived largely from weathered shale.

The Armuchee soil has little or no definite profile development and includes some areas in which the soil is formed of only partly weathered rock material.

The Tellico soil has a well-developed profile that differs from the Armuchee in color and texture. In the uneroded surface soil the texture is fine to very fine sand derived from thin layers of sandstone in the shale parent rock. The surface soil is dark reddish brown to dark brown, and the subsoil is dark brownish red, light brownish red, or maroon.

Use and management.—Although Armuchee-Tellico silty clay loams, eroded hilly phases, are moderately productive and responsive to good management, they are too strongly sloping and too erosive for cultivated crops. Their best use apparently is for perennial crops, forest, or legumes.

All the areas have been cleared and probably most of them have been cultivated. Most of them are in permanent pasture, but some have returned to forest vegetation, largely by voluntary reseeding. A small acreage is cropped. Where erosion is not too active, lespedeza and grasses are established soon after the cultivation of regular field crops is discontinued. Other vegetation, as black locust, pines, sassafras, persimmon, and briers, also make rapid growth on abandoned cropland. Mainly because the soils are highly susceptible to erosion and the slopes are generally too steep for controlling soil losses, little or no attempt is made to establish improved permanent pasture under present economic conditions.

Cotton is the most common crop, and corn, lespedeza, and cowpeas are grown to some extent. Yields of cotton range from ¼ to ½ bale an acre under usual management, which includes light applications of fertilizer. Heavier applications of fertilizer would produce higher yields in favorable seasons, but the hazards of damage from erosion or from drought are too great to risk much expense in growing cotton.

Armuchee-Tellico silty clay loams, severely eroded hilly phases (12–25% slopes) (ATR).—This complex is similar to the complex of eroded hilly phases, except that it is more eroded and cut by a larger number of deep gullies. All of the land has been cultivated, but because of severe erosion practically none is used for field crops. Many areas have been abandoned so long that forest vegetation has reestablished itself. Pines, black locust, sweetgum, persimmon, and various oaks are the principal trees. Most areas support some native grasses and lespedeza; consequently most areas are used as timberland pasture.

Barbourville-Cotaco fine sandy loams (0–5% slopes) (BC).—This complex consists of an intricate pattern of well and poorly drained soils on local alluvium or local wash consisting of material derived from sandstone or sandstone and shale. Known locally as made land, most of the complex consists of narrow strips along the upper reaches of drains and small bodies at the heads of drains and gentle depressions. The areas at heads of drains and in depressions are commonly associated with Hartsells and Enders soils, but many of those along drainways are associated with Muskingum, Pottsville, and Hanceville soils. The greater part of the acreage is on Sand Mountain. The surface is nearly level to gently sloping. The areas of the Barbourville soil are moderately to well drained, and those of the Cotaco soils are slowly or poorly drained. Some parts of this complex, especially where the Cotaco soils lie along the intermittent drains, are subject to flooding.

Profile description of the Cotaco soil:

0 to 10 inches, brownish-gray loose friable fine sandy loam.
10 to 24 inches, light yellowish-brown friable fine sandy loam to loam, somewhat mottled with gray and dark gray in the lower part.
24 to 30 inches +, light yellowish-brown friable loam mottled with gray, brown, and dark reddish brown; grades at variable depth to older colluvial, alluvial, or residual material usually grayer and finer textured.

Profile description of the Barbourville soil:

0 to 12 inches, pale-brown or light yellowish-brown friable fine sandy loam.
12 to 30 inches, brownish-yellow or yellowish-brown friable loam or clay loam.
30 inches +, splotched or mottled gray, yellow, and brown friable clay loam.

Bedrock sandstone under this complex is 5 to about 15 feet below the surface. The soil material is medium to strongly acid, and the natural

fertility is medium to low. The texture of the surface layer in places is very fine sandy loam or loam. These finer textured areas are associated generally with interbedded sandstone and shale parent rocks.

Use and management.—About 20 percent of Barbourville-Cotaco fine sandy loams, chiefly in the lower less well-drained parts, is in forest. An equal area is in permanent pasture, and the rest, including the better drained land, is used for crops. Corn, sorghum, potatoes, sweetpotatoes, soybeans, and home-garden vegetables, particularly those for fall use, are grown. Little fertilization is practiced, and cover crops for use as green manure are not commonly planted. No systematic crop rotation is followed. Under average conditions, corn yields about 30 bushels an acre. Under good management an acre has a carrying capacity of at least 100 cow-acre-days.

Areas of this complex vary in suitability for agricultural use. The Barbourville areas are well suited to many crops because they are moderately fertile, smooth, and have very favorable moisture relations. A great many crops, including corn, sorghum, sweetpotatoes, potatoes, soybeans, and many garden crops, are particularly well suited. With proper fertilization, corn produces 40 to 60 bushels; soybeans, 2½ or 3 tons; and potatoes, 200 bushels an acre. With adequate fertilization, these areas are well suited to intensive use and are also productive of pasture where properly fertilized, limed, and seeded.

The Cotaco, or less well-drained places, are suited to corn, lespedeza, soybeans, and like crops. A great part is probably better suited to pasture. Where properly fertilized, limed, and seeded, the Cotaco soil is particularly productive and useful as grazing land because its generally moist subsoil favors the growth of pasture plants during drier seasons when other higher and drier soils are unproductive.

Bruno fine sandy loam (0–2% slopes (BF).—This soil is in the limestone valleys in well-drained first-bottom positions along the main channels and on gently rounded hummocks, low ridgelike divides, and fans lying somewhat higher than the surrounding soils. The areas are fairly well distributed throughout the limestone valleys, mostly in the upper part of valleys and coves. The surface is nearly level to very gently undulating or very gently sloping, and the soil boundaries in places are characterized by fairly sharp breaks toward the stream channels or lower lying soils. Along these breaks the slopes may be 5 percent or more, but the breaks are very short and represent relatively little difference in elevation, seldom more than 5 feet. External drainage is commonly fair to good, and internal drainage is usually very good, especially in the surface soil and upper subsoil. All the areas are subject to overflow by the adjacent streams.

The soil parent material is washed largely from Hartsells, Muskingum, Hanceville, and other soils on the high plateau or from colluvium or soils developed partly or entirely from sandstone materials in the valleys. Most of the parent material contains shale and limestone materials, and the highly acid sandstone materials have become neutralized or nearly neutralized by lime-bearing water. Natural vegetation consists largely of deciduous hardwoods. Most of the soil has developed from material that accumulated since the surrounding areas were opened for agriculture. The soil has not necessarily supported any forest vegetation, because the soil materials often were deposited by floodwaters on forested areas.

Profile description:

0 to 8 inches, grayish-brown to brown loose friable fine sandy loam; slightly acid.
8 to 20 inches, yellowish-brown to reddish-brown friable fine sandy loam; somewhat heavier with increasing depth; slightly acid.
20 to 36 inches, streaked or stratified brown, yellowish-brown, and brownish-yellow friable fine sandy loam, loamy fine sand, and fine sandy clay loam; slightly acid or almost neutral.

Variations occur even within small areas because most of the soil material is of recent deposition and the depth of loose friable brown fine sandy loam may vary from a few inches to more than 36 inches. The underlying, or old, soil material is generally fairly well drained, although once it may have been part of a poorly drained first bottom. Mottlings are common at 18 to 24 inches in areas where the recent deposits are shallow.

Use and management.—Bruno fine sandy loam is easily worked, has good tilth, and absorbs moisture well. It is not seriously affected by erosion. Overflows, however, may occur during the growing season and be destructive to plowed soil and crops. Most areas have been improved for cultivation, but small areas are in pasture. The soil is well suited to agriculture, particularly livestock farming in which corn, hay, and pasture are important. Corn and hay are the principal crops, and soybeans, lespedeza, cowpeas, sorghum, peanuts, potatoes, sweetpotatoes, melons, and cotton are grown to some extent.

This land is fairly productive and requires only moderate fertilization for corn and hay. Selected areas are used for cotton, which is commonly fertilized with light applications of complete fertilizer. Fertilizer considered good for potatoes and sweetpotatoes is 600 to 1,000 pounds of 4–10–7 [5] mixture an acre.

Bruno loamy fine sand (0–2% slopes) (BU).—Most of this recently formed alluvial soil is in small areas bordering the main or secondary channels of streams. It occurs where floodwaters have deposited coarse sandy material. Some areas have many sandstone boulders and smaller sandstone fragments on the surface and in the soil. In general the soil is light brown to brownish yellow and resembles Bruno fine sandy loam except that it has a somewhat lighter color and consists largely of medium and fine sand.

The parent material is largely from sandstone. Although alluvial in origin, in the upper part of the valley some of the soil has a colluvial origin. The parent material varies from loose sand to very friable fine sandy loam. It is well assorted in some places, and in others it contains sandstone and chert fragments. Both external and internal drainage are good to rapid, although internal drainage may be excessive in places. On most areas of the soil there is no native forest vegetation, but on some areas willow, sycamore, yellow-poplar, and old-field pine have come up voluntarily.

Use and management.—Except where Bruno loamy fine sand adjoins larger areas of tillable soil in first bottoms, very little of it is used

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

for crops. Most of the areas are in permanent pasture and are not productive even for this use, except early in spring or in wet seasons. Some of the larger areas in which the soil is uniformly loamy fine sand are used for corn, potatoes, melons, and soybeans. The yields, however, vary from fairly good to low.

Capshaw silt loam, undulating phase (2–5% slopes) (CPU).—This phase occurs as small irregular areas on gently sloping to undulating moderately low terraces in the limestone creek valleys and coves. It is closely associated with Etowah silt loam, undulating phase, which it somewhat resembles, but it is less red and less well drained in the deeper layers. It is also associated with the better drained Sequatchie soils and with the more poorly drained Tupelo, Taft, and Robertsville soils. In places it borders upland soils of the Colbert, Talbott, or Fullerton series or alluvial soils of the Lindside or Melvin series. The terraces where it occurs are lower than those of Etowah soils and somewhat higher than those of Tupelo, and the slopes frequently form a complex pattern. External and internal drainage in the upper part of the profile are usually good. Drainage may be somewhat impeded in places by the heavy subsoil. The native vegetation was largely deciduous hardwoods, but some pines occur. Old-field pines are fairly common on cut-over areas.

Profile description:

0 to 8 inches, pale brownish-gray to grayish-yellow friable silt loam; dark grayish brown in the upper 2 to 3 inches caused by organic matter; strongly acid.

8 to 12 inches, brownish-gray to yellowish-brown friable silty clay loam becoming more yellow or yellowish brown and somewhat finer textured with increasing depth; strongly acid.

12 to 26 inches, yellow to yellowish-brown friable silty clay breaking readily into a soft granular mass when moist; when dry forms fairly hard angular to subangular blocks ½ to ¾ inch in diameter; usually uniform in color; strongly acid.

26 to 36 inches, yellowish-brown to pale-yellow firm to friable silty clay faintly to strongly mottled with shades of brown, yellow, gray, and reddish brown; moderately plastic when wet and fairly hard when dry; weakly developed blocky structure; very strongly acid.

36 to 48 inches, mottled yellow, gray, and reddish-brown firm silty clay to clay.

The chief variations are in the number and distribution of concretions and in color of the surface soil. Dark-brown to nearly black soft, moderately firm, or hard concretions may be in the soil or on the surface. The concretions are most common at or near a depth of 30 inches, but many profiles show no concretions. The surface soil ranges from brown to pale gray.

Use and management.—Because of good tilth, fairly good workability, gentle slopes, good moisture-absorption and moisture-holding capacity, and adequate drainage for most crops, Capshaw silt loam, undulating phase, is a good soil for crop production. Some of the larger areas are adapted to the use of power machinery. In general this soil has many of the favorable features of Etowah silt loam soils, but it is somewhat less well drained and warms up more slowly in spring.

Approximately 80 percent is used for general field crops. Cotton, corn, and hay are the dominant crops. Annual lespedeza and soybeans are the most common hay crops. Yields of cotton, when fertilized with 250 to 600 pounds of 6–8–4 or comparable fertilizer, range from one-half to nearly a bale an acre. The lower and more nearly level areas are less well suited to cotton than to corn, but in the past most areas have been used for cotton occasionally. When corn follows well-fertilized cotton it is generally side-dressed with 150 to 225 pounds of nitrate of soda or the equivalent in nitrogen fertilizer, but when it follows a winter legume, a side dressing is not used. Yields range from 10 to 35 bushels an acre, depending largely on season and management. Lespedeza hay yields ¾ to 1½ tons an acre and soybean hay 1 to 2½ tons, depending largely on management and seasons.

Winter legume can be produced successfully on most areas, especially those having enough slope to provide good surface drainage in winter. Winter legumes usually should be fertilized with 300 to 400 pounds of superphosphate or 400 to 600 pounds of basic slag an acre at the time of seeding unless they follow a well-fertilized crop such as cotton or potatoes. The control of erosion is not difficult. Care is needed in farming areas with slopes of 4 to 5 percent and some of the long slopes that have less than 3-percent gradient. Contour cultivation and in places terracing will help to reduce soil washing.

Capshaw silt loam, level phase (0–2% slopes) (CPV).—This phase occurs on moderately well drained low stream terraces in the limestone valleys. It is similar to the undulating phase, but it has more level surface relief and pale yellowish-gray surface soil and yellow subsoil. Areas generally are slightly undulating and have small depressions that provide outlets for surface runoff. There is enough slope to carry off surplus water soon after heavy showers, and no water stands on the surface for any length of time, although some may collect in shallow depressions. Internal drainage is good in the surface soil and upper subsoil but somewhat impeded in the lower subsoil, as indicated by mottling, usually at a depth of 22 to 26 inches.

Use and management.—The workability, tilth conditions, and moisture-absorption and moisture-holding capacity of Capshaw silt loam, level phase, are similar to those of the undulating phase. The soil is suitable for most crops commonly grown in the county. Nearly a fourth is in partly cleared pasture land or in forest, the native vegetation consisting largely of deciduous hardwoods, underbrush, vines, and reeds. The rest is cleared, and of this about 60 percent is used for general field crops, principally corn, hay, and cotton. Some of the soil is used for oats and other winter grains. It is less well suited to cotton than the undulating phase but is as well suited to corn, grain sorghum, and sorghum, especially in areas where external drainage has been improved by the construction of open ditches or the laying of tile.

Depending on the soil management, corn produces 19 to 40 bushels an acre; soybeans, 1 to 2½ tons of hay; and cotton, ⅓ to ⅘ bale. The soil is well suited to pasture under proper management.

Clarksville cherty silt loam, rolling phase (5–12% slopes) (Cco).—This phase occupies areas on ridge tops and slopes and is the most typical of the Clarksville soils. It derived from weathered cherty limestone and is closely associated with the Fullerton and Greendale soils. External drainage is good to excessive, and internal drainage is good to rapid in the surface soil and fair in the subsoil. The phase has rapid moisture absorption in the surface soil and fair moisture-holding capacity in both the surface soil and subsoil.

Profile description:

0 to 6 inches, pale-gray to brownish-gray mellow strongly acid cherty silt loam; in virgin areas contains some organic matter in the first 2 inches; many angular chert fragments on the surface and in the soil.
6 to 15 inches, yellow to pale-yellow cherty silt loam containing a large quantity of sharply angular chert fragments; becomes more cherty and clayey with depth; very strongly acid.
15 to 30 inches, pale-yellow cherty silty clay; very sticky when wet and breaks into hard lumps when dry; easily crumbled to a loose mass because of high chert content; very strongly acid.
30 inches +, brownish yellow cherty silty clay splotched with gray and reddish brown; material is in places nearly white and contains many sharply angular chert fragments up to 6 inches or more in diameter; number of fragments increases with depth; clay, silt, and fine grit in the spaces between the chert fragments.

Variations occur in the thickness of the surface soil and subsoil, in the quantity of chert fragments on the surface and in the profile, and in the color of the subsoil. Although predominantly yellow, the subsoil is in places nearly white or in others grades toward the red of the Fullerton soils. In some areas, especially east of Stevenson and northwest of Long Island, the phase has a covering, probably waterlaid, containing sand, pieces of water-worn gravel, and small cobbles up to 6 inches or more in diameter. This covering ranges from very thin to about 15 inches thick.

Use and management.—Clarksville cherty silt loam, rolling phase, is low in organic matter and essential plant nutrients. The chert in the surface soil interferes somewhat with tillage and increases the wear on plows and other tools, especially mowers or similar cutting machines having a cutting bar close to the ground. This chertiness, however, tends to decrease erosion, moisture evaporation, and hardening of the surface by baking. The chert increases the quantity of moisture absorbed by the surface soil, provides good aeration, and hastens soil warming in spring. As the soil warms comparatively early in spring, it is good for crops grown for early markets. Most of the favorable qualities brought about by the presence of chert, however, are lost where runoff water is allowed to wash away the loose, friable, cherty surface soil.

Nearly a third of this soil is in forest, the greater part being used for woodland pasture. Most of the rest is cultivated. Cotton, corn, cowpeas, soybeans, potatoes, sweetpotatoes, and lespedeza are the main general farm crops. Under good management, cotton yields 1/3 to 3/5 bale an acre. Corn yields ordinarily are low, but when corn follows a winter legume its yields increase 10 to 15 bushels an acre and average about 23 bushels. The soil is fairly well-suited to grapes, berries, and home orchards of peach, plum, apple, and pear trees.

Clarksville cherty silt loam, eroded rolling phase (5–12% slopes) (CcN).—This phase is similar to the rolling phase except for its loss of a large percentage of the original surface soil through sheet erosion. Half to nearly all the surface soil is gone from two-thirds of the area, and all the surface soil and some of the subsoil from the rest. In the more severely eroded areas shallow gullies are common.

Use and management.—All of Clarksville cherty silt loam, eroded rolling phase, has been cultivated. Because of accelerated erosion nearly a third of the acreage used for crops has been abandoned. The cropped areas are used largely for cotton, corn, lespedeza, cowpeas, and soybeans. Chert fragments in the plow layer interfere somewhat with cultivation but do not prevent use for cultivated crops. The fragments range mainly from 2 to 8 inches in diameter, but in places they are 18 inches or more in diameter. The larger fragments are often collected and removed from the fields. These fragments, however, aid in warming the soil early in spring, especially for the production of cotton and early truck crops, and in acting as a mulch to absorb and retain moisture in summer.

A common practice is to rotate pasture with row crops. For 2 or 3 years the areas are used for lespedeza pasture, which is followed by corn for 1 or 2 years and then cotton for 1 or 2 years. After cotton, the areas are returned to pasture. This system of rotation, however, is used only where tillable land is plentiful. Many farmers use a rotation of cotton and corn, and plant a winter cover crop, generally hairy vetch, following the cotton. They turn under the vetch before corn is planted.

Erosion has reduced the moisture-absorption capacity of all of the soil, and careful water-control and soil-conserving practices are essential if this phase is cultivated. Well-constructed terraces together with the frequent use of cover crops are generally sufficient for conserving the soil, although a permanent cover crop is necessary in a few small areas.

Clarksville cherty silt loam, undulating phase (2–5% slopes) (CcU).—This phase occurs mainly in small areas on the smoother, relatively broad ridge tops and gently or nearly level benches near the base of slopes. It differs from the rolling phase chiefly in its milder slope but is practically similar in color and only slightly different in soil material and profile development. Like the rolling phase it has a gray, cherty silt loam surface soil and a yellow, fairly friable, cherty silty clay or clay loam subsoil. The surface soil may average slightly deeper, and the content of fine grit and finer soil somewhat higher. Drainage is good to slightly excessive, and erosion fairly active in some places.

In the chert hills east of Stevenson, where a thin coating or overwash of water-moved material commonly covers the surface to a depth of 5 inches or more, the workability is slightly better than elsewhere, moisture absorption is good, and moisture-holding capacity may be somewhat higher. Areas of such deposit are too spotty to be classified separately and as a whole have about the same economic value as those more representative of this phase.

Use and management.—The workability of Clarksville cherty silt loam, undulating phase, is fairly good, but the areas are small and irregularly shaped and only a few are suitable for the use of large machinery. Stones interfere to some extent with cultivation, as they are objectionable for plowing and hoeing and make the use of mowing machines difficult. However, the stones aid in preventing erosion, help conserve moisture for crops, and cause the soil to warm comparatively early in spring, thus facilitating earlier crop production.

Practically all the soil is cultivated. Cotton, corn, cowpeas, soybeans, and lespedeza are the most common general farm crops. Sorghum, oats, potatoes, sweetpotatoes, garden vegetables, and fruits produce fairly satisfactory yields on selected areas. Depend-

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ing largely on management and season, cotton yields ¼ to ¾ bale an acre. Corn yields 10 to 18 bushels an acre under common practices and 20 to 35 bushels under better practices.

A small acreage is in forest consisting of red, post, white, chestnut, and blackjack oaks, scaly bark and black hickories, persimmon, beech, redgum, and blackgum. There are a few yellow-poplar and cedar and some old-field pine. The pines are more numerous on cutover or abandoned areas.

The phase is not so productive nor so responsive to good management as most of the well-drained soils of the uplands and high-lying stream terraces of the limestone valleys. It is, however, fairly responsive to the liberal use of fertilizer, lime, or other soil amendments, and green-manure crops, especially winter legumes. Terracing is generally needed if the areas are used for row crops.

Clarksville cherty silt loam, eroded undulating phase (2–5% slopes) (CcE).—This phase is essentially the same as the undulating phase, but it has lost 50 to nearly 100 percent of the virgin surface soil through erosion. A small included acreage is more severely eroded than common, and small gullied spots also are included.

Use and management.—Practically all of Clarksville cherty silt loam, eroded undulating phase, is cultivated. The general farm crops are similar to those on the undulating phase, but average yields are slightly less. This phase is less desirable than the undulating phase because of its poorer workability and moisture-absorption and its low moisture-holding qualities. With proper erosion control and other good management practices, however, most of the soil can become fairly productive.

Clarksville cherty silt loam, hilly phase (12–25% slopes) (CcL).—This phase, which occurs mainly on the stronger slopes of the chert ridges in the northeastern part of the county, is similar to the rolling phase. It has steeper slopes, however, and is characterized particularly by chertiness or stoniness. Chert fragments probably constitute 20 to 40 percent of the soil mass and range from 1 to 24 inches in diameter. No relation between slope gradient and native vegetation can be observed, especially between slope and the varieties of trees, but some differences in the growth or density of the stand can be correlated with the direction of slopes. Strong slopes facing south or west are more droughty and sparsely forested than slopes of the same type facing north or east.

Use and management.—The areas of Clarksville cherty silt loam, hilly phase, cleared for cultivation constitute less than 20 percent of the total area and are used largely for pasture grown in rotation with corn or cotton. A common practice is to use the land for lespedeza pasture a few years and then for corn 2 or 3 years, after which it is returned to pasture. Cotton can be grown successfully on the less cherty areas.

Most of the phase has never been cleared of forest, and the soil is used largely for woodland pasture and for timber. The trees are principally post, white, and southern red oaks, sweetgum, blackgum, and hickory. In some places there are a few old-field pine.

Clarksville cherty silt loam, eroded hilly phase (12–25% slopes) (CcH).—This soil is similar to the hilly phase but is more eroded largely because of its use for row crops. Erosion has removed more than 50 percent of the original surface soil. Angular chert fragments 1 inch or more in diameter constitute 20 to 40 percent of the soil mass.

Use and management.—All of Clarksville cherty silt loam, eroded hilly phase, has at some time been cultivated. A small acreage is now used for crops, mainly corn and cotton, but yields are low. On the whole the phase is less desirable for cropping or pasture than the hilly phase. A common practice is to use the land a few years for lespedeza pasture or allow it to lie idle, then to return it to corn, which is frequently followed by cotton. After being in corn or cotton, the land is again pastured or allowed to lie idle. Some areas, however, can be cultivated for a greater number of years than others and can remain idle or in pasture for a fewer number of years between each period of cultivation.

Colbert silty clay loam, undulating phase (2–5% slopes) (CtU).—This phase is well distributed throughout the limestone valleys and coves. It has developed mainly under hardwood forest. It commonly occurs in small areas in close association with other Colbert soils and with Talbott soils bordering the base of rough limestone slopes. The relatively level areas scattered through the limestone valleys are commonly underlain by limestone at a depth of 24 to 36 inches and have limestone outcrops (pl. 4, *B*). The parent material consists largely of limestone residuum, a great part of which has been shifted down the slopes by runoff from areas of Rolling stony land (Colbert soil material) and Limestone rockland (hilly) and Limestone rockland (rough). Probably a third to a half of the surface soil in most areas has been removed by accelerated erosion.

Profile description:

0 to 5 inches, dark yellowish-gray to grayish-brown moderately friable heavy slightly acid silty clay loam; when broken the material forms granular particles 1/16 to ¼ inch in diameter; sticky and plastic when wet; slightly acid.

5 to 10 inches, faintly mottled pale-yellow, yellowish-brown, reddish-brown, and gray heavy silty clay loam; grades to silty clay with increasing depth; sticky and plastic when moist, but breaks into granular particles slightly coarser than those in layer above when moderately dry; material hard when very dry; many dark-brown or nearly black soft iron concretions; medium acid.

10 to 24 inches, faintly mottled light-yellow and light-brown tough and plastic silty clay; sticky and plastic when wet and shrinks and breaks into nutlike fragments ¼ to ½ inch in diameter when dry; some small concretions; slightly acid.

24 to 36 inches, yellowish-brown heavy stiff plastic clay; reddish-brown streaks or stains on cut surfaces indicate presence of small brown concretions; very sticky when wet; medium acid to nearly neutral.

36 to 48 inches, brownish-yellow stiff plastic silty clay to clay mottled with reddish-brown and gray; gray mottlings more numerous with depth; in places mainly gray in color; except in the small limestone fragments material is slightly acid.

Variations exist in the color of the surface soil, which may be dark yellowish gray, pale gray, yellowish brown, dark orange, or dark olive brown. The texture is generally heavy silty clay loam, but some fine or very fine sand may be in areas containing material derived from weathered sandstone. Some areas are more acid throughout the profile.

Use and management.—Colbert silty clay loam, undulating phase, has fair workability and moisture-absorption capacity and is moderately responsive to good management. Chiefly because of its shallow

depth to the plastic clay subsoil and its shallow depth to bedrock, it is not well suited to crops. More than 75 percent, however, has been in cultivation at some time, and probably 50 to 60 percent is now being cropped. About 20 percent of the cleared land is in permanent pasture. Some of the forested soil is in woodland pasture. The soil is best suited to hay and pasture. Where the crops are rotated to include soybeans, annual lespedeza, sericea lespedeza, cowpeas, or other legumes, the other general field crops show considerable improvement.

Sericea lespedeza does well after a good stand is established. It produces two cuttings a year and yields 1½ to 3 tons an acre, depending on the season and management. Annual lespedeza is the more common hay and pasture crop. Yields range from ¾ to 1¼ tons of hay an acre during seasons with well-distributed rainfall but they are low or nearly a failure in dry years.

Cotton, corn, and soybeans are the main crops besides lespedeza. Under common management, including applications of 200 to 300 pounds of 6–8–4 or other high-grade fertilizer, cotton yields ¼ to ½ bale an acre, depending on the season. Where good management is practiced, including the use of legume crops in the rotations and the applications of larger quantities of fertilizer, cotton yields range from one-third to nearly three-fourths bale an acre. Corn yields are low under common management, but under good management they generally range from 20 to 30 bushels an acre.

Colbert silty clay loam, rolling phase (5–12% slopes) (CTo).—This phase occupies more sloping areas than the undulating phase but is eroded to about the same extent. A third to a half of the original surface soil has been removed by erosion. Both of the phases, however, are similar in texture, color, structure, and consistence of surface soil and subsoil. External drainage is more rapid in this rolling phase but internal drainage is good to slow.

Use and management.—Colbert silty clay loam, rolling phase, has less desirable workability and less moisture-absorption capacity, is more susceptible to erosion, and presents greater problems in soil conservation than the undulating phase. About 25 percent is in nearly virgin condition. The rest is cleared land once used for general field crops., but only about 25 percent of this is still cultivated. The chief crops grown are lespedeza for hay and pasture, soybean hay, and corn. Sericea lespedeza is grown to some extent and is well suited. Most cleared areas not in cultivation are in permanent pasture, a small part of which is in improved permanent pasture and the rest mainly in volunteer lespedeza and Dallis, Bermuda, and Johnson grasses. Broomsedge, bitterweed, and nettle are also common pasture plants.

Colbert silty clay, eroded undulating phase (2–5% slopes) (CBe).—This phase is well distributed in narrow strips on gentle slopes and is similar to Colbert silty clay loam, undulating phase, in range of slope and position. It differs from the undulating phase of the silty clay loam, however, in the quantity of surface soil material and, in places, of subsoil material that has been removed by accelerated erosion. More than half the original surface soil has been lost through accelerated erosion.

In general, the soil to plow depth consists of a little of the original surface or subsurface material mixed with subsoil material. To a depth of 3 to 7 inches the cultivated soil is brownish-yellow to yellowish-brown moderately friable silty clay. The subsoil is yellow heavy sticky mottled clay, very gray in the lower part, that rests on parent material at a depth of 30 to 40 inches.

Use and management.—Colbert silty clay, eroded undulating phase, has fair workability and moisture absorption. It has more rapid surface drainage, is less resistant to drought, and presents a greater problem in conservation than Colbert silty clay loam, undulating phase. Most of the phase is cleared land used for crops and pasture. Cotton, corn, and lespedeza are the principal crops, and the yields normally are 10 to 25 percent lower than those on Colbert silty clay loam, undulating phase.

Even though this soil has a slowly pervious heavy clay subsoil that causes it to erode easily and to be somewhat droughty for crops, under good management it is fairly productive of certain crops, especially annual and sericea lespedeza.

Colbert silty clay, severely eroded undulating phase (2–5% slopes) (CBp).—This soil, which occurs in small scattered areas on gentle slopes at the base of limestone slopes, is characterized mainly by its grayish-yellow or yellowish-gray surface soil and yellow subsoil, its extreme stickiness when wet, and its severely eroded condition. Erosion has been so severe that very little of the original surface soil remains, and the soil to plow depth consists largely of grayish-yellow silty clay or clay subsoil material. The subsoil is yellow heavy sticky clay mottled with some red, gray, and brown.

Use and management.—Tilth of Colbert silty clay, severely eroded undulating phase, is unfavorable because of the cloddiness of the plow layer. The most sloping areas are difficult to conserve. The phase is well suited to sericea lespedeza, which under present soil conditions is probably one of the best suited crops. Annual lespedeza, hop clover, and Dallis grass likewise are well suited as a source of some grazing. Hop clover supplies grazing in spring, and annual lespedeza and Dallis grass can be used both in spring and in fall. Crop yields are low.

Colbert silty clay, eroded rolling phase (5–12% slopes) (CBn).—Areas of this phase are well distributed along the base of limestone slopes in the limestone valleys. The soil is associated with Talbott, Cumberland, Etowah, and other Colbert soils. It differs from the eroded undulating phase in having a stronger slope, a less thick subsoil, and shallower depth to bedrock.

To plow depth the phase consists of subsoil material mixed with varying quantities of surface soil. This mixed material is yellowish-gray to yellowish-brown stiff to moderately friable silty clay that is very sticky and plastic when wet. If worked when too wet, it will bake and harden on drying. The subsoil is yellow heavy plastic clay showing some gray, brown, and red mottlings.

Use and management.—As a result of erosion, Colbert silty clay, eroded rolling phase, has poor tilth, comparatively low moisture-absorption capacity, and poor resistance to drought. It presents a difficult conservation problem. Most of it has been cultivated once, but a large part is used for pasture or forest. The clayey nature of the plow layer, the heavy tight subsoil, and rolling surface make this soil poorly suited to crops requiring tillage.

A small part of the soil is used for cotton, corn, lespedeza, and other general farm crops. Annual lespedeza, hop clover, and Dallis grass—the principal pasture plants—provide fairly good grazing. Sericea lespedeza is well suited; it is an excellent hay crop, forms good pasture, and is helpful in controlling erosion.

Colbert silty clay, severely eroded rolling phase (5–12% slopes) (CBD).—Areas of this phase are scattered over the limestone valleys and coves, principally at the base of steep limestone slopes. The soil differs from the eroded rolling phase in that little or none of the original surface soil remains. The soil to plow depth consists almost wholly of subsoil material.

To a depth of 3 to 5 inches is yellowish-brown moderately friable to stiff and tight silty clay, which is very sticky and plastic when wet. The subsoil is yellowish-brown tight plastic and sticky silty clay faintly mottled with reddish brown, pale yellow, and gray. In places the soil to plow depth has a reddish tinge and in this respect resembles the Talbott soils. Shallow gullies and bare sheet-eroded spots are common in many places. A few deep gullies 300 feet long or longer are indicated on the soil map by symbol.

Use and management.—Under present conditions Colbert silty clay, severely eroded rolling phase, is best used for pasture, but the most severely eroded areas are limited in their suitability for forest. Areas that have reverted to forest are mainly in old-field pine, although some areas are planted to pine, black locust, and a few ash. Pasture is most commonly obtained by seeding the land to hop clover and possibly to orchard grass, lespedeza, and Dallis grass. Because sericea lespedeza is well suited, aids in erosion control, and produces excellent hay, its acreage is increasing.

Colbert-Talbott stony silty clay loams, severely eroded rolling phases (2–12% slopes) (CTD).—This complex occurs in relatively small areas, generally in association with other Colbert soils and with Rolling stony land (Colbert soil material). Composed largely of Colbert soil, it occupies the smoother parts of low ridges in the limestone valleys, relatively gently sloping benches in hilly and rough stony lands, and less rocky and more deeply covered positions in the smooth and gently rolling stony lands. It is characterized by heavy, sticky, and plastic clay loam or silty clay that contains many limestone boulders and limestone outcrops, but it is less stony than the stony lands. In some places the profile, including the parent material, is similar in color, texture, and consistence to the Colbert soils. In other places it resembles the Talbott.

Use and management.—A large part of Colbert-Talbott stony silty clay loams, severely eroded rolling phases, is cleared and used mainly for pasture; a small part is cropped. Most of the cut-over, pastured, or tilled areas are severely eroded, although some are moderately eroded. Small areas are used for home gardens and subsistence crops. A few areas are in nearly virgin forest, the vegetation consisting mainly of cedar or cedar and deciduous hardwood mixed.

Crossville loam (2–5% slopes) (Co).—This soil is closely associated with Hartsells and Muskingum soils. It is derived mainly from weathered sandstone material and occurs in gently sloping uplands and upland depressions, chiefly on Sand Mountain. Surface drainage is usually good, but internal drainage is fairly slow, especially where seepage water moves through the soil. Although erosion is not generally severe, terracing probably would be helpful where the soil is used for row crops.

Profile description:

0 to 4 inches, dark-brown to grayish-brown friable mellow loam; very strongly acid.
4 to 9 inches, dark-brown to yellowish-brown heavy friable loam to silty clay loam; crushes readily to a soft granular mass under a fairly wide range of moisture content; very strongly acid.
9 to 22 inches, yellowish-brown friable very fine sandy clay to fine sandy clay containing considerable silt; in places more friable with increasing depth and may contain partly weathered sandstone fragments; very strongly acid.
22 inches +, sandstone bedrock.

The range in the depth of the soil to bedrock is the principal profile variation. In some places the depth is less than 8 inches, in others more than 30; the usual depth is 12 to 22 inches. In places, however, there are bedrock outcrops. The larger areas include patches of Hartsells soils too small to show separately on the soil map.

Use and management.—Crossville loam is the best soil for pasture on the mountains, and many areas are used for that purpose. Most of the cleared land is used for corn, hay, or pasture. In most places this soil is surrounded by Hartsells soils. In areas where the depth to bedrock is less than 10 inches, the soil is relatively droughty during long dry spells. Most areas are somewhat slow to dry in spring, making this a later soil than the associated Hartsells.

Only about 40 percent of the soil is cleared and cultivated or in pasture. In forested areas the trees are mainly Virginia pine, post oak, sweetgum, blackgum, some old-field pine, and water and southern red oaks. Most of the forested areas are in the northeastern part of the county north of Flat Rock. These areas are still in forest because they are not easily accessible or because their importance for improved pasture is not fully realized.

The areas on the southern part of Sand Mountain are mostly cleared and used for crops and pasture. Lespedeza, Dallis grass, common white clover, orchard grass, and possibly Kentucky bluegrass afford excellent grazing under management that includes yearly fertilization with 500 pounds an acre of basic slag or the equivalent in lime and phosphate.

The suitability of this soil for different crops depends to some extent on its depth to bedrock. The soil in areas where it is 15 inches deep or more over bedrock is well suited to corn. Yields of 15 to 35 bushels of corn an acre can be expected under normal conditions if management includes the application of 100 or 200 pounds of nitrate of soda. The use of some phosphate and potash might also be helpful except in areas where corn is rotated with cotton. A rotation of corn, hay, and pasture is possibly the best. Soybeans are normally planted on those areas where the depth to bedrock is less than 15 inches; yields range mainly from ¾ to 1¼ tons of hay an acre without use of fertilizer.

Cumberland loam, undulating phase (2–5% slopes) (CUU).—This soil occurs in the limestone valleys, where it occupies well-drained stream terraces occurring principally southwest and northeast of Langston and northeast of Hollywood. A few small areas, however,

are in other parts of the main limestone valley. The phase is associated most commonly with other Cumberland soils and with Etowah soils. It closely resembles Waynesboro fine sandy loam, undulating phase, although it has a browner and shallower surface soil.

This soil developed from alluvial material washed from soils in the limestone valleys or directly from residuum of weathered limestone with admixtures of material derived from sandstone or from sandy soils. It normally has an undulating to gently sloping surface, but a few included areas have slopes up to 9 percent.

Internal and external drainage are good, except on the stronger slopes where runoff is fairly rapid. The soil is moderately susceptible to erosion, but the erosion can be controlled in most areas by terracing or in places by planting properly selected crops and by plowing along the contour. Natural vegetation consists largely of hardwood trees, shrubs, and vines.

Profile description:

0 to 5 inches, grayish-brown to reddish-brown very friable loam to fine sandy loam; grayish when dry; strongly to medium acid.
5 to 8 inches, grayish-brown to reddish-brown loam, grading to fine sandy clay loam with increasing depth; readily crushed to a friable mass of soft rounded crumbs; strongly to medium acid.
8 to 24 inches, dark-red to dark reddish-brown friable very fine sandy clay loam to silty clay loam; firm in place but crushes easily to a friable mass when broken loose; strongly to medium acid.
24 to 48 inches, dark-red to dark reddish-brown friable silty clay containing some very fine sand; yellowish red or light brownish red and more friable with depth; medium acid.

The depth of the relatively loose friable surface soil and the percentages of sand, fine sand, and very fine sand or silt it contains may vary. A small number of water-worn pieces of gravel are on the surface and throughout the profile in places and a few fine chert fragments or small cobbles occur in others. The thickness of the subsoil ranges from about 40 to 96 inches or more but is generally about 48 to 66 inches.

Use and management.—Cumberland loam, undulating phase, has good workability, good moisture-absorption capacity, and very good moisture-holding capacity. It is easily permeable to roots. It is very desirable farm land and is used in the production of all general farm crops. Cotton and corn are the principal crops. Alfalfa is well suited, but applications of 2 to 3 tons an acre of finely crushed limestone and other good management practices are required for its production.

Cumberland silt loam, undulating phase (2–5% slopes) (Csu).—This soil occupies small undulating or gently sloping areas on high stream terraces in the limestone valleys, chiefly in association with other Cumberland soils. Several areas are in the vicinity of Hollywood, near Stevenson, and northwest of Paint Rock. The parent material is largely alluvial in origin and consists of material derived mainly from weathered limestone but to some extent from weathered sandstone and shale. External drainage is good to slightly rapid and internal drainage is good. Erosion is active but has removed less than 50 percent of the original surface soil.

Profile description:

0 to 5 inches, dark grayish-brown to light-brown friable heavy silt loam readily crushed to a mass of soft rounded crumbs when moderately moist and to a loose powdery mass when dry; sticky and subject to puddling when worked too wet but has a fairly wide range of moisture under which it can be worked without puddling; medium acid.
5 to 12 inches, dark grayish-brown friable silty clay loam; grades to reddish-brown moderately friable but firm silty clay with increasing depth; readily crushed to a mellow mass of soft fine crumbs, although the material in the lower part of the layer is heavier and crushes into coarse particles; medium to strongly acid.
12 to 30 inches, brown-red firm but friable heavy silty clay containing some grit consisting of water-worn sand, fine angular fragments of chert, or both; strongly acid.
30 to 48 inches, brownish-red friable heavy silty clay that breaks into somewhat larger and less firm particles than the material in the layer above; in places somewhat purplish red; strongly acid.

Pebbles and sand are present to some extent in all places, and in some small areas chert fragments may be on the surface and in the soil. Small soft to fairly firm iron concretions are not uncommon throughout the profile.

Use and management.—Cumberland silt loam, undulating phase, has good physical and chemical properties, good workability, and good moisture-absorption capacity. Erosion control is not a difficult problem, but most areas require some terracing to prevent loss of soil materials and to improve moisture absorption. The phase responds exceptionally well to good management.

Most of the soil is cultivated (pl. 4, *C*). Cotton and corn are the chief crops, but soybeans, cowpeas, oats, and lespedeza are grown to some extent. Cotton yields one-half to nearly a bale an acre under common management, and somewhat more under better management. Corn yields 20 to 50 bushels, depending largely on season and management. When corn follows a winter legume, good yields are obtained. When treated with 2 to 3 tons of finely crushed limestone an acre and given other good management practices, this is one of the best soils for alfalfa in the limestone valleys.

Cumberland silt loam, rolling phase (5–12% slopes) (Cso).—Areas of this phase are small and generally associated with other Cumberland soils and are similar in texture, color, and structure to the undulating phase. The slopes, however, are steeper. The loss of soil material through accelerated erosion is estimated to range up to 50 percent of the virgin surface soil. Small severely sheet-eroded and gully-eroded areas included with the phase are designated on the map by symbol.

The surface soil is grayish-brown to slightly reddish-brown friable heavy silt loam about 5 inches thick. The subsoil is reddish-brown firm but friable silty clay. The thickness of the surface soil and subsoil is in many places somewhat less than that of the undulating phase, but the main characteristics are similar.

Use and management.—Cumberland silt loam, rolling phase, has good physical and chemical properties, but its strong slopes necessitate measures to protect the soil from serious erosion damage while it is under cultivation. All the soil is cleared and in use, mainly for crops. It is used principally for cotton and corn but to some extent for soybeans, lespedeza, and cowpeas. It responds well to winter cover crops,

especially legumes. When treated with 2 to 3 tons of lime an acre, it is well suited to the production of alfalfa, providing other management is good.

Cumberland silty clay loam, eroded undulating phase (2–5% slopes) (CME).—Although similar to Cumberland silt loam, undulating phase, this phase differs in being eroded to such extent that nearly all the original surface soil is gone. As a result the soil is redder, heavier to plow depth, and consists largely of subsoil material mixed with some surface soil. It occupies well-drained undulating or gently sloping areas in the limestone valleys, where it is closely associated with other phases of Cumberland soils and with soils of the Etowah, Dewey, Waynesboro, and Allen series. External drainage is good but generally somewhat rapid on more strongly sloping areas. Internal drainage is generally good.

Profile description:

0 to 4 inches, brownish-red to red friable to moderately friable heavy silty clay loam; sticky and plastic when wet and if worked when too wet subject to puddling; when worked under optimum moisture conditions breaks into a fairly loose friable mass; acid to strongly acid.

4 to 8 inches, brownish-red to red moderately friable silty clay loam to firm but moderately friable silty clay; variable in depth from place to place and entirely absent in some places; medium to strongly acid.

8 to 30 inches +, brownish-red firm but friable heavy silty clay.

The thickness of the first two layers depends greatly on the depth to which the soil is worked. These layers consist of surface soil and subsoil mixed by the plow during cultivation.

Use and management.—Cumberland silty clay loam, eroded undulating phase, has good chemical properties but has lost many of its best physical properties through accelerated erosion. Because of the loss of the friable surface material, this phase is tilled less easily, has a narrower range of moisture conditions in which it can be worked, absorbs moisture less readily, is more sticky when wet, and bakes and cracks more when dry than Cumberland silt loam, undulating phase. It is responsive to good management, however, and can be built up by deep cultivation and use of cover crops, especially winter legumes, which supply organic matter. Loss by erosion can be prevented and moisture conserved by proper terracing, provided other good management practices are followed.

All this phase has been in cultivation once, and most of it is still cultivated. Cotton, the principal crop, gives relatively satisfactory yields but slightly less than on Cumberland silt loam, undulating phase. Oats and other winter grains do well and are frequently used following cotton. No fertilizers are applied when these grain crops are seeded; however, a top dressing of 100 to 250 pounds of nitrate of soda or an equivalent nitrogen fertilizer is usually applied in spring for better results. This soil is not so well suited to corn as Cumberland silt loam, undulating phase, but after the soil has been built up by proper terracing, the use of cover crops, and other methods, fairly good yields are obtained.

Cumberland silty clay loam, eroded rolling phase (5–12% slopes) (CMN).—This phase occupies well-drained high stream terraces in the limestone valleys. It is distributed throughout many of the smaller limestone valleys and coves, but the larger areas are in the

main limestone valley on either side of the Tennessee River from the Alabama-Tennessee State line to the Jackson-Marshall County line. The soil has rapid to excessive external drainage, mainly because of its fairly strong slopes, and nearly everywhere has good internal drainage. Erosion has been active, and it is estimated that the areas generally have lost half to nearly all the virgin surface soil. Included with this soil are some areas in which shallow gullies have formed and part of the subsoil has been removed. These gullied areas are indicated on the map by symbol.

The parent material is mainly alluvial in origin, having been brought in and deposited by streams or by local wash. This material is now high above the present streams. Some residual material appears in places, especially southwest and northeast of Bellfonte Island. The soil is relatively free from coarse material, but in places a few pebbles, pieces of water-worn gravel, and small cobbles are on the surface and through the profile. Angular chert fragments are as common as the water-worn material and are numerous in spots, but the quantity of chert, pebbles, or cobbles is seldom, if ever, large enough to interfere with tillage.

Like the other eroded or severely eroded Cumberland soils, this phase is characterized by a reddish-brown surface soil and a brownish-red to red subsoil, the red color nearly everywhere continuing to a depth of 48 to 72 inches. It is separated from the other Cumberland phases mainly on the basis of slope range and percentage of soil material lost through accelerated erosion, and from other red soils like Waynesboro and Allen chiefly on the basis of character of parent material. It resembles the eroded undulating phase in color, texture, structure, and surface and subsoil consistence.

Use and management.—The loss of friable surface soil material through erosion has reduced the moisture-absorption and moisture-holding capacity of Cumberland silty clay loam, eroded rolling phase, and has narrowed the range of moisture content under which it may be worked. Tilth conditions are less favorable, mainly because plowing is done largely in heavy subsoil material.

All this phase has been cultivated at some time. At present one-half to two-thirds is used annually for field crops, and about one-fifth occupies narrow strips of sharply sloping breaks that divide one level from another. These strips have slopes of 9 percent or more and are not cultivated but generally support a fairly dense growth of briers, a few scattered trees, and in places brushland pasture. The rest of the soil is used mainly for pasture or a rotation of pasture and field crops.

The cultivated areas are used largely for cotton and less commonly for corn, hay, and other field crops. Crop yields are relatively low. Cotton yields one-third to about two-thirds bale an acre under fairly good management. When corn follows a winter legume on well-terraced land, yields of 20 to 30 bushels an acre are obtained. The soil is well suited to sericea lespedeza, which makes excellent hay and supplemental grazing. Some of the narrow strips that have strong slopes are well suited to kudzu, either for hay or for grazing.

Erosion control is essential if this soil is to be maintained and improved under cultivation. When properly terraced, the soil can be built up to a fairly high state of productivity by the use of winter cover

crops. Winter legumes are highly satisfactory for soil building, but winter grains can be grown satisfactorily when they follow well-fertilized cotton. No fertilizers are applied at the time of seeding winter grains, but a top dressing of 100 to 250 pounds an acre of sodium nitrate, or the equivalent in nitrogen, applied in spring, probably would be beneficial.

Cumberland silty clay loam, severely eroded rolling phase (5–12% slopes) (CMD).—This is one of the most severely eroded red soils in the county. It is similar to the eroded rolling phase in color, texture, character of parent material, and range of slope and differs from that phase primarily in having lost a greater quantity of surface soil and subsoil material through erosion. This phase is so severely eroded that tillage is almost entirely in subsoil material. External drainage tends to be excessive in most places, but internal drainage is good.

Use and management.—Cumberland silty clay loam, severely eroded rolling phase, has poor workability, slow moisture absorption, and relatively low moisture-holding capacity. Because of the slow moisture absorption, crops will likely be injured more quickly by lack of moisture during dry periods than they would be if grown in less severely eroded or uneroded areas. On the other hand, the soil has good chemical properties and can become fairly productive if it is properly terraced, especially on the more gentle slopes, and organic matter is incorporated by turning under green-manure crops.

All this phase has been cultivated, but because of severe damage from erosion, a large part is idle or in pasture. Probably less than 20 percent is used annually for field crops. Cotton is the principal crop and yields ¼ to ½ bale an acre under common management. Better yields are obtained on areas improved by terracing and other soil-building practices. Some soybeans, cowpeas, and annual lespedeza are grown, but returns are low. Corn is considered poorly suited, except on terraced areas and where it follows a winter legume.

Sericea lespedeza and kudzu are suited and produce fair to good yields of high-quality hay; they can be used as supplemental grazing when other pasture crops are short. These crops are productive over a long period of years. They are useful in reducing erosion and in building up badly eroded areas. Voluntary reseeding of annual lespedeza, hop clover, and Dallis grass supplies most of the grazing. In some areas voluntary forest vegetation has come up, and in others pine, black locust, and other trees have been planted.

Cumberland silty clay loam, eroded hilly phase (12–25% slopes) (CMH).—This phase occurs in small areas in the limestone valleys. It is similar to the eroded undulating phase in profile characteristics but differs in relief. Under the native vegetation of deciduous hardwoods and pine, external drainage was good to rapid and internal drainage good. Under persent eroded conditions, however, external drainage is rapid to excessive and internal drainage is good to rapid.

Use and management.—All of Cumberland silty clay loam, eroded hilly phase, has been cultivated, but little is used for general farm crops. The principal use is for pasture and forest. Terracing the soil for tilled crops is difficult and nearly everywhere impractical, but some of the more gently sloping and less severely eroded areas may be terraced for close-growing crops, as sericea lespedeza. Kudzu and sericea lespedeza are suitable for controlling erosion. Areas not suitable for close-growing crops and pasture may be allowed to grow up or be planted in forest. Pines are probably the best trees for these localities, and black locust for fence posts may also be grown advantageously.

Cumberland silty clay loam, severely eroded hilly phase (12–35% slopes) (CMR).—This phase is closely associated with the other Cumberland soils and resembles the eroded hilly phase in range of slope and position, although it differs in the amount of surface and subsoil material lost through accelerated erosion. It has a red surface soil and a red to brownish-red subsoil. Practically all the original surface and subsurface soil and much of the upper subsoil have been removed by erosion so that the phase to plow depth now consists mainly of subsoil material. External drainage is very rapid to excessive, but internal drainage is good.

Use and management.—The workability, moisture-absorption capacity, and moisture-holding capacity of Cumberland silty clay loam, severely eroded hilly phase, have been seriously impaired by the loss of friable surface and subsurface soil material. The reduced moisture-absorption capacity of the soil tends to reduce the quantity of soil moisture available for plant use. The phase is difficult to develop into improved permanent pasture but is suitable for sericea lespedeza for use as grazing. Its best use is probably forest. Trees and, where feasible, kudzu or sericea lespedeza are beneficial for checking erosion and building up the soil.

All the phase has been cultivated at some time. As the soil was highly susceptible to erosion, most areas were abandoned in a relatively short time for crop use. Some of them have reverted to volunteer forest of old-field pine, black locust, sweetgum, persimmon, and other common trees; others have been reforested by planting seedlings of pine and black locust. Most of the soil, however, is used for permanent pasture established either by seeding common lespedeza or by allowing common grasses and other plants to reseed themselves. Only a small part is cultivated to cotton, corn, and lespedeza. Low average yields are obtained.

Dewey silt loam, undulating phase (2–5% slopes) (DSU).—This phase occupies comparatively small undulating to very gently rolling or very gently sloping areas on fairly broad ridge tops or small tablelands in the limestone valleys. It is commonly associated with the chert ridges near Bridgeport, northeast of Hollywood, and northeast of Fackler and with the red hills that parallel or border the Tennessee River in irregular and broken chains. Some of the areas adjoin or are near the base of rough limestone slopes in the smaller limestone valleys and coves.

The phase is derived from a fairly deep layer of fine material that is relatively free of chert fragments or other coarse material but overlies beds of highly cherty material. The fine material consists mainly of weathered products of high-grade or dolomitic limestone. In places, however, it probably contains some colluvial and alluvial material. The depth to the underlying cherty material is more than 96 inches in the deeper areas but is only about 20 inches in the shallow

areas where there are occasional chert outcrops. This phase is chiefly associated with the surrounding Dewey soils. The gently undulating to undulating relief is favorable to good surface drainage and the texture, structure, and consistence are favorable to good internal drainage.

Profile description:

0 to 5 inches, dark grayish-brown to very dark-brown friable silt loam readily crushed to a mellow mass of fine rounded soft crumbs; acid.

5 to 12 inches, dark reddish-brown firm but friable heavy silt loam to silty clay loam; fairly plastic and somewhat sticky when wet; becomes redder and firmer, lower in organic-matter content, and narrower in range of optimum moisture with depth; larger and more angular soil particles in the lower than upper part of the layer; medium to strongly acid.

12 to 30 inches, yellowish-red, reddish-brown, to brownish-red firm but moderately friable heavy silty clay loam to silty clay; crumbles readily under slight pressure at optimum moisture conditions into slightly angular fragments that crush easily to a mass of soft crumbs; fairly plastic and sticky when moderately moist to wet, fairly hard when dry; strongly to very strongly acid.

30 to 48 inches, slightly reddish-brown, light-brown, to brownish-red moderately stiff plastic heavy silty clay; breaks into angular or subangular blocks ½ to ¾ inch in diameter; readily crushed to fine moderately soft pieces when in best moisture condition; sticky and plastic when wet, drying into hard lumps not easily broken or crushed by hand; generally firmer and more plastic than the overlying layer and in the lower part more yellow; strongly acid to very strongly acid.

The phase varies in color and surface soil texture. The color ranges from grayish brown to slightly reddish brown. In some places there is an increase in redness in eroded areas, largely because redder soil materials from the subsurface and upper subsoil have been mixed with the remaining surface soil in plowing and cultivating. The redder color may have been brought about partly by the loss of organic matter through continuous tillage and crop production. The variation in texture of the surface soil is partly due to differences in texture of the parent material but more commonly to the loss through erosion of the looser more friable surface soil material and to the admixture of the heavier subsoil material by tillage operations. The greatest variation is in the depth to underlying cherty material.

Small soft iron concretions are generally present and produce a brown-specked or streaked appearance, especially on a cut surface. They usually are more numerous in the subsoil and underlying material than in the surface soil. Some are shotlike and fairly hard. Fine grit and small chert fragments may occur on the surface and in the soil material, but the surface soil is usually free of stone and chert except for occasional cherty spots or outcrops of cherty material.

Other variations occur in the areas bordering Tellico and Armuchee soils in the red hills along the Tennessee River. In these areas the parent material consists partly of weathered shale, and the resulting soil is slightly redder and heavier, somewhat tighter, and more plastic than elsewhere.

Areas of the undulating phases of Fullerton silt loam, Cumberland silt loam, and Talbott silt loam, as well as the eroded undulating phase of Talbott silty clay loam, too small to be shown separately on the soil map are included with this phase.

Use and management.—Dewey silt loam, undulating phase, is highly productive. To maintain good tilth, a crop rotation that includes winter legumes for green manure is essential. The texture, structure, and consistence of the phase are favorable to the movement of moisture and air and to root penetration, especially in the surface and subsurface soil and the upper part of the subsoil. The organic content appears to be high in virgin areas or protected areas where little or no soil material has been lost through erosion. The soil seems to retain its organic-matter content even where continuously cropped.

The phase is suitable for general farm crops and is one of the best in the county for alfalfa. Practically all accessible areas are cultivated. Cotton, corn, and hay are the principal crops. Cotton yields range from ½ to 1 bale an acre under common practices and average about 1 bale an acre under good management practices. The corn acreage is only slightly less than that of cotton, especially on the farms where a winter legume follows cotton and corn follows the winter legume. Corn yields range from 35 to 50 bushels under good management. The average corn yield over the period of 6 years, 1929 to 1934, inclusive, obtained by the Tennessee Valley Substation in Limestone County, Ala., on Decatur clay loam, which is very similar to this phase, was 37.4 bushels an acre when the crop was fertilized with 600 pounds of 6–8–4 fertilizer an acre (*2*). Other yields reported were lespedeza hay, ¾ to 1¾ tons; soybean hay, 1 to 2½ tons; and alfalfa, 2½ to 4 tons annually an acre. Alfalfa may be cut two to four times a year, depending on the season, the condition of the soil, and cultural methods. In preparing the ground for seeding alfalfa, 1½ to 3 tons of crushed limestone is needed unless the soil has been limed within the preceding 10 to 15 years.

Dewey silt loam, rolling phase (5–12% slopes) (Dso).—This phase which occurs in gently rolling to rolling areas on uplands in the limestone valleys, is similar in color, texture, consistence, and structure to the undulating phase, and differs mainly in range of slope. In profile development the two soils are nearly identical, except that this rolling phase generally has a somewhat thinner dark-brown organic-rich surface soil and a less well-developed subsoil, especially on the stronger slopes. In cultivated fields the soil to plow depth is redder and less brown or grayish brown than in the undulating phase. The mixing of red subsurface and subsoil material with the surface soil by tillage is in part due to the shallowness of the original surface soil and in part to greater loss of surface soil through erosion.

External drainage is rapid to excessive, but internal drainage is generally good. Because of the greater loss of moisture by runoff, a smaller percentage of rainfall penetrates the subsoil and reaches the underlying material. Both sheet and gully erosion are more active in the rolling than in the undulating phase, and erosion is more difficult to control. Cultivated areas in particular need special care if erosion is to be controlled and serious damage prevented.

Use and management.—Approximately 80 percent of Dewey silt loam, rolling phase, is cultivated; 10 percent is in trees; and the rest represents pasture, building sites, or idle land. The same kinds of crops are grown as on the undulating phase, but acre yields are 10 to 20 percent lower under the same management. Terracing and contour planting of intertilled crops are the best methods of protecting areas not under a forest or grass cover.

Dewey silt loam, hilly phase (12–25% slopes) (DsL).—This phase occurs in only a few small areas in close association with the Armuchee-Tellico complexes in the red hills bordering the Tennessee River. Unlike the other hilly phases it is still largely in woodland. The forest has been cut over at various times, however, and erosion has been active in places. In color, texture, and other physical characteristics the phase is similar to the undulating phase, but it generally has thinner surface soil and subsoil layers and many chert fragments.

In virgin or nearly virgin areas the dark-brown organic-stained surface layer ranges from about 2 to more than 8 inches deep. The surface soil is brown to grayish-brown friable heavy silt loam to silty clay loam and is very granular. The subsoil is yellowish-red to dark brownish-red firm but friable silty clay containing some small angular chert fragments. It continues to 26 to 56 inches, where it passes into mottled yellow, red, brown, and gray soil material. The parent rock consists of limestone and to some extent shale.

Use and management.—More than 60 percent of Dewey silt loam, hilly phase, is in forest or woodland pasture. The rest is in open pasture and cropland. The soil is subject to erosion, and the problem of erosion control on cropped land is relatively difficult. Either kudzu or sericea lespedeza is considered a good crop for the control of erosion and for periodic grazing.

Dewey silty clay loam, eroded undulating phase (2–5% slopes) (DwE).—This phase occurs in association with other Dewey soils and agriculturally it is the most important Dewey soil in the county. It is similar to Dewey silt loam, undulating phase, in range of slope and position and originally was identical in color, texture, and other characteristics. It has been greatly altered, however, by accelerated erosion, which has caused the loss of more than half the original surface soil. The present surface soil, a reddish-brown or brownish-red silty clay loam, consists of material from the subsurface soil and upper subsoil mixed by tillage with the remaining surface soil. In physical characteristics the subsoil of Dewey silt loam, undulating phase, and this soil are practically the same.

External drainage is good to rapid, and internal drainage good. Properly constructed terraces will quickly control erosion and rapid surface drainage. The native vegetation, much like that of most well-drained soils on the uplands and high stream terraces of the limestone valleys, consisted mainly of deciduous hardwood forest with dense growths of underbrush. The most common trees were white, post, black, chestnut, and southern red oaks, scaly bark and black hickories, sweetgum, blackgum, sourwood, yellow-poplar, and persimmon.

Use and management.—All of Dewey silty clay loam, eroded undulating phase, is cleared land, and nearly all is in cultivation. This phase is desirable for general farm crops, but is fairly susceptible to erosion. Because the land has been cropped to cotton, corn, and other clean-tilled crops, for the most part without proper management that includes adequate terracing, measures now have to be taken to control erosion.

Under good management, including adequate erosion control, use of winter legumes, liberal applications of fertilizer, and good tillage, however, this phase can be maintained in a highly productive state. Cotton, corn, and hay are the chief crops. Cotton yields one-half to more than a bale an acre, depending largely on season and soil management. Corn is not so well suited as to Dewey silt loam, undulating phase; but if a rotation of cotton, winter legumes, and corn is used, fairly good corn yields can be expected. Winter cover crops do well; winter legumes make good cover crops where cotton has been grown. Following summer legumes, oats or rye make good cover crops. Winter oats are well suited and more could be feasibly grown.

Dewey silty clay loam, eroded rolling phase (5–12% slopes) (DwN).—This is a red soil on uplands in the limestone valleys. It has a brown to reddish-brown surface soil and a yellowish-red to dark brownish-red subsoil, both of which are moderately heavy. External drainage is rapid to excessive, and internal drainage good. Since it has been tilled the phase has lost half to nearly all its original surface soil through erosion, and its remaining surface soil has become so mixed with the subsoil material that it now consists of reddish-brown moderately friable heavy silty clay loam. The loss of the virgin surface soil through erosion has also resulted in reduced organic-matter content, impaired tilth, and lowered water-absorption and water-holding capacity.

In most areas the phase is in close association with soils of the Fullerton series and other Dewey soils. It is similar to Dewey silt loam, rolling phase, in range of slope and resembles Dewey silty clay loam, eroded undulating phase, in color, texture, and other physical characteristics. The subsoil and substratum are similar to those of Dewey silt loam, undulating phase, although they are not so thick.

Use and management.—Practically all areas of Dewey silty clay loam, eroded rolling phase, are open land and most of them are cultivated to cotton, corn, and hay. The yields of these crops, however, are about 20 percent less than on Dewey silt loam, undulating phase. Sericea lespedeza is useful in controlling erosion as well as in producing pasture. The construction of terraces is also an important means of controlling erosion. The phase responds well to good management and is not difficult to build up and maintain in a productive state.

Dewey silty clay loam, severely eroded rolling phase (5–12% slopes) (DwD).—This phase resembles the eroded rolling phase in slope, color, texture, and other characteristics but is more severely eroded. It has been so severely eroded that little original surface soil is left, and the soil to plow depth now consists mainly of subsoil material and is somewhat redder and slightly heavier than that of the eroded rolling phase. In addition to being sheet eroded, it contains many shallow gullies.

Use and management.—All of Dewey silty clay loam, severely eroded rolling phase, has been used at some time for crops, but most of it has been abandoned because of severe erosion. A large part is now in unimproved permanent pasture, some is lying idle, and some has reverted to forest. Lespedeza, hop clover, Dallis grass, and Johnson grass are the most common pasture plants. Sericea lespedeza and kudzu are well suited and highly desirable for controlling erosion and for hay and temporary grazing. The growth of these plants, however, is greatly benefited by liberal applications of lime and phos-

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phate or basic slag. In the forested areas volunteer shortleaf pine is most common, although cedar, hickory, persimmon, blackgum, and red gum are fairly common in places.

Dewey silty clay loam, eroded hilly phase (12–25% slopes) (DWH).—This red moderately heavy soil occurs chiefly in the red hills bordering the Tennessee River. It is closely associated with other Dewey soils, especially other hilly phases, the Armuchee-Tellico complexes, and the Fullerton soils. The parent material is derived from shale and highly cherty limestone. The native vegetation consisted largely of deciduous hardwoods. Old-field pine is fairly common in cut-over areas and in old fields that have reverted to forest vegetation.

External drainage is very rapid to excessive, and internal drainage good to moderately slow. Erosion has been active and has removed half to three-fourths of the virgin surface soil. The soil to plow depth is largely subsoil material mixed by tillage with what remains of the original surface soil, and as a result of the addition of heavier and more plastic and sticky subsoil material the surface soil now has a heavy silty clay loam texture.

Use and management.—Dewey silty clay loam, eroded hilly phase, is not easily penetrated by roots and has poor workability and moisture absorption, low moisture-holding capacity, and a relatively inadequate supply of organic matter. It contains no large stones but many small chert fragments.

Under present conditions only a small part of this phase is used for general field crops, its most common use being for pasture and trees. A few acres are planted to cotton, corn, and lespedeza for hay, but average yields are low. The soil is suitable for pasture, especially well suited to kudzu, and fairly well suited to forage crops—lespedeza, hop clover, Dallis grass, and Johnson grass.

Dewey silty clay loam, severely eroded hilly phase (12–25% slopes) (DWR).—This phase resembles the eroded hilly phase in color, texture, consistence, and relief but is more severely eroded. It is sheet and gully eroded and has lost not only all or nearly all the original surface soil but in places part of the subsoil. Although most gullies are shallow, some are deep. The deeper gullies are indicated on the soil map by symbol.

Use and management.—All of Dewey silty clay loam, severely eroded hilly phase, has at some time been cultivated. Little of it, however, is now being cropped, and only a small part is in improved permanent pasture. Mainly because of excessive erosion, tilth conditions and water absorption are poor. External drainage is very rapid, and the problem of conserving moisture and soil is difficult. Some areas have reverted to forest vegetation, and old-field pine, sweetgum, persimmon, black locust, and sassafras are the principal trees. The best use for this soil is permanent pasture and forest. Kudzu is a good forage crop and can be grazed periodically.

Dewey cherty silt loam, eroded undulating phase (2–5% slopes) (DNE).—This phase occurs in a few small areas, mostly on low ridge tops. It has moderate to fairly rapid runoff and moderate to fairly slow internal drainage. Shallow gullies are common on the stronger slopes. The soil is closely associated with the undulating phases of

Dewey silt loam and Fullerton cherty silt loam. It has a less cherty surface soil than the cherty soils of the Fullerton and Clarksville series. The thin to 24-inch cherty surface soil is grayish-brown, friable, and moderately eroded. It is underlain by a relatively chert-free red firm but friable silty clay subsoil that ranges from very thin to more than 36 inches thick. The subsoil overlies highly cherty clay soil material that in most places resembles the cherty material under the Fullerton and Clarkville soils.

A small area one-fourth mile north of Long Island is underlain by heavy material from weathered limestone. This area has a somewhat less desirable surface soil with respect to workability and moisture absorption than the other areas. The layers of the profile vary considerably in thickness.

Use and management.—Most of Dewey cherty silt loam, eroded undulating phase, is cultivated. Cotton, corn, cowpeas, soybeans, lespedeza, potatoes, sweetpotatoes, and sorghum are the principal crops. The soil is fairly productive and has good workability and moisture absorption and fairly good moisture-holding capacity. Its inherent fertility is not so high as that of the undulating phase of Dewey silt loam but somewhat higher than that of the rolling phase of Fullerton cherty silt loam.

Cotton yields from three-fifths to four-fifths bale an acre under good management. Corn is fairly well suited to the more deeply covered cherty areas, and when it follows a legume cover crop the yields range from 20 to 40 bushels an acre.

Dewey cherty silt loam, eroded rolling phase (5–12% slopes) (DNN).—This phase resembles the eroded undulating phase in character of parent material and in degree of erosion, but it has steeper slopes. External drainage is good to rapid, and internal drainage is generally good. Under virgin condition the soil is not very erosive, but in cultivated fields shallow gullies are likely to form, especially in areas where the soil is formed of a relatively shallow layer of cherty friable surface soil over a fairly tight silty clay subsoil. Even though the surface soil absorbs moisture well, during heavy showers it receives more water than it can hold and more than the subsoil will absorb. The surface soil therefore becomes so saturated in places that, in spite of its chertiness, most of it washes to lower levels and leaves shallow gullies. Generally little subsoil is removed unless the small gullies once formed remain open and carry excess surface water.

The soil has lost half to three-fourths of its original surface soil through erosion. This loss has impaired workability, reduced water-absorption and water-holding capacity, and increased the problem of conserving moisture and soil. Erosion can be controlled by terraces, especially on the milder slopes. On the stronger slopes permanent pasture and forest are best, but where this phase is cultivated, close-growing crops apparently are effective in holding the soil.

Use and management.—All of Dewey cherty silt loam, eroded rolling phase, has been cultivated at some time. At present not more than 60 percent, however, is used for crops, principally cotton, corn, and hay. The yields are a little less than on the eroded undulating phase. Lespedeza and soybeans are the most common hay crops. Most of the soil not in crop use is in permanent pasture, but very little has

been improved. Sericea lespedeza for hay and periodic grazing is considered a good crop for the stronger slopes and more eroded areas.

Dewey cherty silty clay loam, severely eroded rolling phase (5–12 % slopes) (DRD).—The largest areas of this phase are southwest of Goose Pond Church. The soil is similar to Dewey cherty silt loam, eroded rolling phase, in range of slope and position, but it has lost a large quantity of surface soil through accelerated erosion. Erosion has been active; sheet and shallow gully erosion have removed practically all the original friable surface soil. In most areas some deep gullies difficult to control with ordinary methods have formed. External drainage is very rapid to excessive; internal drainage, good to somewhat slow.

To a depth of 3 to 6 inches is reddish-brown moderately friable heavy silty clay loam containing a fairly large quantity of chert fragments. This layer consists of some surface soil mixed with subsoil material by tillage. Although fairly gritty, it is sticky and plastic when wet. The subsoil is yellowish-red to brownish-red firm but moderately friable silty clay to gritty clay. Both the material and the thickness of the subsoil are extremely variable from place to place, but in the representative areas the subsoil is similar to that of Dewey silt loam, undulating phase.

Use and management.—The loss of soil material through accelerated erosion has impaired the workability of Dewey cherty silty clay loam, severely eroded rolling phase, and has made it less permeable to moisture and roots. The problem of conserving moisture and soil has been made more difficult and productivity has been reduced. All the soil has at some time been cultivated, usually for cotton or other intertilled crops. The soil was not protected from erosion and was therefore seriously damaged. Selected areas can be terraced at a moderate cost in time and material and put into fairly good condition for crops. Other areas can be improved by moderate terracing for permanent pasture land and permanent hay land. The more severely eroded areas apparently are best suited to sericea lespedeza, common native pasture, or forest vegetation.

Dunning silty clay (0–2% slopes) (DU).—This soil occurs in nearly level to slightly depressed first-bottom areas along lateral drains in the limestone valleys. It has developed from limestone residuum deposited as alluvium in those areas where the waters from the higher lying rough limestone slopes spread over the first bottoms and form temporary slackwater ponds in which silt and clay are deposited by nearly neutral or mildly alkaline waters. Areas generally do not extend beyond the immediate influence of lime-bearing waters. The soil is nearly free of gritty matter, but in open or cleared areas bordering high-lying Colbert soils or fairly close to rough stony slopes, fast-moving waters may bring in some chert fragments.

The soil is associated with Hollywood, Colbert, Melvin, Lindside, Egam, and Robertsville soils. It most closely resembles the level and undulating phases of Hollywood silty clay, from which it differs only slightly in color, consistence, and structure. The main difference between the two soils, however, is in position; the Dunning occupies first bottoms, and the Hollywood low colluvial slopes. Both soils receive runoff water from adjacent rough limestone slopes. The

Dunning is frequently subjected to long periods of overflow, especially in winter; whereas the Hollywood soil, although subjected to sheet wash carried by runoff water, is seldom flooded by standing water.

Dunning silty clay is relatively lower than the adjoining soils of the first bottoms, except at the drainage outlet. Because of the high water table throughout most of the year, the soil is nearly permanently wet. Runoff is slow, but most areas have natural surface outlets. Internal drainage is very slow.

Profile description:

0 to 3 inches, very dark grayish-brown silty clay faintly mottled with shades of gray, yellow, and brown; breaks into a mass of fine angular granules that dry into firm to hard particles; slightly acid.
3 to 10 inches, dark grayish-brown heavy stiff clay with a slight olive-drab tinge and faintly mottled or splotched with shades of dark gray and brown; plastic when wet, but breaks into small nutlike fragments when moderately dry; slightly acid.
10 to 26 inches, dark-gray mottled with gray, brown, and yellow heavy stiff clay with an olive tinge; plastic and sticky when wet, but breaks into coarse angular fragments when dry; medium acid to nearly neutral.
26 to 40 inches, grayish-brown to olive-drab heavy stiff clay mottled with shades of gray, yellow, and brown; plastic when wet, but breaks into small angular lumps when dry; slightly acid.

The upper part of the surface layer in a virgin area contains a high percentage of well-incorporated organic matter.

Use and management.—Nearly level relief, fine texture, and a high water table make Dunning silty clay undesirable for field crops because good artificial drainage is fairly difficult to obtain. In most areas, however, the soil can be drained well enough by open ditches for pasture grasses. It is naturally fertile, and when properly drained produces good pasture without amendments. Only a small part is used for field crops.

Most areas are in open or woodland pasture and a few are in native timber made up of water-loving or water-tolerant deciduous hardwoods, with some cedar and holly. A few of the naturally or artificially better drained areas have been improved for the production of corn and soybeans, lespedeza, and other hay crops. Under proper management, the soil is well suited to improved permanent pasture.

Egam silt loam (0–2% slopes) (EG).—This well-drained soil occurs in first bottoms near streams in the limestone valleys. It occupies nearly level or low ridgelike areas, the borders of which incline toward well-developed minor drainageways or the stream channels. The largest areas are along the Tennessee River. The alluvial parent material is derived mainly from limestone residuum that probably washed from Hollywood, Colbert, and Talbott soils or from the adjoining rocky limestone slopes. Along the Tennessee River this soil generally is associated with Huntington silt loam. It is darker, however, has a more compact subsoil, and occupies a slightly higher position. In the smaller limestone valleys it is associated in most places with Lindside, Dunning, Melvin, and other soils of the first bottoms, and with Hollywood, Colbert, Talbott, and other soils of the stream terraces and uplands in the limestone valleys.

The soil is subject to overflow during periods of high water, but surface drainage is generally good, and long periods of flooding are rare. Internal drainage is slow because of the heavy tight subsoil, but the uniform color in the upper part of the subsoil indicates that

drainage is adequate for good aeration. In the lower part of the subsoil drainage is slow and aeration poor.

Profile description:

0 to 8 inches, grayish-brown friable heavy silt loam tinged with olive; easily broken into a fairly mellow mass of soft very fine granules; slightly acid.
8 to 12 inches, dark grayish-brown friable silty clay loam; somewhat sticky and plastic when wet; medium to slightly acid.
12 to 30 inches, very dark grayish-brown to nearly black or dusky-olive stiff tight clay; relatively uniform in color but finely specked with brown and yellowish brown; medium acid to nearly neutral.
30 to 48 inches, dark grayish-brown mottled with gray and yellow silty clay; gray mottling more intense with increasing depth; stiffer and tighter consistence than that of the overlying layer.

This soil varies considerably in texture and color from place to place. In general, areas bordering the Tennessee River have more friable and deeper surface soil. The subsoil is dark and compact but generally is not so tough as in the areas along the smaller streams. In many areas in the Paint Rock River valley the surface soil is very shallow, and the subsoil is dark, compact, and tough. South of Estill Fork are several areas in which the surface soil resembles that of Lindside silt loam, and the subsoil, that of Dunning silty clay or of the level and undulating phases of Hollywood silty clay.

In most areas the soil is practically free of gravel, pebbles, and chert fragments. In the upper part of the Paint Rock River valley and in some other valleys where floodwaters are generally rapid, water-worn pieces of gravel and chert fragments may occur both on the surface and in the soil.

Use and management.—Probably 60 percent of Egam silt loam is in cropland used mainly for corn, soybeans, lespedeza hay, and Johnson grass hay. Approximately 30 percent is in permanent pasture, and 10 percent is in native trees, mainly deciduous hardwood, and woodland pasture. Little fertilizer is used for crops. Depending on management, corn yields 20 to 50 bushels an acre; soybean hay, 1½ to 2 tons; and lespedeza hay, 1 to 1½ tons. Some areas are planted to oats, but the hazard of floods in winter limits use of this crop. Spring oats are sometimes grown. Heavy farm machinery can be used on this soil in most of the major valleys and in some of the small valleys and coves.

Egam silty clay loam (0–2% slopes) (EL).—This well-drained soil occupies relatively large areas in the first bottoms of limestone valleys along the large creeks and the Tennessee River. It is similar to Egam silt loam in relief, position, character of parent material, soil characteristics, drainage, and native vegetation, but it has a shallower and finer textured surface soil. The slope is generally slightly stronger than average along the outer parts of areas, where the surface inclines toward fairly well developed drainageways. External drainage is good. Internal drainage is slow because of the tight subsoil, but it is ample for the quantity of moisture that enters the subsoil. Aeration is good to fair.

The surface soil, extending to a depth of about 10 inches, is dark grayish-brown friable silty clay loam. The subsoil is a very dark grayish-brown or olive-black tough compact silty clay. The upper part of the subsoil has a fairly uniform color, but in areas located in the Paint Rock River valley and the valleys of large creeks the lower part is generally light grayish-brown to grayish-yellow mottled sticky silty clay. In general, the surface soil is less deep than in Egam silt loam and in places this layer is in comparison very thin.

In most areas along large creeks and in probably half of those along the Paint Rock River this soil has a friable silty clay loam surface layer 6 inches or more thick. In some areas along the Paint Rock River and in a few areas along some of the larger creeks it has a comparatively thin surface soil averaging less than 6 inches thick and a dark-colored compact tight subsoil. A few of the larger areas of this soil with a relatively shallow surface layer are south of Garth. The soil in several areas north of Paint Rock has a silty clay surface soil 6 to 8 inches thick. The color in these areas is fairly typical, but the soil is slightly less well drained. In these areas it is closely associated with Lindside silty clay and Melvin silty clay but is better drained than either.

Use and management.—Where the surface soil is 6 or more inches deep, Egam silty clay loam has fair to good tilth, is easily worked, and has fair to good moisture-absorption and moisture-holding capacity. It has a wide range of use suitability for crops. In areas where the surface soil is relatively shallow, however, it has comparatively poor workability and tilth and only a relatively narrow range of moisture conditions under which it can be worked. It also has poor moisture absorption and a low moisture-holding capacity. These features restrict its use for crops; it is therefore largely in pasture.

Most of the soil is cleared and used for field crops and pasture. Probably 60 to 70 percent is in cropland planted principally to corn, soybeans, and lespedeza, but some selected well-drained areas are in cotton. The remaining soil is used largely for pasture consisting chiefly of lespedeza, Dallis grass, orchard grass, and hop and white clovers. Natural vegetation consists of deciduous hardwood, underbrush, and vines, with weeds and grasses in the open areas.

Corn is generally planted on the areas having comparatively thick surface soil. The yields range from 20 to 50 bushels an acre, depending on management and depth of the surface soil. Soybeans and lespedeza are grown largely on areas where the surface soil is comparatively shallow. The yields range from ½ to 1½ tons of hay an acre.

This soil has good chemical properties, but its physical condition, chiefly its heavy compact tight subsoil, is a distinct disadvantage to crop production. This condition is not easily corrected. Deep plowing with subsoiling might help temporarily but would require considerable power and would be relatively expensive. Where much of the subsoil is brought to the surface by deep plowing, a liberal application of phosphate might prove beneficial.

Enders silt loam, undulating phase (2–5% slopes) (EDU).—This phase occupies uplands in the high sandstone plateaus. Most of it is on the northern half of Sand Mountain. It occurs on relatively smooth tableland on broad ridges or divides and at slightly lower levels on moderately large benchlike flats nearly surrounded by sandstone outcrops, Rough stony land (Muskingum soil material), or hilly phases of Pottsville loam.

The parent material, mainly residual in origin, is derived from or largely influenced by acid shale. This shale in most places is interbedded with fine-grained sandstone. On the benchlike flats lying at

slightly lower elevations the parent material may consist partly of alluvial and colluvial deposits. External drainage is generally good, but in wet seasons it may be somewhat slow in the nearly level areas. Internal drainage is generally good to fair in the surface soil and upper part of the subsoil, but fair to slow in the lower part of the subsoil and slow in the parent material.

Profile description:

½ to 0 inch, fine leafmold.
0 to 3 inches, loose friable silt loam containing enough well-incorporated organic matter to be fairly dark gray; strongly acid; small platy fragments of siltstone present in places.
3 to 9 inches, pale-gray to pale-yellow friable silt loam; grades with increasing depth to moderately friable heavy silt loam; strongly acid.
9 to 12 inches, light grayish-yellow moderately friable heavy silt loam to silty clay loam faintly mottled with brownish yellow; contains some thin fragments of shale and fine-grained sandstone; when moist, moderately firm in place but easily crushed to a friable mass; when wet, somewhat plastic; very strongly acid.
12 to 30 inches, yellow to reddish-yellow firm silty clay; tough and hard when dry and plastic when wet; breaks into subangular and angular fragments that have a yellowish-brown to brownish-red coating; material in places mottled with yellow, rusty brown, red, and gray; except where the parent material is derived largely from clay shale, layer generally contains some fragments of hard shale and fine-grained sandstone; strongly acid.
30 to 45 inches, mottled dark-red, yellow, reddish-brown, and gray plastic clay; breaks into angular fragments coated with gray; in most places contains fragments of hard shale or fine-grained sandstone; very strongly acid.
45 inches +, varicolored partly weathered shale or thinly bedded very fine-grained sandstone (pl. 5, *A*); very strongly acid.

The profile varies from place to place, largely according to the character of the parent material. When the soil is cultivated, the organic matter in the surface soil is rapidly lost and that layer becomes a very pale gray. A cultivated field that has a yellow or grayish-yellow surface soil usually has lost part of the surface soil through erosion.

Use and management.—The phase has good workability, good moisture absorption, and fairly good moisture-holding capacity. It is very susceptible to erosion on slopes of 3 percent or more unless protected by terracing or other methods. Where conservation methods are used before erosion has advanced too far, the phase is seldom difficult to conserve. If it is not protected it will erode, for the heavy layer in the lower subsoil and the tight parent material will prevent ready moisture absorption and promote rapid runoff and severe erosion. At best, moisture conditions in the lower part of the subsoil are not favorable for plant growth, and they become poor after the open friable surface soil is eroded away. The soil is badly leached of soluble salts and plant nutrients but fairly responsive to good management.

About 50 percent of the phase is used for crops, 20 percent for open or woodland pasture, and 25 percent for forest. About 5 percent lies idle. Most of the uncleared areas are suitable for crops, and the forested ones are being rapidly cleared and settled. Large areas remain in virgin or cut-over forest largely because most of them were not accessible by even moderately good roads until recently. Shortleaf and old-field pines are replacing hardwoods on much cut-over land and are growing in many abandoned fields. Much of the soil now

farmed has been put under cultivation in relatively recent years. It is commonly planted to truck crops, a use for which it is well suited. It has not proved so productive for either cotton or corn as Hartsells fine sandy loam, undulating phase, but under good management it might become relatively satisfactory for these crops.

Under good management this phase can be built up to a reasonable level of productivity in a few years. It will then give fairly satisfactory yields. Cotton yields ⅕ to ⅔ bale an acre under common management and ½ to 1 bale under good management. Corn yields 15 to 25 bushels an acre under common management and 20 to 40 bushels under good management. The soil is fairly well suited to winter cover crops, especially winter legumes. More of these crops should be used to increase the organic and nitrogen content of the soil and to help control erosion.

Under present farming systems about one-fourth of the cropped area is used for cotton; one-fourth for corn; one-fourth for soybeans, lespedeza, and other hay and forage crops; and one-fourth for potatoes, sweetpotatoes, truck crops, berries, and orchard fruits. Truck farming (pl. 6. *A*) that includes the raising of potatoes has become fairly important at the northern end of Sand Mountain because that area is close to the Chattanooga market.

Enders silt loam, eroded undulating phase (2–5% slopes) (EDE)—This phase occurs in association with the undulating phase in relatively small areas north and northeast of Rosalie, south of Christian Home, and in the vicinity of Higdon. It resembles the undulating phase in relief, distribution, and parent material but differs in surface soil color and texture and in the thickness of the surface and subsoil. The two soils were nearly identical under virgin conditions, but this one has lost 50 to 75 percent or more of the loose friable surface soil and some of the subsurface soil through sheet and shallow gully erosion.

External drainage is more rapid than in the undulating phase. Internal drainage is fair in the surface soil and upper part of the subsoil and fair to slow in the lower part of the subsoil. Between 15 and 20 percent of the total soil area is underlain by thinly bedded sandstone and shale at a depth of less than 24 inches, and as a result little moisture penetrates the soil to the underlying shale and sandstone. Because of the tight subsoil the soil is more difficult to build up and maintain than the undulating phase.

Use and management.—Practically all of Enders silt loam, eroded undulating phase, has been used at some time for general field crops, but these areas have not been properly protected and have become severely eroded. Erosion has also greatly impaired the workability, moisture absorption, and moisture-holding capacity.

Probably 60 percent of the soil is used annually for field crops. Much of the rest is idle or in permanent pasture. A small part has reverted to forest, mainly shortleaf and old-field pine. Cotton, soybeans, cowpeas, and lespedeza are the chief crops. Yields are 10 to 30 percent less than on the undulating phase, and corn and potatoes are not so well suited as on that soil, largely because of the lower moisture-absorption and moisture-holding capacity.

Enders silt loam, rolling phase (5–10% slopes) (EDO).—Most of this phase occurs 1 to 5 miles southwest and west of Flat Rock and

south of Christian Home, where it is in close association with the undulating and eroded undulating phases. It is similar to the undulating phase in profile characteristics but differs in having steeper slopes. Under virgin vegetation external drainage is good, but in most places it becomes somewhat rapid to exeessive after the land is cleared and used for cultivation. Internal drainage is good to fair in the surface soil and upper part of the subsoil and fair to slow in the lower part of the subsoil. Little of the moisture absorbed by the soil penetrates the underlying shale and sandstone, and considerable seepage water moves down the slopes in wet seasons.

Use and management.—About 75 percent of Enders silt loam, rolling phase, is in forest consisting of the same kinds of trees as those on the undulating phase. The rest is cleared and cultivated. These areas have been cleared so recently or have been so well protected that little or no serious erosion has resulted. The cultivated areas, however, have been the smoother ones, as, for example, the gently rounded ridge crests and gentle slopes, where problems of conservation are less difficult.

More of this phase can be cleared and placed under cultivation, but great care must be taken to protect the soil from erosion. Terracing, contour planting, crop selection, and other methods of conservation are necessary if the land is to remain in cultivation for any length of time. Some areas should remain in forest. Practices for conserving the soil are necessary, even in open or partly cleared pasture, to prevent loss of soil material.

Cotton, corn, and hay are the main crops, except where truck farming is widespread. In those places potatoes, greens, cabbage, tomatoes, okra, various beans, and peas are grown. Crop yields are 10 to 25 percent less than on the undulating phase.

Enders silt loam, eroded rolling phase (5–10% slopes) (EDN).—This phase occupies areas on rounded ridge tops, moderately steep slopes, and rolling tableland and benches on the sandstone plateaus, mainly on the northern half of Sand Mountain. It resembles the rolling phase in relief and position and the eroded undulating phase in profile characteristics. It has a grayish-yellow surface soil and a grayish-brown to yellowish-brown subsoil mottled with brown, red, yellow, and gray. The parent material is weathered shale and thinly bedded fine-grained sandstone.

External drainage is rapid to excessive. Internal drainage is fair in the surface soil and upper part of the subsoil and moderately slow in the lower part of the subsoil. There is seepage in wet seasons. The soil is susceptible to erosion and has been damaged by both sheet and shallow gully erosion. Half to nearly all the original friable surface soil and subsurface soil have washed away. The present surface soil consists largely of material from the subsoil mixed by tillage with the remaining original surface soil and subsurface soil.

Use and management.—All of Enders silt loam, eroded rolling phase, has at some time been cultivated, but erosion has been so active that probably less than half is now in use. The rest is largely in pasture, but some is lying idle, and a small part is abandoned to forest vegetation, mainly old-field pine. Erosion has impaired the workability of the soil, including tilth conditions, reduced its ability to absorb and hold moisture, and restricted its crop suitability range.

Cotton, soybeans, cowpeas, lespedeza, and corn are the main crops. Yields range from 20 to 30 percent lower than on the undulating phase. Cotton yields ⅕ to ½ bale an acre; corn, 10 to 25 bushels; and lespedeza hay, ½ to ¾ ton. Sericea lespedeza is an excellent hay crop and is considered highly useful for controlling erosion. Although the crop is somewhat slow in getting a start, it should prove fairly satisfactory once growth is established.

Enders silt loam, rolling shallow phase (5–10% slopes) (EDG).—This phase occurs in relatively small areas on narrow ridge tops, saddles, and moderately steep slopes. Several small areas are north of Rosalie. It is closely associated with other Enders soils and resembles the rolling phase in relief, in color of surface soil and subsoil, and in parent material. It differs in depth to parent material, which is generally at 14 to 24 inches. External drainage under virgin vegetation is fair to rapid, and internal drainage is fair to good. In cultivated areas external drainage is rapid to excessive. Mainly because of the relative shallowness of the profile over partly weathered and weathered shale and sandstone, the soil is very erosive and subject to serious erosion unless well protected.

Profile description:

0 to 5 inches, pale yellowish-gray smooth friable silt loam; contains a small quantity of organic matter; strongly acid.
5 to 8 inches, grayish-yellow friable to moderately firm silt loam; strongly acid.
8 to 11 inches, splotched or mottled brown and red friable but firm silty clay loam; strongly acid.
11 to 24 inches, yellow to light reddish-yellow firm moderately friable silty clay; breaks into angular and subangular blocks ¼ to ¾ inch in diameter; somewhat plastic when wet; in places yellowish gray, yellow, and red mottled with reddish brown; strongly acid.
24 inches +, varicolored partly weathered and thinly bedded sandstone; acid.

Use and management.—About 90 percent of Enders silt loam, rolling shallow phase, is in forest that has been largely cut over. The rest is cleared and used for such subsistence crops as corn and potatoes, home gardens, general field crops, and pasture.

Enders silt loam, eroded rolling shallow phase (5–10% slopes) (EDA).—This phase is similar to the rolling shallow phase in slope range and distribution. Where cleared both phases have rapid to excessive external drainage. This phase, however, has lost most of its surface and subsurface through sheet and shallow gully erosion.

Use and management.—All of Enders silt loam, eroded rolling shallow phase, has at some time been used for general field crops, but probably only 30 percent is now used. Corn and other subsistence crops predominate. Most of the rest is used for pasture, but a small part has reverted to forest vegetation. Under common management pasture yields are relatively low.

Etowah loam, level phase (0–2% slopes) (EWV).—This phase occurs as relatively small areas on low but well-drained nearly level stream terraces in limestone valleys. It has grayish-brown surface soil and yellowish-brown subsoil. It is similar in most soil characteristics to the undulating phase, but differs in having nearly level relief, slightly grayer surface soil, and a somewhat paler and more mottled subsoil that indicates slower internal drainage. External and internal

drainage are slower than for the undulating phases of Etowah loam and Etowah silt loam. The parent material is similar to that of Etowah loam, undulating phase. Native vegetation was the same on both soils.

Use and management.—Etowah loam, level phase, has good tilth, moisture absorption, and moisture-holding capacity, is easy to work, and presents practically no problem in the conservation of moisture and erosion control. It is productive and well suited to all locally grown crops. Most of it is cultivated. In many places, where it is closely associated with the undulating phase and other good agricultural soils, it is used in large fields suitable for heavy farm machinery and power or tractor farming.

Cotton, corn, and hay are the principal crops. Yields are good and about the same as on the undulating phases of Etowah loam and Etowah silt loam. Cotton yields range from ⅓ to 1 bale an acre under fair to good management, and corn yields from 20 to 50 bushels, depending on the season and management. The best fertilization for cotton is 300 to 500 pounds of a high-grade fertilizer, as 6–8–4 or 4–10–7, and for corn, 200 to 225 pounds of nitrate of soda. Other management practices good for corn are those of preceding it with a winter legume or growing it in a rotation with a summer legume. Soybeans produce 1 to 2 tons of hay an acre, and lespedeza, 1 to 1¾ tons.

When treated with 2 to 3 tons of finely ground limestone, properly fertilized, and given other needed management, the soil is well suited to alfalfa. It is subject to a higher water table, especially in winter and wet seasons, is generally not so well suited to winter cover crops as the better drained Etowah soils, and tends to warm somewhat more slowly in spring as a result of its slower drainage.

Etowah loam, undulating phase (2–5% slopes) (Ewu).—This soil occupies stream terraces in the limestone valleys. It occurs in association with other Etowah soils, with Cumberland, Sequatchie, Capshaw, Holston, Wolftever, and other soils on the stream terraces, and with Dewey, Fullerton, Colbert, Talbott, and other soils in the limestone valley uplands. The relief is gently undulating and gently sloping, with slopes in a few areas ranging up to 9 percent. Native vegetation consisted mainly of deciduous hardwoods, underbrush, vines, and briers.

The parent material consists of alluvial material derived from uplands underlain by limestone, being similar to the parent material of Etowah silt loam, undulating phase, except in its higher sand content. External drainage is exceptionally good but is somewhat rapid to rapid on the stronger slopes. Internal drainage is good except in places where it tends to be slightly restricted in the lower subsoil.

Profile description:

0 to 8 inches, light grayish-brown to slightly reddish-brown very friable loam; fine sandy loam to fine sandy clay loam texture; strongly acid.
8 to 12 inches, light-brown to reddish-brown friable loam grading to friable fine sandy clay loam; strongly to medium acid.
12 to 36 inches, firm but friable yellowish-brown to yellowish-red fine sandy clay to very fine sandy clay; when moderately moist crumbles under slight pressure to a mass of soft crumblike particles.
36 to 48 inches, faintly to distinctly mottled yellow, brown, red, and gray friable fine sandy clay.

The texture varies from loose friable fine sandy loam to heavy fine sandy clay loam or very fine sandy clay loam. The depth of the surface soil ranges from 3 to 12 inches.

Use and management.—Practically all of Etowah loam, undulating phase, has been cleared, and most of it is in crops. It is one of the most desirable soils in the county for agriculture. Because it occurs as fairly large areas or is closely associated with other good agricultural soils, it offers the farmer an opportunity to plan good land use and farm lay-outs. It is suitable for the operation of large farm machinery and for power farming, has good physical and chemical qualities, and is easy to till under a wide range of moisture conditions. It is well suited to all locally grown crops. Treated with 2 to 3 tons of finely crushed limestone and other needed management practices, it is well suited to alfalfa.

This soil is very responsive to good management and can readily be maintained at a high level of productivity. Erosion is not serious on slopes of less than 3 percent. On slopes of 3 to 5 percent or more, however, erosion control measures must be taken. Terracing probably would be beneficial on the gentler slopes and is necessary where the slope exceeds 5 percent and the land is planted to intertilled crops.

Etowah silt loam, undulating phase (2–5% slopes) (Esu).—This phase occupies undulating and gently sloping areas on stream terraces. The parent material is alluvial, its origin being mainly limestone and to some extent sandstone and shale. External drainage is good but may become somewhat rapid on some of the longer slopes with more than a 3-percent gradient. Internal drainage is generally good. In color and other profile characteristics this phase resembles the undulating phase of Dewey silt loam. The native vegetation consisted largely of deciduous hardwoods of the varieties found on most well-drained soils of the limestone valleys.

Profile description:

0 to 6 inches, grayish light-brown very friable silt loam; in virgin areas upper 2 to 3 inches usually contain enough organic matter to be very dark grayish brown; medium acid.
6 to 12 inches, yellowish-brown friable silty clay loam; grades to reddish brown or yellowish red; strongly to medium acid.
12 to 30 inches, yellowish-red friable silty clay; firm in place but readily crushed to a mass of soft crumbs when loosened; strongly acid.
30 to 48 inches, reddish-brown to brownish-red friable silty clay; reddish yellow or mottled yellow, red, brown, and gray with increasing depth; very strongly to strongly acid.

The subsoil varies in color. In some places it becomes redder with increasing depth and then continues relatively uniform in color to a depth of 48 inches or more; in others it approaches yellow or light brown in the upper subsoil and is distinctly mottled in the lower subsoil. Water-worn pieces of gravel and angular chert fragments less than 3 inches in diameter are on the surface or in the soil in most places, but the soil is free of larger stones.

Use and management.—Practically all of Etowah silt loam, undulating phase, is cleared land, nearly all of which is cropped. This phase is probably the most desirable Etowah soil in the county for general farm crops, although some areas of the undulating phase of Etowah loam are nearly as desirable. Under virgin condition the soil has good physical and chemical properties and presents no prob-

lem in the conservation of moisture and material. Under cultivation, however, it is moderately susceptible to erosion. When the soil is continuously cropped and not replenished with plant nutrients, it produces lower yields. Erosion, however, can be controlled by simple conservation practices, and soil fertility can be maintained, or even improved, by the use of proper amendments and other good management.

Practically all this phase is used annually for cotton, corn, soybeans, lespedeza, and other general crops. It is productive and highly responsive to good management. Depending mainly on kind of management, it produces ½ to 1¼ bales of cotton, 20 to 50 bushels of corn, 1 to 1¾ tons of lespedeza hay, and 1 to 2 tons of soybean hay an acre. Cotton is generally fertilized with 300 to 600 pounds of a high-grade fertilizer, as 6–8–4 or 4–10–7. Corn often follows a winter legume plowed under as green manure, or the crop is side-dressed with 100 to 225 pounds of nitrate of soda an acre or the equivalent in nitrogen fertilizer. Other field crops are seldom fertilized. Truck and garden crops, which are grown to some extent, receive heavy applications of mixed fertilizer or barnyard manure.

Etowah silt loam, level phase (0–2% slopes) (Esv).—This phase occurs generally as small widely scattered areas on relatively low, level but well-drained stream terraces in the limestone valleys. It is associated with other Etowah soils. It has grayish-brown surface soil and yellowish-brown to yellowish-red subsoil. It resembles the undulating phase in most physical characteristics, but differs in relief. The parent material is alluvial and consists of material washed largely from higher lying limestone-valley soils but partly from limestone slopes. Both external and internal drainages are slower than for the Etowah soils that have stronger slopes.

Use and management.—Most of Etowah silt loam, level phase, is cultivated and used for cotton, corn, hay, and other general farm crops. Cotton produces ½ to 1 bale an acre, corn 25 to 55 bushels, lespedeza 1 to 1¾ tons of hay, and soybeans 1 to 2 tons of hay, depending largely on the season and kind of management. Cotton is fertilized with 300 to 600 pounds of a high-grade fertilizer, as 6–8–4 or 4–10–7. Corn is generally fertilized with 100 to 225 pounds of nitrate of soda or is planted following a summer or winter legume crop that has been turned under. Hay crops are seldom fertilized but can be improved by treatment with basic slag or other phosphatic fertilizer.

Etowah silt loam, rolling phase (5–12% slopes) (Eso).—In most physical characteristics this phase is similar to the undulating phase, but has steeper slopes. Ordinarily it is only slightly eroded. Where slopes exceed 8 percent, however, it is subject to serious erosion unless protected.

Use and management.—Etowah silt loam, rolling phase, has good tilth conditions and good moisture-absorbing and moisture-holding qualities and is responsive to proper management. Mainly because of its more difficult conservability and workability and greater surface runoff, it is less desirable for general farm crops than more gently sloping Etowah soils. This phase, however, is suited to the same general farm crops, but gives lower yields. Not more than 75 percent of the land is planted annually to general field crops; the rest is in pasture or second-growth trees.

Under common management cotton produces ⅓ to ¾ bale an acre; corn, 20 to 45 bushels; oats, 20 to 45 bushels; soybeans, ½ to 1 ton of hay; and lespedeza, ⅔ to 1½ tons of hay. Volunteer or native pastures consist chiefly of lespedeza, Dallis grass, and Bermuda grass. The improved pastures contain also common white clover and Kentucky bluegrass, and possibly orchard grass and hop clover.

Etowah silty clay loam, eroded undulating phase (2–5% slopes) (Ete).—This phase occupies undulating to gently sloping terrace positions in the limestone valleys, where it is closely associated with other Etowah soils and with Dewey, Talbott, Cumberland, and other well-drained soils. It is similar to Etowah silt loam, undulating phase, in parent material, relief, position, and distribution but has a redder and finer textured surface soil. The two soils were probably identical under virgin conditions. External drainage is more rapid than on the undulating phase of Etowah silt loam, partly because of the generally stronger slopes but largely because of reduced moisture absorption resulting from erosion. Internal drainage is generally good.

Sheet erosion has removed half to nearly all of the original surface and subsurface soil. In some places not only the surface soil and subsurface soil, but material from the upper part of the subsoil has been lost through shallow gully erosion. The present surface soil therefore consists largely of redder and finer textured subsoil material mixed by tillage with the remaining surface soil and subsurface soil; and it is much shallower, heavier, and less friable than the surface soil in virgin areas. The present surface soil is grayish brown to light reddish brown; the subsoil, yellowish brown to yellowish red.

Use and management.—Tilth conditions, water absorption, and water-holding capacity of Etowah silty clay loam, eroded undulating phase, have been impaired by soil loss through erosion. As a result, problems of conserving moisture and soil have been increased and the response to good management decreased. The eroded condition can be repaired to large extent, however, by engineering projects for water control and by building up the soil through use of legumes and cover crops and other good management practices.

Practically all this soil is cultivated. Crop yields vary, depending on the degree of erosion, care of the soil, and cultural methods. Cotton produces ⅓ to ¾ bale an acre; corn, 20 to 50 bushels; oats, 20 to 45 bushels; and lespedeza and soybeans, ¾ to 1½ tons of hay. Cotton is generally fertilized with 250 to 400 pounds an acre of 6–8–4, 4–10–7, or other high-grade fertilizer. Corn generally either receives a side dressing of 100 to 200 pounds of nitrate of soda or follows a winter legume. Oats commonly receive a top dressing of 100 to 200 pounds of nitrate of soda applied in late winter or early spring. Truck crops and home gardens seldom are grown. They require heavier applications of fertilizer than other crops. Other minor crops are seldom fertilized.

Etowah silty clay loam, eroded rolling phase (5–12% slopes) (Etn).—This phase occupies sloping positions on well-drained stream terraces in the limestone valleys. In many places it occurs in narrow bands on relatively sharp breaks that border higher lying Etowah soil

or along ridgelike divides on the terraces. It has grayish-brown to reddish-brown surface soil and yellowish-brown, reddish-brown, or yellowish-red subsoil. The parent material is alluvial and principally of limestone origin. The color and texture of the surface soil are similar to those in the eroded undulating phase; its relief to that of Etowah silt loam, rolling phase.

Susceptible to erosion, especially on the slopes of 8 percent or more, this phase has lost approximately half to three-fourths of its original surface soil and subsurface soil through sheet and shallow gully erosion. Moderately deep gullies are common, with some too deep to be crossed by heavy farm machinery. Some of the gullies are designated on the soil map by symbol. External drainage is rapid to excessive, largely because the slopes are strong, and moisture absorption is greatly reduced by the eroded condition. Internal drainage is generally good.

Use and management.—All of Etowah silty clay loam, eroded rolling phase, has been used for crops, but, largely because of unfavorable slopes and serious erosion, not more than 65 percent is cropped annually. The rest is in permanent pasture, which is probably the best use, particularly for the most severely eroded areas. Sericea lespedeza is well adapted and should prove a satisfactory hay crop. Kudzu, when well established, will produce good yields of excellent hay or forage if pastured for short intervals during the growing season.

Cotton, the principal crop, produces ⅓ to ½ bale or more an acre under management that includes applications of 250 to 400 pounds of a high-grade mixed fertilizer an acre. Oats produce 10 to 35 bushels under management that includes applications of 100 to 200 pounds of nitrate of soda an acre. Corn produces 15 to 35 bushels an acre where it follows a winter legume or 10 to 30 bushels under management that includes applications of 100 to 225 pounds of nitrate of soda an acre.

Erosion has impaired not only the workability, including tilth conditions, but also moisture-absorption and moisture-holding qualities and the responsiveness of the soil to good management. Problems arising from the rapid runoff of surface water and the need for conserving moisture and soil have been greatly increased, and average yields of crops have been lowered. The less sloping areas could be improved by terraces, which would check further soil losses and improve the water absorption and workability of the soil. Well-terraced land can be used for tilled crops with good results.

Etowah silty clay loam, severely eroded rolling phase (5–25% slopes) (Etd).—Sloping or rolling widely scattered small areas of this soil occur on stream terraces in the limestone valleys. The soil is closely associated with other Etowah soils and with the Dewey, Fullerton, and Cumberland. External drainage is rapid to excessive; internal drainage is good to rapid in the surface soil and upper part of the subsoil but somewhat slow in the lower part of the subsoil.

Practically all the surface soil and subsurface soil have been lost by sheet and shallow gully erosion, and in places, particularly where there are gullies, part of the subsoil. The present surface soil, a

moderately friable silty clay loam, consists largely of subsoil material and is reddish brown or grayish brown with a reddish hue. The subsoil is yellowish red to reddish brown moderately friable silty clay mottled to some degree in the lower part with yellow, brown, and red. Below the subsoil is yellowish brown, mottled with yellow, red, and gray, soil material. The parent material, similar to that of other Etowah soils, is alluvial in origin and is derived largely from limestone material.

Use and management.—At present probably not more than 20 percent of Etowah silty clay loam, severely eroded rolling phase, is used each year for field crops. Most of the phase is in unimproved or idle-field pasture, although a few areas have been allowed to grow over with forest vegetation consisting principally of old-field pine, sassafras, sweetgum, and persimmon. Some parts are in lespedeza hay; some selected areas are in general field crops, mainly cotton. Lespedza is the principal pasture plant, but Dallis, Bermuda, Johnson, and other grasses in time establish themselves by voluntary seeding.

The present eroded condition of the soil is largely the result of unsuitable practices of management, especially tillage without proper control of surface runoff. Terracing would improve a few areas enough to permit their use for general field crops. The soil is well suited to kudzu, probably the best crop for both pasture and hay that can be produced on severely eroded land. Kudzu also is considered highly useful for controlling erosion. The less severely eroded areas can be used for sericea lespedeza, which is considered good for hay and supplementary pasture. Common white clover, hop clover, Dallis grass, orchard grass, and possibly Kentucky bluegrass may be used for improved pasture where the soil is properly protected from erosion and properly fertilized and receives other good management.

Fullerton silt loam, undulating phase (2–5% slopes) (Fsu).—This phase occurs in undulating areas on ridge tops in close association with Fullerton cherty silt loam, rolling phase. To some extent it is also associated with Dewey, Talbott, and Colbert soils on the chert ridges of the main limestone valley and on cherty slopes in the Paint Rock River valley. It has a relatively thick grayish-brown friable gritty silt loam surface soil nearly free of coarse chert fragments and a reddish-yellow subsoil that contains chert. The parent material consists of weathered products of cherty limestone (pl. 5, *B*) or impure dolomite lying mainly in place on ridge tops. It includes some colluvial wash.

External drainage is usually good but may be slightly rapid on slopes greater than 3 percent. Internal drainage is generally good but tends to be rapid in the surface soil in places. Although erosion has been active to some extent, probably less than 50 percent of the virgin surface soil has been lost. The native vegetation consisted mainly of deciduous hardwoods, with cedar and pine admixed.

Profile description:

0 to 6 inches, grayish-brown friable gritty silt loam; practically free of coarse chert fragments; enough organic matter in the upper 2 to 3 inches to produce a fairly dark color; very strongly acid.

6 to 10 inches, pale yellowish-brown to dark yellowish-brown friable silt loam; grades to pale reddish brown or weak orange with increasing

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depth; generally contains a relatively large quantity of fine chert and grit but in places is very smooth and nearly free of chert and grit; very strongly acid.

10 to 27 inches, reddish-yellow to yellowish-red friable cherty silty clay loam to silty clay, some gray mottling; somewhat sticky and plastic when wet, especially in the lower part of layer; chert content varies from place to place but chert generally makes up most of the lower part of the layer; very strongly acid.

27 to 45 inches, yellowish-red to yellowish-brown silty clay; contains a large quantity of sharply angular chert fragments; very strongly acid.

The quantity of grit in the surface and subsurface soil varies from place to place, and the grit particles are generally very small. The chert fragments are mostly less than 1 inch in diameter.

Use and management.—Fullerton silt loam, undulating phase, is less erosive than Dewey or Cumberland soils on similar slopes, but in most cultivated areas it would probably benefit by being terraced to control erosion. The uneroded or only slightly eroded soil generally has good moisture-absorption and fairly good moisture-holding capacity. Its tilth conditions are in general good, although not so good as those of uneroded or only slightly eroded Dewey, Cumberland, or Etowah soils. The chert or gritty material in the soil aids moisture absorption and helps maintain a friable surface soil that will not bake or crack in dry periods. The content of chert is not sufficient to interfere materially with tillage. The soil is severely leached and inherently less fertile than Dewey, Cumberland, Etowah, and many other soils of the limestone valleys.

This phase has many good qualities and responds well to good management. It is desirable for general crops and practically all of it is cultivated each year. Cotton, corn, lespedeza, soybeans, and oats are the main crops. Under good management cotton yields about ⅘ bale an acre, and corn from 30 to 45 bushels.

Fullerton silt loam, eroded undulating phase (2–5% slopes) (FSE).—This phase occupies gently rounded to nearly level ridge tops and very gentle slopes. It occurs in close association with the undulating phase, and with Fullerton cherty silt loam, rolling phase. External drainage is good to slightly rapid, and internal drainage is nearly everywhere good. The native vegetation consisted of deciduous hardwoods, vines, underbrush, and in places some pines and cedars.

From half to more than three-fourths of the original surface soil and in places some of the subsoil has been removed by erosion. To a depth of 3 to 7 inches is reddish-brown gritty silt loam to silty clay loam consisting of subsurface soil and subsoil material mixed with the remaining surface soil. The subsoil is yellowish-red to brownish-red cherty silty clay. The soil resembles the undulating phase in position, distribution, and character of parent material. It is also similar in profile development below the upper subsoil layer, although it generally occupies slightly higher slopes and is more eroded.

Use and management.—Fullerton silt loam, eroded undulating phase, is less desirable for general farm crops than the undulating phase because of impaired tilth conditions, slower moisture absorption, and lower moisture-holding capacity. It therefore is less responsive to good management, and its use suitability and productivity are lowered. During heavy rains surface runoff is so rapid that gullies may form unless the soil is protected by terraces or other means of erosion control. Although many good qualities have been adversely affected by the loss of the friable surface soil through accelerated erosion, this phase can be built up to a fairly productive state by terracing and other soil-improvement practices.

All the phase has at some time been cultivated, and most of it is used for general farm crops. Cotton and corn are the principal crops. Cotton produces ⅓ to ¾ bale an acre under management that includes fertilization with 250 to 400 pounds an acre of 6–8–4 or some other high-grade fertilizer. Corn produces 12 to 25 bushels an acre if it receives 100 to 200 pounds an acre of nitrate of soda or if it follows a legume.

Fullerton silt loam, eroded rolling phase (5–12% slopes) (FSN).—This phase occurs in rolling areas in the Paint Rock River valley and the valleys of tributary streams and in a few scattered valleys and coves. It has a light reddish-brown or reddish-yellow color to plow depth and its cherty subsoil is yellowish red to brownish red. In degree of erosion and profile characteristics it resembles the eroded undulating phase, but it differs in having stronger slopes.

Under virgin conditions external drainage was good, but after the native vegetation was removed and the soil was opened to cultivation, external drainage became rapid to excessive. Internal drainage is good to slightly rapid. The surface soil has been altered by sheet and shallow gully erosion. About half to three-fourths of the original surface soil and, in places, some of the subsoil have been washed away. There are a few deep gullies; exceptionally large ones and very severely gullied areas are designated on the soil map by symbol.

Use and management.—All of Fullerton silt loam, eroded rolling phase, is cleared land used for general farm crops. About 75 percent of the total area is now used annually for cotton and corn. Under good management yields are fair to good. Cotton yields of ⅓ to ⅔ bale an acre are most common, and corn yields range from 15 to 25 bushels an acre. Most of the areas not regularly cultivated are used alternately for pasture and crops. A few areas have reverted to forest vegetation.

The soil is more difficult to work and conserve than the undulating phase, largely because of its stronger slopes. The most gently sloping areas can be improved and maintained in good condition for crops by terracing and other proper management practices. The more eroded sloping areas are best suited to permanent pasture. Lespedeza is the most common pasture crop. Sericea lespedeza should prove satisfactory for hay and supplementary pasture.

Fullerton cherty silt loam, rolling phase (5–12% slopes) (FCO).—This phase occurs in rolling and sloping areas on the uplands of chert ridges and red hills extending from northeast of Bridgeport to southwest of Scottsboro. Derived from weathered material of cherty limestone and cherty dolomite, it is characterized by a grayish-brown cherty surface soil and a reddish-yellow to yellowish-red friable subsoil. Its profile characteristics are similar to those of the undulating phase.

External drainage is good to excessive—dominantly good under forest cover but excessive on the stronger slopes used for cultivation.

Internal drainage is rapid in the surface soil and good to fair in the subsoil. Cleared areas of this phase have lost a fourth to a half of their original surface soil through erosion. About a third of the area is in forest, mainly of deciduous hardwoods, vines, and shrubs, and in places cedars and some pines. In forested localities the soil has been affected little or not at all by erosion.

The thickness of the surface soil and subsoil, the quantity of chert on the surface and in the profile, the size of chert fragments, and the color of the subsoil vary. The chert fragments are dominantly sharply angular and range in size from fine grit to as much as 24 inches in diameter, the usual size of the large fragments being about 8 inches. In the areas east of Stevenson the chert ridges are covered with a thin layer of water-laid material that contains water-worn pieces of gravel and small cobbles. The soil in these areas differs from that in others in having a slightly deeper surface soil caused by the water-laid material. The thickness of this material is also variable, ranging from practically nothing to about 15 inches. The presence of water-worn gravel and small cobbles is indicated on the soil map by gravel symbol.

Use and management.—The chertiness of Fullerton cherty silt loam, rolling phase, aids in absorbing and conserving moisture and in conserving the soil. The chert fragments do not prevent tillage but interfere with it to some extent. The larger fragments are harmful to mowers and other cutting machines that have their cutting bars near or in contact with the ground.

This phase is used for cotton, corn, and pasture. Cowpeas, soybeans, lespedeza, potatoes, sweetpotatoes, and sorghum are grown to some extent, and fair to good yields are obtained under good management. Where the soil is plentiful, areas are commonly used 3 or 4 years for pasture and then planted to a row crop, either cotton or corn. Under this system and with the use of 200 to 300 pounds to the acre of 6–8–4 or other high-grade fertilizer, cotton yields ½ to ⅔ bale or more an acre. If a side dressing of 100 to 200 pounds of nitrate of soda is used, corn yields 10 to 25 bushels. Soybean yields range from ½ to 1 ton or more of hay an acre. The lower yields are obtained without the use of fertilizer, the higher where management includes the use of basic slag or superphosphate.

Although erosion is not severe, the phase is subject to serious erosion unless properly used and managed. In tilled areas terraces should be constructed to conserve the soil. Sericea lespedeza can be used to good advantage for conserving the soil and for producing hay and temporary pasture in many areas, particularly in those with stronger slopes.

Fullerton cherty silt loam, eroded rolling phase (5–12% slopes) (Fcn).—This phase occurs in rolling or sloping areas on the cherty ridges and red hills that extend from northeast of Bridgeport to southwest of Scottsboro. It has a yellowish-brown to reddish-brown cherty surface soil and a yellowish-brown to yellowish-red cherty subsoil.

The soil is moderately eroded. Shallow gully and sheet erosion have removed one-half to more than three-fourths of the virgin surface soil and in places some of the subsoil. The present surface soil consists largely of subsurface and subsoil materials mixed by tillage with the remaining surface soil. It differs from the original surface soil

Soil Survey of Jackson County, Ala. PLATE 5

A, Thin-bedded shale parent rock of Enders silt loam, undulating phase.
B, Exposure of Fullerton soils showing chert content and depth to bedrock.

A, Truck crops on Enders silt loam, undulating phase.
B, Soybeans and land prepared for corn on Guthrie silt loam.
C, Typical home in the Sand Mountain section on Hartsells fine sandy loam, undulating shallow phase; Crossville loam at extreme right.

by being redder, thinner, heavier, and less friable. It ranges from 3 to 7 inches thick and passes directly into the heavier and tighter subsoil. The combined depth of the original surface soil and subsurface soil ranged from 9 to somewhat more than 14 inches, an average of 11 inches.

Use and management.—Mainly because so much of the friable surface soil and subsurface soil has been lost through erosion, the workability (including tilth conditions), moisture absorption, organic content, and drought resistance of Fullerton cherty silt loam, eroded rolling phase, have been reduced. Likewise, its susceptibility to erosion, loss of moisture by runoff, and problems of conservation have increased. All the phase has been cleared. Probably 65 percent is used annually for crops. The rest is largely in permanent pasture, although some is idle. A common practice is to use the areas 2 or 3 years for lespedeza pasture or to allow them to remain idle 1 to 3 years. The areas are then used 1 or 2 years for corn, following which they are planted to cotton, returned to lespedeza pasture, or left idle.

Cotton, corn, and hay are the principal crops. Corn is not well suited unless erosion has been reduced by terracing or other control measures and the soil has been built up by green-manure crops or other legumes. When corn follows a winter legume or is fertilized with 100 to 200 pounds of nitrate of soda, yields of 18 to 25 bushels are common. Under management that includes application of 300 to 400 pounds an acre of 6–8–4 or some other high-grade fertilizer, cotton produces ⅓ to ⅔ bale an acre.

If this soil is to be maintained under cultivation, terraces for controlling erosion and conserving moisture seem necessary. When properly protected from erosion, the soil responds to other practices of good management, including the use of winter legumes to increase the organic content.

Fullerton cherty silt loam, undulating phase (2–5% slopes) (Fcu).—Areas of this phase are on the broad crests and gentle slopes of the chert ridges and red hills bordering the Tennessee River and on gentle cherty slopes in the Paint Rock River valley. Probably 50 percent of the surface soil consists of chert fragments. The parent material on the ridge crests is derived mainly from weathered cherty limestone and impure dolomite and that on the slopes comes to some extent from colluvial material. External drainage is good, and internal drainage is good to excessive in the surface soil and generally good in the subsoil.

Profile description:

0 to 7 inches, grayish-brown very friable cherty silt loam; organic matter in first 1 to 2 inches is enough to give a dark grayish-brown color; many chert fragments 1 to 6 inches or more in diameter on the surface and in the soil; strongly acid.

7 to 11 inches, light yellowish-brown friable cherty silt loam somewhat heavier than in the overlying layer; the fine material slightly plastic and sticky when wet, but, owing to high chert content, friable in the soil mass; chert content commonly greater with increasing depth; very strongly to strongly acid.

11 to 27 inches, yellowish-brown to yellowish-red friable cherty clay having some gray; the fine material sticky and plastic when wet; very high content of chert fragments; strongly acid.

27 to 48 inches, red clay; many chert fragments; in places yellowish red or yellowish brown with increasing depth; very strongly acid.

48 inches +, red splotched with yellow and gray cherty clay; bedrock limestone at a depth of 10 to 20 feet.

The soil layers vary, especially in color, from place to place, but usually the subsoil has some red. Areas where the subsoil is dark brownish red have some gray. The chert fragments vary in size. In most places they range up to 8 inches in diameter but in others many of them are 10 to 24 inches in diameter. The larger fragments are usually removed to facilitate tillage. Areas containing a relatively large quantity of water-worn gravel or small cobbles are designated on the soil map by symbol.

Use and management.—Fullerton cherty silt loam, undulating phase, is leached of all soluble carbonates. It is fairly low in plant nutrients but apparently not so low as Clarksville soils, as it is more productive than the associated Clarksville cherty silt loam, rolling phase. Tilth conditions are fairly good, moisture absorption very good, and moisture-holding capacity fair to good.

Although the chert fragments do not prevent tillage, they interfere with it. Their sharp edges increase the wear on plows and other tools, and the larger fragments interfere somewhat with the operation of mowers and other cutting machines, particularly those with the cutting bar near or in contact with the ground. On the other hand, the chert fragments tend to reduce the susceptibility of the soil to erosion, the evaporation of soil moisture, and the hardening or baking of the surface soil. The open cherty surface soil increases moisture absorption and provides good aeration. Because the soil warms comparatively early in spring, it is particularly suitable for truck or berry crops grown for early markets or for cotton. On this soil cotton matures before it is seriously damaged by boll weevils.

About an eighth of the total area is in native forest consisting mainly of deciduous hardwoods. Cedar and pine are common in places, however, and abandoned fields and some cut-over areas support stands of old-field pine. Little, if any, of the soil has been planted to pine or other tree seedlings. The land not forested is cleared and in crops and pasture.

This phase is used largely for cotton, corn, hay, and pasture but is also considered desirable for potatoes and sweetpotatoes, home gardens, and home orchards. Cotton yields ⅗ to ⅘ bale an acre under management that includes good tillage and treatment with 300 to 400 pounds of 6–8–4 or some other high-grade fertilizer. Corn yields range from 15 to 28 bushels an acre under management that includes applications of 100 to 200 pounds of nitrate of soda or a rotation in which corn follows a leguminous crop.

Cleared areas are commonly slightly eroded but on the whole have probably lost less than a fourth of their surface soil. When used for cultivated crops, the soil should be protected from erosion by carefully built terraces or by other means of controlling surface runoff. Areas estimated to have lost more than half the virgin surface soil and subsurface soil are indicated on the soil map by symbol.

Fullerton cherty silt loam, eroded undulating phase (2–5% slopes) (Fce).—This phase differs from the undulating phase principally in the quantity of virgin surface soil lost through accelerated erosion. Both soils have similar relief and parent material and occur in the same localities. Native vegetation consisted mainly of deciduous hardwoods, with some pine and cedar.

Half to nearly all the original surface soil has been eroded. In places shallow gully erosion has removed nearly all the surface soil and some of the subsoil. A few deep gullies, 300 feet or more in length, have formed. The most seriously gullied areas are designated on the map by symbol. The present surface soil consists largely of what remains of original surface soil mixed by cultivation with subsoil material. It is grayish red and comparatively heavy. It extends to a depth of 3 to 7 inches, where the relatively firm and tight subsoil begins.

Use and management.—Loss of original surface soil has impaired the tilth and workability of Fullerton cherty silt loam, eroded undulating phase, and has reduced its moisture-absorption and moisture-holding capacity. Surface runoff, susceptibility to erosion, and conservation problems have increased. Because of the favorable slope and cherty character, however, many of the unfavorable effects caused by erosion can be remedied by terracing, and other good management practices that will reduce runoff and improve fertility, organic matter, and soil tilth.

About 65 percent of the phase is cropped annually, and fair to good yields are obtained. Cotton and corn are the principal crops. Cotton yields ½ to ¾ bale an acre under management that includes fertilization with 250 to 400 pounds to the acre of 6–8–4 or some other high-grade fertilizer. Corn yields 10 to 30 bushels an acre, depending to a large extent on management. The soil not regularly cultivated is used largely for permanent pasture or pasture rotated with general field crops. Lespedeza supplies most of the grazing.

Practically all of this phase that has not been terraced would be benefited by terracing if used for general field crops. The more severely eroded areas could be conserved best by a cover of improved permanent pasture until the soil is built up. They should then be used for crop rotations that include winter or summer legumes for green manure, at least in alternate years, unless used occasionally for improved permanent pasture over a period of years.

Fullerton cherty silt loam, hilly phase (12–25% slopes) (Fcl).—This phase is on the sharply rounded crests and strong slopes of the chert ridges and red hills in the main limestone valley and on the strong cherty slopes in the Paint Rock River valley. External drainage is very rapid to excessive; internal drainage is rapid to excessive in the surface soil and good to rapid in the subsoil.

The cherty surface soil is grayish brown, and the cherty subsoil is yellowish red to brownish red. The profile is similar to that of the undulating phase, but the layers are thinner and the profile shallower, mainly because of the stronger slopes. These slopes increase runoff and normal erosion and reduce water absorption. The smaller quantity of water that enters the soil has retarded soil development, and the greater normal erosion has kept the surface layer relatively thin. The quantity of organic matter that has accumulated in the surface soil is relatively low.

Use and management.—Workability of Fullerton cherty silt loam, hilly phase, is difficult, largely because of the strong slopes and chert fragments on the surface and in the soil. These fragments, however, tend to reduce erosion when the soil is cleared of forest. The best use of this phase is for pasture, although the most feasible use for some areas may be forest. Lespedeza usually reseeds itself and produces

fairly good pasture. Hop clover, Dallis grass, and other plants afford some grazing. Corn is the most commonly cultivated crop.

Where other land suitable for crops is scarce, this phase is frequently pastured for 2 years or more and then plowed on the contour and planted to corn for 1 or 2 years. The soil is then sown to lespedeza for pasture. Fair to good yields are obtained by this rotation; however, the soil soon becomes so badly eroded that it remains in pasture or reverts to forest unless more efficient erosion control is used. At present about half the total area is in forest, and the rest is in cropland and permanent pasture. The natural vegetation consists mainly of deciduous hardwoods, with some cedar and pine.

Fullerton cherty silt loam, eroded hilly phase (12–25% slopes) (FcH).—This phase is widely distributed over the principal limestone valley and in the northern half of the Paint Rock River valley. It resembles the hilly phase in most respects, the main difference being its greater erosion. Half to more than three-fourths of its original surface soil has been removed by sheet and shallow gulley erosion. External drainage is very rapid to excessive; internal drainage is rapid in the surface soil and good to rapid in the subsoil.

About 80 acres of the eroded hilly phase of Dewey cherty silt loam are included with this phase. Unlike Fullerton cherty silt loam, eroded hilly phase, the included Dewey soil has generally less chert in its surface soil and subsoil and is deeper over the underlying cherty clay. The Dewey soil has a grayish-brown friable cherty surface soil and a relatively chert-free red and firm but moderately friable silty clay subsoil, which is underlain by a deep mass of highly cherty clay somewhat finer than that underlying the subsoil of Fullerton and Clarksville soils. The parent material is partly residual and partly colluvial in origin.

The included phase occurs on hills or steep slopes in the chert ridges and red hills in the limestone valleys, where it is closely associated with the hilly and steep phases of Fullerton cherty silt loam. Its slopes are similar to the eroded hilly phase with which it is mapped. Some areas are on converging slopes similar to those occupied by Greendale cherty silt loam, eroded rolling phase, except that they are stronger. Nearly half the total area of this included soil is about 2 miles south-southwest of Bellefonte Island. Other areas are 1 mile northeast of Bellefonte Island, 1½ miles south of Bridgeport, 1½ miles northeast of Caperton Ferry, and ½ mile southeast of Long Island.

Use and management.—All of Fullerton cherty silt loam, eroded hilly phase, has been cleared and is in crops and pasture. Probably not more than 25 percent is used annually for general farm crops. In the northern half of the Paint Rock River valley a slightly higher percentage may be cropped. The best use for this phase apparently is for pasture and forest. The more severely eroded areas can be used either for trees or for sericea lespedeza hay or pasture. Harvesting the hay crop is relatively difficult because of the steepness of slope and chert on the surface. The best plan is to pasture the kudzu periodically throughout the summer.

As in the other hilly cherty soils, the common practice is to alternate pasture and field crops, but no systematic rotation is usually employed. Many farmers, however, pasture the areas for 2 years or more and then plant them to corn for 1 to 2 years. Afterwards they either return the land to pasture or plant it to cotton. Under this plan little fertilizer is used for the corn, and fair yields can be obtained. Corn produces 13 to 18 bushels an acre, and cotton ⅕ to ½ bale. Cotton is usually fertilized with a light application of a complete fertilizer.

Practically all the included soil—Dewey cherty silt loam, eroded hilly phase—has been cleared for cultivation, but largely because of its strong slopes and susceptibility to erosion most of it has been abandoned for general farm crops. More than half the total area is covered with volunteer old-field pine. Volunteer sweetgum, persimmon, dogwood, hickory, and oak are also fairly common in places. The rest of the soil is used mostly for either open or woodland permanent pasture, in which common lespedeza, hop clover, Dallis grass, and other grasses and legumes furnish fairly good grazing. Sericea lespedeza is probably the best crop, as it is highly useful either for hay or for supplementary grazing. Periodic grazing appears to be more satisfactory than continuous grazing on this included soil.

Fullerton cherty silt loam, steep phase (25–40% slopes) (FcZ).—This phase occurs chiefly on the red hills east of Bellefonte Island and southwestward nearly to the Jackson-Marshall County line. It differs from the hilly phase primarily in having steeper slopes. The parent material is similar to that of other Fullerton soils, and the surface and subsoil are fairly similar in color to the rolling phase. Steep slopes and erosion, even in forested areas, however, have not permitted the development of a very definite profile. Under natural cover external drainage is rapid to excessive, but internal drainage is generally good. The natural vegetation consists mainly of deciduous hardwoods and vines, briers, and other underbrush. Cedar and pine grow in some places.

Use and management.—Most of Fullerton cherty silt loam, steep phase, is under forest cover. Some areas have been cleared but have since reverted to forest consisting largely of pine. Only a small part is planted annually to general farm crops. Cleared areas are used mainly for lespedeza pasture and corn. The soil is difficult to work on account of the steep slopes and large quantities of chert fragments.

Under present conditions this phase is best suited to forest, although some cleared areas might be used for pasture. Sericea lespedeza makes good pasture after it becomes well established, and it also serves to control erosion. Grazing pastures for short periods and then allowing a period of rest for growth to recover is the most satisfactory plan for growing sericea lespedeza.

Fullerton cherty silt loam, eroded steep phase (25–40% slopes) (FcF).—This phase is similar to the steep phase in soil characteristics, slope, and geographic distribution but differs in degree of erosion. From half to more than three-fourths of the original surface soil has been removed by erosion caused by clearing the natural forest cover and by using the land for tilled crops and pasture. External drainage is excessive; internal drainage is rapid to excessive near the surface and good to rapid in the lower part of the subsoil. The present surface soil is largely the original surface soil mixed with subsoil material. It is generally somewhat redder and heavier than the

original surface soil but has the same cherty character. Little difference between the nature of the subsoil and that of the virgin soil is evident.

The soil is closely associated with other Fullerton soils and with Clarksville and Hermitage soils. As mapped it includes areas of Clarksville cherty silt loam, eroded steep phase, which has similar parent material and use suitability. It also includes an area of about 450 acres of Fullerton silty clay loam, severely eroded steep phase. The included Fullerton soil is similar to the other steep phases of Fullerton soils in character of parent material, chert content, surface relief, and subsoil characteristics, but it is more eroded, having lost practically all the original surface soil and subsurface soil through accelerated erosion. Sheet erosion, shallow gully erosion, and to some extent deep gully erosion have been active in reducing the soil to its eroded state. Excessively gullied areas and large individual gullies are designated on the map by symbols. External drainage is excessive, and internal drainage is generally rapid to excessive near the surface and good to rapid in the lower subsoil.

Use and management.—Practically all of Fullerton cherty silt loam, eroded steep phase, is cleared. Most of it has been used at some time for general farm crops and pasture, and about 10 to 15 percent is now used for general field crops. A common practice is to alternate field crops and pasture at intervals of 2 to 4 years. The soil is usually reseeded to common lespedeza and other well-established pasture plants. It is then pastured 2 to 4 years and afterwards cropped to corn 1 or 2 years. Occasionally cotton follows corn after the first year. Very little if any fertilizer is used for pasture or field crops. Sometimes cotton receives an application of 200 to 300 pounds of 6–8–4 or other high-grade fertilizer.

This phase is difficult to work because of its steep slopes and many chert fragments. Erosion has impaired tilth conditions, reduced moisture absorption, and increased surface runoff and susceptibility to erosion. With its loss of organic matter and comparatively poor response to good management, as well as other unfavorable features, the soil generally is not well suited to field crops and pasture. Under present economic conditions the best use seems to be for forest. Sericea lespedeza can be grown for temporary grazing and for controlling erosion.

All of the included Fullerton silty clay loam, severely eroded steep phase, is cleared and at some time has been used for tilled crops and pasture. Very little of it, however, is now cropped, and most areas are in permanent pasture or idle. The soil is difficult to work and conserve and is best suited to forest and pasture. It is suited to sericea lespedeza, which can be used for pasture where better pasture land is limited or is unavailable and which serves to control erosion. Some areas have been abandoned to forest vegetation, mainly old-field pine, sweetgum, persimmon, sassafras, and black locust.

Fullerton cherty silty clay loam, severely eroded rolling phase (5–12% slopes) (FTD).—This soil is similar to Fullerton cherty silt loam, eroded rolling phase, in range of slope, subsoil characteristics, and distribution in the county, but it differs in being more eroded. Shallow gully erosion and to some extent deep gully erosion have been very active, and most of the original surface soil and part of the subsoil material have been removed so that the plow layer consists largely or wholly of reddish-yellow or yellowish-red subsoil material. In its virgin condition the phase was relatively shallow, and after a loss of 6 to more than 10 inches of surface soil and subsurface soil, it is not deep enough to be a good soil.

Use and management.—All of Fullerton cherty silty clay loam, severely eroded rolling phase, has been used at some time for tilled crops. Under present conditions, however, not more than 35 percent is planted to general farm crops; most of it is in permanent pasture. Lespedeza, hop clover, Dallis grass, and native plants supply most of the grazing. Because of the cherty and relatively strong slopes, it is less suitable for hay than for pasture. The more severely eroded areas can be used best for sericea lespedeza or for trees. A common practice is that of alternating pasture and tilled crops. Under this practice the land is used 2 or 3 years for lespedeza and then cropped 1 to 3 years, usually to corn or cotton.

Largely because of erosion, the phase has lost many of its better qualities. It is more difficult to work, mainly because of gullies, poorer tilth conditions, and more rapid runoff and consequent excessive external drainage. The less severely eroded and less sloping areas apparently can be reclaimed by terracing, but the more sloping and especially the more severely eroded areas are not easily reclaimed.

Fullerton cherty silty clay loam, severely eroded hilly phase (12–25% slopes) (FTR).—This phase is similar to Fullerton cherty silt loam, eroded hilly phase, except it is severely eroded. It is one of the most severely eroded soils of the chert hills. All or practically all of the original surface soil has been removed by sheet erosion, and the subsoil is generally exposed at the surface. Shallow gullies have formed in most areas, and deep gullies in a few places.

Use and management.—All of Fullerton cherty silty clay loam, severely eroded hilly phase, has been cleared for tillage, but because of steep slopes and resulting severe erosion very little is now used for crops. Its most common use is as permanent pasture, but in some areas pasture and tilled crops are alternated. The soil is well suited to lespedeza and kudzu. Once established, kudzu helps control erosion and supplies excellent temporary grazing.

Greendale cherty silt loam, undulating phase (2–5% slopes) (GCU).—In some sections this young soil is known as "made land." It occurs near the base of cherty slopes, in drainage heads, and in slight depressions. In other parts of the limestone valleys it occupies or borders chert ridges and cherty slopes. The colluvial parent material is made up largely of recent accumulations, mainly from Clarksville and Fullerton soils, but in some areas from cherty soils of the Dewey and Hermitage series. Both external and internal drainage are usually good, but internal drainage may be somewhat slow in places, especially in the more nearly level areas that receive seepage waters. Trees on uncleared areas are mainly deciduous hardwoods, with cedar and some pine.

Profile description:

0 to 8 inches, pale grayish-brown to brownish-gray friable cherty silt loam; contains many chert fragments, mostly ½ inch or less in diameter, and sharp grit, water-worn sand, and pieces of gravel; slightly acid.

8 to 16 inches, grayish-brown friable cherty heavy silt loam; yellowish brown when moist; easily crumbled when moderately moist, sticky when wet; medium to strongly acid.
16 to 36 inches, grayish-brown friable cherty clay loam mottled with gray, yellow, and brown; strongly to medium acid.
36 to 48 inches, light yellowish-brown friable cherty clay loam to cherty clay mottled with gray, yellow, brown, and red; strongly to medium acid.

Variations in this soil are usually in depth and in the quantity of small chert fragments, grit, water-worn pieces of gravel, and coarse chert fragments 2 to 6 inches or more in diameter. In a few areas the soil is relatively free of chert fragments and contains a high percentage of silt and fine grit.

Use and management.—Greendale cherty silt loam, undulating phase, has fair to good workability, moisture absorption, and moisture-holding ability. In general it is moderately high in organic matter but inherently somewhat low in plant nutrients. In most areas, however, it responds fairly well to good management. It is satisfactory for winter legumes, except in some level areas where the water table is high in winter as a result of nearly constant seepage of water.

This phase is used chiefly for general farm crops. Corn is the principal crop, but cotton, soybeans, lespedeza, sorghum, sweetpotatoes, and potatoes are also commonly planted. Corn yields range from 15 to 40 bushels an acre, and cotton yields from 2/5 to 1 bale an acre, depending to a large extent on season and type of management. The sorghum sirup is of better quality than that produced on most soils in the limestone valleys.

Greendale cherty silt loam, eroded undulating phase (2–5% slopes) (GcE).—This phase is similar to Greendale cherty silt loam, undulating phase, in color, character of parent material, and position on the landscape, but it differs in being eroded. In general, one-half to three-fourths of the original surface soil has been removed by erosion. In some small areas little or none of it has been removed; in others all of it has been removed and the subsoil exposed. The severely eroded areas are designated on the soil map by symbol. Slopes range from 2 to 5 percent, but most of the erosion is on 4- or 5-percent slopes. External drainage generally is good to rapid but is somewhat excessive in areas where erosion is most severe. Internal drainage is good to somewhat slow.

Use and management.—All of Greendale cherty silt loam, eroded undulating phase, is cleared and cropped. Loss of the surface soil through erosion has reduced the organic matter content, impaired tilth conditions, reduced moisture absorption, and increased surface runoff. Conserving the soil is not difficult. Terracing would be useful in preventing further soil loss and aid in conserving moisture. Cotton, corn, lespedeza, and soybeans, the main crops grown on this phase, yield well under good management.

Greendale cherty silt loam, level phase (0–2% slopes) (GcV).—This cherty or gritty soil occupies level or slightly depressional areas on chert hills in the Paint Rock River valley. The small irregularly shaped areas occur mostly as narrow strips along small intermittent drainageways that originate in cherty areas and empty into flood plains. Both external and internal drainages are good to slow. In general the profile is similar to that of Greendale cherty silt loam, undulating phase. The surface soil, however, is nearly everywhere slightly darker gray and the subsoil slightly more mottled with brown and gray, indicating somewhat slower drainage in both surface soil and subsoil. The parent material is the same in both soils.

In places this phase is closely associated with Ooltewah silt loam, a more poorly drained soil. The separation of these soils on the map is arbitrary and is based largely on the character of the parent material. Areas with highly gritty or cherty material are classified with the Greendale soil; those with smooth silt loam or silty clay loam material are classified with the Ooltewah. In larger areas where both soils can be definitely outlined they are classified on the basis of drainage differences.

Use and management.—Practically all of Greendale cherty silt loam, level phase, is used for permanent pasture. Corn is the main grain crop and soybeans and lespedeza are the main hay crops. Cotton is grown on some of the better drained areas, especially those improved by artificial drainage. The soil, however, is better suited to corn, hay, and pasture than to cotton. Corn generally yields 15 to 35 bushels an acre and soybeans 3/4 to 1½ tons of hay an acre, depending to some extent on management. The soil is well suited to sorghum, and good yields of excellent sirup are obtained. Oats can be grown on the better drained areas and under good management produce large yields.

Greendale cherty silt loam, eroded rolling phase (5–12% slopes) (GcN).—This phase, which occurs mainly near the base of long or fairly steep cherty slopes, is similar to the eroded undulating phase in physical characteristics but differs in having rolling relief. It is closely associated with Fullerton and Clarksville soils, being separated from them mainly on the basis of depth of the colluvial parent material to the underlying residual cherty material. The parent material is largely old colluvial material accumulated under forest cover that held it in place over a long period of time and permitted the formation of a distinct texture profile.

External drainage was good under forest cover but has become rapid to excessive since the soil was cleared for cultivation. Also, erosion has become active. Internal drainage was commonly good under forest cover, but under present conditions it is rapid to somewhat excessive in the surface soil and usually good in the subsoil. The present surface soil consists of remaining surface soil and subsurface soil that have been mixed by tillage with subsoil material.

Use and management.—Most of Greendale cherty silt loam, eroded rolling phase, is cleared, but a small area has never been cleared. Some of the tilled areas are only slightly eroded, but most of them have lost half to three-fourths of their original surface soil. Erosion has adversely affected tilth conditions and moisture absorption. It has increased surface runoff and the soil's susceptibility to further erosion and has made difficult the conservation of soil and moisture.

Probably not more than 60 percent of this phase is used annually for general field crops; much of the rest is in permanent pastures. Cotton, corn, and soybeans are the most common crops, and under good management give fair to good yields. Cotton generally produces 1/4 to 2/3 bale or more an acre under management that includes application of 250 to 400 pounds of 6–8–4 or other high-grade fertilizer. Corn

produces 15 to 30 bushels an acre under management that includes application of 150 to 200 pounds of nitrate of soda or allows corn to follow a leguminous crop. Soybeans commonly produce ½ to 1 ton of hay an acre without the use of fertilizer if they follow a well-fertilized cotton crop.

Proper terracing aids in reducing the loss of the friable surface soil in most areas. On some of the longer steeper slopes, however, soil conservation is not easy. These slopes can be protected best either by returning them to forest or by using them for pasture and close-growing field crops.

Guthrie silt loam (0–2% slopes) (GL).—This soil occurs as small areas in slight depressions, broad sinks, and slightly dished flats in the limestone valley uplands, especially in the chert-ridge areas, where it is closely associated with Fullerton, Clarksville, Dewey, Colbert, and Greendale soils. The parent material is colluvial and alluvial in origin, consisting largely of silt and clay washed from Fullerton and Clarksville soils. The native vegetation consisted largely of willow, water, post, and white oaks, sweetgum, blackgum, and swamp maple. Cedar, holly, and beech grow to some extent, and vines and briers are common.

Both external and internal drainages are very slow. Most areas are depressional in form and have either no natural drainage outlets or inadequate outlets. In some areas drainage can be improved by open ditches or tiling. In some places artificial drainage is difficult; in others it is impossible.

Profile description:

0 to 3 inches, gray to dark-gray finely granular to mellow floury silt loam; strongly acid.
3 to 7 inches, light-gray or almost white loose friable silt loam; very smooth and mellow; very strongly to strongly acid.
7 to 30 inches, grayish-yellow plastic silty clay splotched or mottled with shades of gray, brown, yellow, and reddish brown; heavier and more plastic with increasing depth; a few small dark-brown or nearly black iron concretions; strongly to very strongly acid.
30 to 48 inches, gray plastic clay intensely mottled with bluish gray and reddish brown; strongly to very strongly acid.

In most areas wash from adjoining slopes is deposited now and then on this soil. In some areas the surface soil is brown or reddish brown as a result of recent wash from adjacent red soils.

Use and management.—Guthrie silt loam is used chiefly for open or woodland pasture. Most areas are best suited to permanent pasture. Well-drained areas and places that can be drained feasibly can be used for corn and hay. Corn, soybeans, lespedeza, and sorghums are the principal crops grown (pl. 6, *B*). Crop yields vary with drainage differences. Well-drained areas produce yields nearly equal to those on Ooltewah silt loam, but on the whole crop yields are low. Permanently wet spots that are difficult to drain can be used for trees or woodland pasture.

Hanceville fine sandy loam, undulating phase (2–5% slopes) (HNU).—This phase occurs on the sandstone upland plateaus, where it occupies narrow divides, small relatively level and nearly isolated plateaus, and adjacent escarpments, in all of which both internal drainage and aeration have been exceptionally good over a long period of time. It is closely associated with the Hartsells soils, especially Hartsells fine sandy loam, undulating phase, and resembles them in texture and friability. It differs, however, in having a browner surface soil and red subsoil. It is derived from weathered products of sandstone and, in places, shale. The native vegetation consisted largely of deciduous hardwoods, with a few shortleaf and old-field pines in many areas.

Profile description:

0 to 8 inches, reddish-brown fine sandy loam; contains a moderate quantity of organic matter to a depth of 2 to 3 inches in forested areas.
8 to 32 inches, brownish-red to reddish-brown friable fine sandy clay; somewhat sticky when wet.
32 to 60 inches, similar to the overlying layer in color and texture but more sticky.
60 inches +, in some places at 36 inches but in others as deep as 84 inches is yellowish-brown fine sandy loam mixed with partly weathered sandstone fragments.

In gently rolling areas on the wide plateaus northwest of Section the subsoil is reddish in higher places and on relatively sharp breaks and yellow or yellowish brown on gentle slopes and the nearly level tops of wide divides. These included areas have a reddish color typical of Linker soils (not mapped in the county), and the color is the chief difference between these areas and those of the light reddish-brown to yellowish-red Hanceville soils. If the included areas were larger they probably would have been mapped as Linker fine sandy loam, undulating phase, or a complex of Linker and Hartsells soils. They have a use suitability similar to that of both Hanceville fine sandy loam, undulating phase, and Hartsells fine sandy loam, undulating phase, with which they are closely associated. The areas are small and irregular and in some places are included with Hanceville fine sandy loam, undulating phase, and in others with Hartsells fine sandy loam, undulating phase.

Use and management.—Most of Hanceville fine sandy loam, undulating phase, is cultivated. The usual crops are cotton, corn, peanuts and soybeans, with some oats and lespedeza. The soil is especially well suited to cotton and possibly the best one in the mountains for oats. Normally yields are about the same as those on Hartsells fine sandy loam, undulating phase, under the same management practices. This soil has about the same use suitability, fertilizer requirements, moisture-absorption and moisture-holding capacity, and response to management as Hartsells fine sandy loam, undulating phase.

Almost any practical crop rotation can be successfully used, and 2-year rotation of cotton, vetch, and corn yields particularly well. A longer rotation of cotton, winter legumes, corn, oats, and soybeans is equally satisfactory. A peanuts-cotton or peanuts-corn rotation may be used. In these rotations the best results are obtained by hogging off the peanuts. Another cropping practice is to grow corn for 2 years in succession, crotalaria being planted the last time the corn is cultivated. In these rotations corn yields 35 to 50 bushels an acre, and cotton from 1 to 1½ bales. Yields of other crops in the rotations are equally good. The soil is low in inherent fertility but responds well to good management.

Cotton yields normally range from ⅗ to 1 bale or more an acre under management that includes applications of 300 to 600 pounds of a 6–8–4 or other high-grade fertilizer. Corn yields 30 to 45 bushels an acre under management that includes a winter cover crop or applica-

tions of 100 to 225 pounds of nitrate of soda. Soybeans yield ¾ to 1½ tons an acre, and little or no fertilizer is used when they follow cotton, potatoes, or other highly fertilized crops.

This phase is well suited to pasture. For best results the land should be well prepared and fertilized with 1 ton of basic slag, which is sufficient to last for several years. Annual applications of 500 pounds of basic slag an acre may be used. Other possible fertilizer treatments are 1,000 pounds of superphosphate an acre and 1 ton of lime or 300 pounds of superphosphate and 500 pounds of lime. A good pasture mixture for this soil is 10 pounds of Dallis grass, 10 pounds of annual lespedeza, and 2 pounds of white clover. Orchard grass, hop clover, and Kentucky bluegrass can also be included.

Hanceville fine sandy loam, eroded undulating phase (2–5% slopes) (HNE).—This phase, one of the redder soils on uplands in the sandstone plateaus, occurs in small areas scattered on Sand Mountain. It is derived largely from weathered sandstone material. It is similar to the undulating phase but differs in being moderately eroded. From half to three-fourths of the original surface soil has been lost by erosion. Subsoil material has been mixed with the remaining surface soil by tillage, and the soil to plow depth is therefore redder and more subject to baking.

Use and management.—Practically all of Hanceville fine sandy loam, eroded undulating phase, is cultivated. It is used mainly for cotton, corn, and soybeans, and to a small extent for pasture. It is not so productive as Hanceville fine sandy loam, undulating phase, but under good management that includes turning under green-manure crops acre yields of ¾ to 1 bale of cotton and 30 to 40 bushels of corn are common. This soil is possibly better suited to cotton than to any other locally grown crop, but good yields of all crops are obtained under proper management. Erosion losses have materially reduced the water-absorbing ability and moisture-holding capacity, but these qualities can be largely restored by deep plowing and incorporation of organic matter.

Hanceville fine sandy loam, rolling phase (5–10% slopes) (HNO).—Scattered rolling areas of this soil occur on Sand Mountain and other mountains. It is similar to the undulating phase in most features except surface relief. The stronger relief makes the soil more subject to erosion and necessitates careful soil conservation measures such as terracing and use of cover crops.

Use and management.—Because about 50 percent of Hanceville fine sandy loam, rolling phase, is in forest and the rest has been only recently cleared or relatively carefully terraced or planted to close-growing crops, erosion is not very active. Cleared areas are used largely for cotton, corn, and pasture. Cotton yields of ½ to ¾ bale an acre are common under management that includes fertilization with 400 pounds an acre of 6–8–4 or other high-grade fertilizer. Corn yields 20 to 25 bushels an acre under management that includes applications of 100 to 200 pounds of nitrate of soda or that allows the corn to follow a winter legume.

Hanceville fine sandy loam, eroded rolling phase (5–10% slopes) (HNN).—This soil occurs in scattered areas, mainly on Sand Mountain. Although it resembles the undulating phase, its slopes are

stronger and one-half to three-fourths of the original surface soil has been removed by erosion. This phase has a 4- to 5-inch brown fine sandy loam surface soil and a red friable fine sandy clay subsoil. The subsoil, exposed in places, gives this phase the appearance of having the reddest surface soil on the sandstone plateaus. In most places ordinary plowing brings subsoil material to the surface.

Use and management.—Despite erosion, the productivity of Hanceville fine sandy loam, eroded rolling phase, has not been seriously impaired, especially where the soil has been improved by terracing, deep plowing, and the turning under of legume crops. It is very responsive to good management and nearly as productive as the rolling phase under the same management. The loose deep subsoil absorbs and retains moisture well.

Practically all the phase is cultivated, but in a few small areas pasture and row crops are rotated. Cotton, corn, soybeans, and lespedeza are the principal crops. On the steeper slopes, kudzu or sericea lespedeza may be the best crop. The yields obtained under current management, which does not include systematic crop rotations but does include an occasional winter or summer legume, are as follows: Cotton, ½ to ¾ bale an acre when fertilized with 250 to 400 pounds of 6–8–4 or other high-grade fertilizer; and corn, 15 to 30 bushels when fertilized with 100 to 200 pounds of nitrate of soda or when the crop follows a legume that has been turned under.

Hartsells fine sandy loam, undulating phase (2–5% slopes) (HFU).—This phase is well distributed over the standstone upland plateaus. The largest areas are on Cumberland Plateau, Keel Mountain, and the southern half of Sand Mountain. The soil resembles other members of the series in position, color, parent material, and inherent fertility but has been formed over a thicker layer of parent material and has a better developed subsoil than the Hartsells soils in other areas, especially in Tennessee. The parent material consists of weathered products of sandstone or conglomerate, mixed in places with weathered acid shale.

This phase is relatively shallow to bedrock, in many places being less than 48 inches. It is slightly erosive, but soil and moisture conservation is not difficult. Measures to control erosion should be taken immediately after the soil is cleared and placed in cultivation. The fine texture tends to offset the effect of shallower depth in the ability of this soil to store moisture for plants. External drainage is usually good to excellent. Internal drainage is very good, although it may be slightly excessive where the subsoil texture is coarser and porosity is greater than usual.

Profile description:

0 to 2 inches, brownish-gray fine sandy loam; contains some organic matter, especially in virgin or nearly virgin areas; very strongly acid.
2 to 9 inches, light grayish-yellow friable fine sandy loam; easy moisture and root penetration; strongly acid.
9 to 30 inches, light-brown to brownish-yellow friable fine sandy clay loam; yellowish brown to dark yellowish brown when moist; moderately easy moisture and root penetration; very strongly acid.
30 to 45 inches, pale-yellow friable fine sandy clay loam, faintly mottled with gray and reddish brown; moderately firm when in place but easily crushed to a friable mass when removed; less silt and clay than the overlying layer; strongly acid.

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45 inches +, partly weathered sandstone fragments mixed with soil material; strongly acid; bedrock at 30 to 96 inches but usually about 48 inches.

The texture is uniformly fine sandy loam throughout the southern part of Sand Mountain; elsewhere it ranges from fine sandy loam to very fine sandy loam. Throughout these areas the parent rock includes interbeds, or strata, of shale with the sandstone. Near Browntown on Sand Mountain is a relatively large nearly level area in which the depth to bedrock is not more than 26 inches and the texture is very fine sandy loam. The native vegetation consisted largely of deciduous hardwood trees, with a few pines especially in cut-over areas and abandoned fields.

Use and management.—The position of Hartsells fine sandy loam, undulating phase, is favorable for agriculture. The soil absorbs and holds moisture well and has good aeration. About 80 percent of the total area has been cleared for cultivation. Land not cleared is largely in the northeastern part of the county and on the Cumberland Plateau and smaller plateaus. Good roads are now built into these areas, and soon all the soil except that on extremely small isolated mountaintops will probably be cultivated.

The usual crops are cotton, corn, peanuts, soybeans, sorghum, and potatoes. These crops normally give good yields but need large applications of fertilizer unless a cover crop is turned under. Most farmers depend almost entirely on commercial fertilizer for plant nutrients. Cotton normally yields ⅗ to 1 bale an acre under management that includes applications of 300 to 600 pounds of 6–8–4 or other high-grade fertilizer. Corn yields 30 to 50 bushels when the crop follows a winter cover crop or when fertilized with 100 to 225 pounds of nitrate of soda. Soybeans yield ¾ to 1½ tons of hay. Little or no fertilizer is used when soybeans follow a well-fertilized crop. Sorghum yields 100 to 200 gallons of sirup an acre. Small basinlike areas are generally selected for sorghum, and little or no fertilizer is used.

Many farmers grow hairy vetch, Austrian peas, or crimson clover preceding corn; some turn under a summer legume, principally crotalaria. Experiments indicate the most economical practice is to rotate crops so that a leguminous crop is turned under every other year. This soil is well suited to all crops commonly grown in the area and lends itself to any type of crop rotation, especially the 2- and 3-year rotations. The cotton-vetch-corn rotation lasting 2 years is considered good, and excellent yields of all crops follow its use. Over a 12-year period, 1930–41, at the Crossville Station in De Kalb County, cotton fertilized with 600 pounds of 6–10–4 and followed by a winter legume seeded in cotton and fertilized with 600 pounds of 0–10–4 at seeding averaged 1,733 pounds of seed cotton an acre. Corn grown the second year of the rotation and not fertilized averaged 50 bushels an acre.

This phase is not often used for pasture. Land for pasture should be well prepared and fertilized with 1 ton of basic slag. This initial application should be sufficient to last for several years, but after that annual applications of 500 pounds of basic slag an acre may be made. Other recommended fertilizer amendments are 1,000 pounds of superphosphate an acre and 1 ton of lime, or 300 pounds of superphosphate and 500 pounds of lime. A suitable pasture mixture consists of 10 pounds of Dallis grass, 10 pounds of annual lespedeza, and 2 pounds of white clover. Orchard grass, hop clover, and Kentucky bluegrass can be added to this mixture.

Hartsells fine sandy loam, eroded undulating phase (2–5% slopes) (HFE).—Most of this phase occurs as relatively small areas in close association with other Hartsells soils and with Enders, Hanceville, Crossville, and Muskingum soils, mainly on Sand Mountain but also on the smaller mountains. The largest areas are northeast and east of Pisgah and on the northern slope of Sand Mountain. The soil is similar to the undulating phase but is more eroded. One-fourth to three-fourths of the original surface soil has been removed. Poor management is the principal cause of erosion. Both external and internal drainage are good to excellent in the terraced areas, but external drainage may be somewhat rapid on unprotected areas.

Use and management.—Hartsells fine sandy loam, eroded undulating phase, has good moisture-absorbing and moisture-holding qualities and good tilth and can be easily conserved. It is well suited to a wide range of crops and produces excellent yields under good management. Practically all of it is cultivated and is used for the same crops as the undulating phase, but the yields generally are slightly lower. It is very responsive to good management practices and can be built up to a high state of productivity. A large part of the soil is now terraced.

Hartsells fine sandy loam, rolling phase (5–10% slopes) (HFO).—Like other Hartsells soils, this phase occurs on Sand Mountain and Cumberland Plateau and in other mountainous areas. The more extensive areas are at the northern end of Sand Mountain. The soil has not eroded to any great extent, even though it has a rolling surface and is subject to erosion.

Use and management.—Hartsells fine sandy loam, rolling phase, is similar to the undulating phase in use suitability, fertilizer requirements, response to management practices, and suitability for crop rotation. Because of its stronger relief, however, this soil is more subject to erosion unless protected by terracing and cover crops. It also presents a greater problem in moisture and soil conservation and produces somewhat lower average yields. Lack of serious erosion is due largely to the fact that possibly 80 percent of the soil is in forest. Also the cleared areas are relatively new or have been carefully terraced. The soil is being cleared rapidly, especially on Cumberland Mountain in the vicinity of Skyline Farms.

Hartsells fine sandy loam, eroded rolling phase (5–10% slopes) (HFN).—Areas of this phase are scattered over Sand, Putnam, Sharp, and Keel Mountains, and other mountains and isolated plateaus. The soil differs from the undulating phase chiefly in its steeper slopes. It has a 4- to 5-inch yellowish-gray to yellowish-brown fine sandy loam surface soil and a yellow to yellowish-brown friable fine sandy clay subsoil. Erosion has removed half to three-fourths of the original surface soil, exposing the subsoil in places and in many other places thinning it to such an extent that ordinary plowing brings subsoil material to the surface.

Use and management.—Practically all of Hartsells fine sandy loam, eroded rolling phase, is cultivated. A few small areas are used for a

rotation of field crops and pasture. The principal crops are cotton, corn, and soybeans, with some lespedeza. A few isolated areas have returned to forest vegetation. Current management practices do not in general include systematic crop rotations but provide for an occasional winter or summer legume. Cotton yields range from ½ to ¾ bale an acre under management that includes applications of 250 to 400 pounds of a 6–8–4 or other high-grade fertilizer. Corn yields 15 to 30 bushels under management that includes fertilization with 100 to 200 pounds of nitrate of soda or a crop system in which the corn follows a leguminous crop that has been turned under.

The productive capacity of this eroded soil has not been destroyed, especially where the profile is deep to bedrock and the soil is protected by terracing, deep plowing, and growing of cover crops. When good management practices are used, the soil becomes nearly as productive as the rolling phase under the same management. It has a loose, very friable thick subsoil that absorbs and retains moisture well. Well-constructed terraces generally are sufficient to control erosion, but on some of the stronger slopes strip cropping or perennial crops can be used advantageously.

Hartsells fine sandy loam, undulating shallow phase (2–5% slopes) (HFM).—This phase occurs in association with Crossville and other Hartsells soils, chiefly on the north end of Sand Mountain (pl. 6, *C*) in the northeastern part of the county. In general it resembles the undulating phase, but it is much thinner. In places bedrock is as close to the surface as 14 to 30 inches but more commonly it is 18 to 26 inches below. Outcrops of bedrock occur in a few areas. The soil is derived from weathered sandstone material.

Under forest cover external drainage is moderate, but it may become excessive when the land is cleared and erosion is not controlled. At present there is little erosion, mainly because cultivated areas either have been cleared only recently or have been terraced. Erosion control is not difficult, but, because the depth of the soil to bedrock is shallow, any loss of soil material may be serious. Internal drainage is good. Water moves relatively freely through the profile and reduces the volume of surface runoff.

Profile description:

0 to 7 inches, light grayish-brown friable fine sandy loam; contains some organic matter to a depth of 2 or 3 inches.
7 to 24 inches, light-brown to brownish-yellow friable fine sandy clay or fine sandy clay loam.
24 inches +, sandstone bedrock.

Depth to bedrock ranges from 14 to 30 inches. The soil is strongly acid throughout. Rock ledges occasionally outcrop in some areas.

Use and management.—Hartsells fine sandy loam, undulating shallow phase, is easy to till in most places because it has a friable fine sandy surface soil. It is very permeable to moisture and has good moisture-holding capacity. It is well suited to crop rotations. About 60 percent is cleared and used for corn, cotton, peanuts, soybeans, sorghum, and pasture. Cotton and corn are the principal crops. Soybeans are generally cut for hay. Cotton yields ½ to ⅘ bale, corn 15 to 35 bushels, and soybeans ½ to 1¼ tons an acre, depending to some extent on management.

Most farmers use commercial fertilizer instead of winter cover crops for supplying nitrogen. Progress in the use of winter legumes or other cover crops for green manure is constantly made.

Cropping practices vary; few farmers follow a definite crop rotation. For most economical management, crop rotations should include a leguminous crop to be turned under at least every other year. The phase is well suited to all crops grown in the locality and can be used for any type of crop rotation. The 2- and 3-year rotations are especially well suited to the soil. A rotation consisting of cotton followed by vetch or some other winter legume and corn planted the following spring is recommended. Under this management excellent yields of all the crops can be expected.

This phase is not generally used for pasture. For fair to good results, the land should be well prepared and fertilized with 1 ton of basic slag an acre. This application is sufficient for several years, but annual acre applications of 500 pounds of basic slag may be used. Other methods are to apply 1,000 pounds of superphosphate and 1 ton of lime an acre or to add 300 pounds of superphosphate and 500 pounds of lime. A suitable pasture mixture consists of 10 pounds of Dallis grass, 10 pounds of annual lespedeza, and 2 pounds of white clover. Orchard grass, hop clover, and Kentucky bluegrass may be added to this mixture.

Hartsells fine sandy loam, eroded undulating shallow phase (2–5% slopes) (HFT).—This phase, which occurs chiefly in small areas scattered over Sand Mountain, is similar to the undulating shallow phase but differs in being moderately affected by sheet erosion and in places by shallow gully erosion. More than half the original surface soil has been removed by erosion, and ordinary tillage brings part of the subsoil to the surface. Sandstone is at a depth of 14 to 30 inches. Under native vegetation external drainage was good to rapid, but after the soil was put under cultivation and no adequate precautions were taken to prevent erosion, external drainage became more rapid and resulted in erosion. Internal drainage is good to excellent.

Use and management.—Probably 80 percent or more of Hartsells fine sandy loam, eroded undulating shallow phase, is used annually for crops; the rest, mainly for pasture. The shallow depth to bedrock and erosion impair the productivity of the soil and restrict its use suitability. In some areas pasture is rotated with cultivated crops as a means of improving the soil.

Even though the soil is eroded and inherently low in fertility, it may produce fair yields under proper care. It has good tilth, is easy to work, holds moisture, and responds satisfactorily to good management. Although yields normally are a little lower than those obtained on the undulating shallow phase, they are nearly equal under good management.

Hartsells fine sandy loam, rolling shallow phase (5–10% slopes) (HFG).—This soil occurs on narrow ridge tops and moderately strong slopes in rolling areas on the sandstone plateaus. The largest areas are on the unimproved part of Sand Mountain; the smaller ones are well distributed over all the sandstone plateaus. The soil resembles the undulating shallow phase in most features except relief, which is stronger and makes differences in land use and management.

The parent material consists of residual products derived mainly from weathered sandstone. The depth of the profile to the underlying sandstone bedrock may be 14 to 30 inches, but the more common range is 18 to 26 inches. Outcrops of sandstone bedrock occur in places, and some of them are designated on the soil map by symbol. Under forest cover both external and internal drainage are moderate, but when the soil is cleared and put under cultivation external drainage may become rapid to somewhat excessive unless proper precautions are taken against erosion. Erosion has not been severe in the cultivated areas, mainly because of the short time these areas have been cleared and the use of control measures.

Use and management.—Probably less than a fourth of Hartsells fine sandy loam, rolling shallow phase, has been cleared for pasture or crops. The rolling relief and the shallow depth of the soil over bedrock make these areas questionable for cropland. Many of them have been nearly inaccessible for farming until recent years when roads were extended into them. Others still are isolated because of lack of roads. More of the land, however, is being cleared and used for cultivation. The trees in the forested areas are largely deciduous hardwoods, but shortleaf and old-field pines are common in some areas, especially on Sand Mountain and in most areas that had been cut over for timber or cleared for farming.

Cotton, corn, peanuts, sorghum, and hay are the principal crops. No special system of crop rotation is followed, although a simple rotation of cotton, corn, and soybeans is common. Some—but not enough—farmers grow winter cover crops. Most farmers depend on commercial fertilizer rather than on winter legumes for supplying the soil with nitrogen. Cotton is commonly fertilized with 250 to 300 pounds of 6–8–4 or other high-grade fertilizer an acre and generally yields ⅓ to ⅗ bale. Corn, which is fertilized with 100 to 225 pounds of nitrate of soda, yields 15 to 25 bushels an acre. Soybeans yield ½ to ¾ ton of hay an acre. Peanuts produce ¼ to ½ ton an acre with the use of little or no fertilizer if they are grown in rotation with cotton.

Yields are largely in proportion to the seriousness of the erosion. Wherever possible, a cover crop should be kept on the land most of the time. Kudzu and sericea lespedeza are considered good hay or temporary pasture crops, providing there is enough land for row crops. This soil can be kept in cultivation over a relatively long time if an effort is made to conserve moisture and soil material as soon as the land is cleared.

Hartsells fine sandy loam, eroded rolling shallow phase (5–10% slopes (HFA).—This phase occurs mostly in small areas scattered over Sand Mountain and isolated plateaus. It is similar to the rolling shallow phase in surface relief and position but, unlike that phase, is moderately eroded. Probably three-fourths of the original surface soil has been removed by erosion, and in many places the subsoil is exposed. The average depth of the surface soil is only about 4 inches. External drainage is more rapid than on the rolling shallow phase. Internal drainage is fairly good, although it is slowed to some extent by the bedrock near the surface. The bedrock also causes seepage water to issue on the slopes during wet periods and helps to make water control one of the most difficult problems in farming this soil.

Use and management.—All of Hartsells fine sandy loam, eroded rolling shallow phase, at some time has been cleared and used for cultivated crops. Many of the areas include old fields farmed by early settlers. Many of the sloping isolated areas, whether severely eroded or not, are now either abandoned to volunteer forest vegetation or lying idle. Possibly 60 percent of the phase is used for crops; the rest is mostly in pasture or idle. Many abandoned fields have a cover of broomsedge, but a few have a cover of lespedeza or other pasture that provides grazing.

The principal crops are cotton, corn, and soybeans. Cotton is generally fertilized, and under management that includes applications of 200 to 300 pounds of a 6–8–4 or other high-grade fertilizer, yields normally are ⅓ to ½ bale an acre. Corn also is generally fertilized. Where it receives 100 to 150 pounds of nitrate of soda, yields normally range from 15 to 20 bushels an acre. Soybeans yield ⅓ to ¾ ton of hay an acre.

The greatest management problems are directly related to the shallowness of the profile to bedrock and the relatively strong relief. If this phase is to be used for crops, it should be terraced to control erosion and to improve tilth, moisture-absorption ability, water-holding capacity, and general workability.

Hermitage silty clay loam, eroded undulating phase (2–5% slopes) (HYE).—This well-drained soil occurs in the limestone valleys. It has developed from old colluvium or local alluvium washed mainly from other soils, as the Dewey, Fullerton, Talbott, and Cumberland, and deposited along the foot of the slopes. Much of the surface soil has been lost through erosion.

Profile description:

0 to 8 inches, light-brown to weak reddish-brown friable heavy silt loam to silty clay loam with weak to moderate fine crumb structure.
8 to 20 inches, reddish-brown firm but moderately friable silty clay loam with medium blocky structure.
20 to 36 inches, reddish-brown to red firm moderately friable to plastic silty clay loam to silty clay with moderately well developed medium blocky structure.
36 to 48 inches, mottled red, yellow, brown, and gray silty clay; relatively dense and plastic when moist, hard when dry; variable from place to place, depending chiefly on the depth of alluvial accumulation and the character of residual material beneath.

This soil ranges from strongly to very strongly acid throughout the profile. In places, especially in the subsoil and substratum, it contains some chert fragments. The extent of erosion differs from place to place and there is a corresponding variation in the texture of the plow layer. In most areas, however, a considerable part of the original surface soil has been removed by accelerated erosion. The deeper layers vary in color, texture, and consistence because the thickness of the alluvial accumulation and the general character of the underlying material are not uniform.

Use and management.—Hermitage silty clay loam, eroded undulating phase, is easily worked, well suited to the production of a large number of crops, and relatively productive. Practically all the phase has been cleared and cultivated. Corn and cotton are the main crops, but some small grain and hay crops, including legumes, are grown. Part of this phase is in pasture, and a small part is idle.

This soil is responsive to good management, and productivity can be increased greatly by good management.

Hermitage silty clay loam, eroded rolling phase (5–12% slopes) (HYN).—Like the other Hermitage soils this phase occupies strips of relatively old local alluvium along the foot of slopes occupied by Dewey, Talbott, Fullerton, and related soils. It is similar to the eroded undulating phase, differing chiefly in its steeper slopes. The two phases are closely associated and are mapped only in the limestone valleys.

Profile description:

0 to 8 inches, reddish-brown friable heavy silt loam to silty clay loam with weak medium crumb structure.
8 to 20 inches, reddish-brown to red firm but moderately friable silty clay loam with medium blocky structure.
20 to 30 inches, reddish-brown to red firm material, moderately friable when low in moisture, but plastic when highly moist; moderately well-developed medium blocky structure.
30 to 42 inches, in most places very firm plastic silty clay or silty clay loam mottled with shades of red, yellow, brown, and gray; layer varies with thickness of the accumulation and character of the underlying residual material; cherty in places.

This phase is medium to strongly acid in all layers. In places a small to moderate number of chert fragments are on the surface and scattered through the soil. The degree of erosion ranges from slight to severe, giving a patchy effect in many fields. The texture of the plow soil varies with the degree of erosion. There is a range also in the thickness of the old accumulated material washed from the higher slopes; the depth may be less than 18 inches to more than 80 inches. As a result, the texture, consistence, and color of the subsoil and deeper layers vary.

Use and management.—Hermitage silty clay loam, eroded rolling phase, has physical conditions and slopes favorable to moderately intensive use under good management. The prevailing eroded condition has injured the tilth, and the position of this soil at the foot of slopes, where water accumulates, emphasizes the need for water control. The phase, nevertheless, is relatively high in productivity and very responsive to the use of lime, fertilizer, and manure and to most of the other good management practices. In planning the use and management of this soil, both its limitations and its high response to good management should be taken into account.

Hermitage cherty silty clay loam, eroded hilly phase (12–25% slopes) (HTH).—This phase occurs mainly in the northern half of the Paint Rock River valley. The parent material is principally colluvial in origin and consists of residue of weathered cherty limestone rolled or washed from higher limestone slopes. The original forest consisted largely of deciduous hardwoods, cedar, and pine. Abandoned old fields are fairly thickly grown with pine.

External drainage is rapid to excessive. Internal drainage is rapid in the surface soil and good to rapid in the upper subsoil. Drainage may be somewhat slow, however, in the lower subsoil because of the sticky plastic consistence and the shallow depth to bedrock. Seepage water issuing from the soil indicates slow drainage in the subsoil. Erosion has been relatively active and has removed more than half the original surface soil. Despite the strong slopes, however, the soil is not extremely erosive. The large chert fragments and highly cherty condition tend to retard erosion even where cultivated crops are grown.

Profile description:

0 to 8 inches, grayish-brown to brownish-gray friable cherty silt loam to cherty silty clay loam; contains many angular chert fragments less than 1 inch to more than 12 inches in diameter and rounded chert nodules 4 or more inches in diameter both on the surface and in the profile; in nearly virgin areas or in grass-covered areas organic matter produces a dark color to a depth of 2 or 3 inches; medium to slightly acid.
8 to 15 inches, grayish-brown to brownish-gray friable silty clay loam; contains a large percentage of coarse chert fragments and chert nodules, many fine chert fragments, and some sharp grit; medium acid.
15 to 30 inches, yellowish-brown to yellowish-gray cherty clay; generally shows various degrees of mottling but is dominantly pale yellow; extremely cherty; medium acid.
30 inches +, mottled yellowish-gray, brownish-gray, and reddish-brown clay; generally gritty or cherty but in places fairly massive, sticky, and plastic and relatively free of chert and grit; ordinarily the large chert fragments practically rest on one another and the finer soil materials fill the spaces between; medium to slightly acid.

The number and size of chert fragments on the surface and in the soil vary from place to place. The texture of the finer materials ranges from very friable cherty silt loam to fairly sticky cherty silty clay. Variations in chertiness and texture may occur within distances of 50 to 100 feet. Outcroppings of limestone bedrock are fairly common in some areas and generally occur at about the same elevation, indicating that some layers of limestone are more resistant to weathering than others.

Use and management.—Hermitage cherty silty clay loam, eroded hilly phase, is difficult to work but tilth conditions are fairly good considering the high chert content. Moisture absorption is commonly good, and the moisture-holding capacity fair. The soil is leached and naturally low in plant nutrients, but in places it receives some organic material and plant nutrients deposited by runoff from rocky limestone slopes.

Nearly all the soil is cleared and cultivated, but only a small part is continuously cultivated. Most tillage is on the contour. Corn and cotton are the most common crops. The usual practice is to alternate field crops with pasture. Lespedeza quickly reestablishes itself after the land is allowed to lie idle or is put in permanent pasture. Sassafras, cedar, pine, and briers soon grow in idle areas. Many farmers prefer to till the soil 1 or 2 years out of every 4 to 5, thus getting fairly good returns with only light applications of fertilizer.

Hermitage cherty silty clay loam, severely eroded hilly phase (12–25% slopes) (HTR).—This soil is mostly in the upper part of the Paint Rock River valley. It is similar in physical characteristics, position, and distribution to the eroded hilly phase but differs in being severely sheet eroded and in containing many shallow and a few deep gullies. All the original surface soil is gone, and the present surface soil consists largely of material derived from the upper part of the subsoil and mixed by tillage with the remaining original surface soil and subsurface soil. The subsoil is exposed at the surface in places.

The chert fragments on the surface are less uniformly distributed than on the eroded hilly phase. A few areas with slopes greater than 25 percent are included.

Use and management.—All the areas of Hermitage cherty silty clay loam, severely eroded hilly phase, have at some time been used for crops. Severe erosion has increased the problems of conservation, reduced moisture-absorption and moisture-holding capacity, increased the difficulty of working the soil and planting and harvesting the crops, and restricted the use suitability. The most common and probably best use made of the soil is for pasture. Under common management most areas reseed to common lespedeza. Sericea lespedeza could be used to increase the carrying capacity of pasture. A few areas have reverted to forest vegetation.

Hilly stony land (Muskingum soil material) (10–20% slopes) (HsM).—This miscellaneous land type is classified mainly by external features, as stoniness and slope, and the character of its parent material. Widely distributed throughout the county, it includes the strongly sloping and hilly areas of sandstone rockland that, with Rough stony land (Muskingum soil material), comprise the upper third or more of the strongly sloping and steep stony lands between the high sandstone plateaus and the limestone valleys. The slopes vary. In places there are sharp stony breaks with slopes of more than 20 percent, and in others gently sloping to nearly level benches that occur generally in narrow strips not large enough to be outlined to scale on the soil map.

External drainage is good to excessive under forest vegetation and generally rapid to excessive in cleared areas. Internal drainage is good to fair under forest cover and fair to rapid in cleared areas. Pine, oak, hickory, beech, and yellow-popular are common in the present forests. Giant chestnut trees were numerous in the virgin forests.

The surface soil material, which is usually deeper than on the Limestone rockland phases and does not have so many rock outcrops, is composed mainly of sandstone fragments up to boulder size, some crushed or weathered. These fragments accumulated, through colluvial action, on the irregular surface of the limestone formation or between limestone boulders. Sandstone bedrock may occur on the high ridges where only remnants of the sandstone formation remain, but most of the bedrock is limestone. In some places the limestone bedrock is exposed, but the colluvial covering over most areas is deep enough to prevent many outcrops. The lower subsoil material is derived largely from limestone.

Use and management.—Practically none of Hilly stony land (Muskingum soil material) is cleared for cultivation. Small clearings have been made for pastures and for building sites and garden plots near coal mines or sawmills; otherwise, the best use under present conditions seems to be forest. The narrow gently sloping to nearly level benches fairly common to these areas and to Rough stony land (Muskingum soil material) are particularly well suited to use as woodland. Cutting timber and moving logs is somewhat easier on this land type, but it supports the same kinds of forest trees and has very nearly the same economic value as Rough stony land (Muskingum soil material).

Hollywood silty clay, level phase (0–2% slopes) (Hcv).—Most of this phase occurs a short distance from the base of limestone slopes and extends toward the lower lying first bottoms or low-stream terraces. Individual areas are fairly well distributed over the limestone valleys. Some of the principal areas are near Hollywood, the place for which the soil is named. Others are north of Kyles and Scottsboro, near Pikesville School, and in the southern third and north-central part of the Paint Rock River valley. The parent material was weathered from exposed limestone that contains a high percentage of clay and has been washed from adjoining slopes onto valley floors. In most places the resulting soil is dark in color, but in some places it is somewhat lighter.

Under native forest cover, external drainage is very slow and in places has caused swampiness. In cultivated areas the surface drainage, although somewhat slow, is generally good enough to prevent water from standing on the surface for any length of time. In many cultivated areas external drainage has been artificially improved, mostly by open ditches. Internal drainage is everywhere slow. The natural vegetation consists largely of water-loving hardwoods, but cedar, holly, and pine are common in places.

Profile description:

0 to 8 inches, dark grayish brown or almost black granular waxlike silty clay; sticky and plastic when wet; the surface shiny on smooth cuts; under optimum moisture friable and easily crushed to a fairly mellow granular mass; medium to slightly acid.
8 to 20 inches, dark grayish brown clay; breaks into nutlike particles ⅜ to ⅝ inch in diameter; heavy, sticky, plastic, and massive; slightly acid.
20 to 40 inches, slightly mottled olive gray and yellowish brown heavy sticky clay; massive and plastic but breaks into angular fragments when dry or moderately dry; neutral or mildly alkaline; bedrock limestone generally 20 to 60 inches below the surface.

The color and texture of the surface soil vary somewhat because different material has been washed from adjoining areas and deposited on the surface.

Use and management.—Hollywood silty clay, level phase, has good workability only under the most favorable moisture conditions. It puddles if worked when wet and clods if worked too dry. If cultivated when moderately dry to moderately wet, the soil breaks into a fine granular mass and forms a good tilth. It absorbs moisture slowly but retains it well.

This phase is fertile and productive under favorable moisture conditions, but during wet seasons it may give very low returns. Most of it has been cleared for cultivation. About 60 percent of the cleared land is used annually for field crops; the rest is used largely for pasture that is moderately well improved. Corn and soybeans are the principal crops; cowpeas are grown to some extent. Lespedeza, Johnson grass, and Dallis grass are the chief pasture plants. Corn yields 20 to 50 bushels an acre, depending to a large extent on the season. Corn is likely to be damaged in wet weather. Soybeans produce 1¼ to 2½ tons of hay an acre. Lespedeza produces excellent pasture.

Hollywood silty clay, undulating phase (2–5% slopes) (Hcu). This phase is derived from the same kind of material as the level phase, but it has slightly stronger relief and generally lies directly

below limestone slopes. External drainage generally is moderately slow to slow under natural cover and good to somewhat rapid where the soil is cleared and cultivated. Erosion is fairly active in cleared areas where the slope is more than 3 percent, especially if the phase occurs on short breaks bordering fairly well-developed drainageways. Little terracing has been done, but where cropping is continuous all the stronger slopes need terracing to protect them from erosion. Internal drainage is somewhat restricted and slow, but in most places aeration is fairly good.

The profile is generally more uniform in color than in the level phase. The surface soil is dark brown to nearly black. The subsoil is greenish yellow or pale-yellow silty clay, which is massive, sticky, and plastic. Splotches or mottlings of light greenish yellow or reddish brown generally appear at a lower depth. The soil varies mainly in depth of surface soil, as is shown by the undulating or wavy contact between the dark surface soil and the yellowish or brighter subsoil. This contact line can be seen in road cuts, ditches, and gullies. The surface soil ranges from about 4 to 24 inches in depth, but in most places from 10 to 18 inches.

Use and management.—About 70 percent of Hollywood silty clay, undulating phase, is used annually for tilled crops, about 20 percent is in open, partly improved pasture, and about 10 percent is in woodland pasture and forest. The soil is better drained than the level phase and can be worked sooner after rains. A greater acreage is used for crops, and average yields are higher. The soil is high in organic matter and fairly high in plant nutrients. It has a good mellow tilth if cultivated when moderately dry. It is productive in favorable seasons, but during wet or very dry ones its yields are lower. It is very well suited to improved pasture.

Holston loam, undulating phase (2–5% slopes) (Huu).—This phase is well distributed in most parts of the limestone valleys and occupies relatively low fairly well drained areas on stream terraces. The principal areas are in the valleys northwest and west of Bridgeport, southwest of Scottsboro, south of Larkinsville, and southeast of Paint Rock, and are in close association with areas of Sequatchie and Monongahela soils. The parent material is alluvium and consists largely of material derived from sandstone areas but to some extent from shale and limestone areas. External and internal drainage are generally good, but the internal drainage may be somewhat slow in places. The native vegetation, which has been mostly removed, consisted chiefly of deciduous hardwoods. Some pine was present in places. Old-field pine is still common on areas that have returned to forest vegetation.

Profile description:

0 to 5 inches, light brownish-gray to grayish-brown loose very mellow loam or very fine sandy loam; medium acid.
5 to 10 inches, grayish-brown to yellowish-brown very friable very fine sandy loam; permeable to roots and moisture; medium to strongly acid.
10 to 30 inches, yellowish-brown friable but firm very fine sandy clay loam grading to very fine sandy clay.
30 to 48 inches, faintly to moderately mottled pale-gray, grayish-yellow, yellowish-brown, and reddish-brown friable very fine sandy loam; firm in places but readily broken into fine soft crumbs when disrupted and lightly crushed; strongly acid.

The surface soil may be fine sandy loam, very fine sandy loam, or silt loam. The color of the subsoil varies from yellowish brown to pale grayish yellow or grayish brown and with increasing depth becomes faintly mottled or somewhat splotched. It is generally friable, but in small spots it is firm and compact.

Use and management.—Holston loam, undulating phase, is used mostly for crops. It has good to excellent workability, responds well to good management, and is suited to practically all locally grown farm crops. Its productivity is good. The most common crops are cotton, corn, hay, oats, sorghum, potatoes, and sweetpotatoes. Home gardens are fairly common. Depending largely on management, cotton yields range from ⅖ to 1 bale or more an acre but generally from ½ to ¾ bale. Corn yields 20 to 40 bushels, the better yields being obtained when the crop is planted after a winter legume.

Holston loam, level phase (0–2% slopes) (Huv).—This soil has a light brownish-gray to pale-gray friable loam or very fine sandy loam surface soil. It is closely associated with the undulating phase and is similar to it in most physical characteristics but is paler and milder in slope. It occurs chiefly on somewhat lower and more nearly level stream terraces than the undulating phase, but some areas are slightly more elevated and have a nearly level surface bordered by very gentle slopes. The parent material is alluvial in origin.

The external and internal drainage are fair to good, but both are somewhat slower than on the undulating phase because of the more nearly level surface and slightly tighter subsoil. The original forest cover consisted largely of deciduous hardwoods, with thin to solid stands of pine in places. Old-field pine is common on abandoned areas.

There are some small areas of Holston loamy very fine sand included. They differ chiefly in having a surface soil or covering of loamy very fine sand 15 to 24 inches thick and a very fine sandy clay or very fine sandy clay loam subsoil.

Use and management.—Most of Holston loam, level phase, is cultivated, corn and hay being the principal crops. Some of the higher lying areas are used for cotton, but this crop is less common than on the undulating phase. This soil and the included soil are also well suited to peanuts, sweetpotatoes, and melons. They are well suited to potatoes but may require artificial drainage for producing that crop early in spring. Fall-planted potatoes should do well without any special drainage.

The soil is somewhat lower in inherent fertility than some of the heavier ones of the limstone valleys but is responsive to good management. Under good management, yields of most crops are good. On the whole, this level phase is easily worked. It has good tilth, excellent moisture absorption, and in most places good moisture-holding capacity. It may, however, require artificial surface drainage if cover crops are grown in wet winters.

Huntington silt loam (0–2% slopes) (Hl).—This first-bottom soil occupies level to gently undulating well-drained areas. Near the outer edge of these, where there is a sharp decline toward drains or other first-bottom lands, the slopes may be stronger. Although subject to occasional overflow, the areas are mostly slightly higher than those of

the adjoining soils of the first bottoms, and many of them are on low very gently rounded ridgelike divides in the first bottoms. The undulations in the surface are larger in the first bottoms near the Tennessee River than along other streams in the county.

The alluvial parent material is derived largely from limestone areas, but it contains some materials from sandstone and shale areas distributed to different degrees in all parts of the limestone valleys. The alluvium also contains some micaceous material that originated in igneous rock areas and was deposited along the Tennessee River. Both external and internal drainage are commonly good. In the level or nearly level areas, internal drainage is relatively slow in the lower subsoil or in the parent material. Native vegetation consisted of a thick growth of deciduous hardwoods, vines, and briers, and scattered stands of cedar, pine, and holly.

Profile description:

0 to 7 inches, dark grayish-brown very friable silt loam; easily crushed to a soft mellow mass; slightly acid.
7 to 12 inches, moderate brown silt loam; contains some fine and very fine sand; slightly acid.
12 to 30 inches, pale yellowish-brown friable silty clay loam; grades to dark grayish-brown heavy silty clay loam or silty clay and becomes somewhat firm with increasing depth.
30 to 48 inches, dark yellowish-brown silty clay loam somewhat lighter in color and coarser in texture than the material in the overlying layer; slightly acid to neutral.

The surface soil ranges from a silty clay loam to a very friable silt loam. The subsoil ranges from pale grayish brown to very dark brown and nearly black and varies in texture from relatively loose friable silty clay loam to very firm silty clay or silty clay that is compact when in place but friable when broken loose.

Use and management.—Huntington silt loam is excellent for agricultural purposes. It has good workability, including good tilth, good moisture-absorption and moisture-holding capacity, and good fertility. It responds to the better cultural methods. Since it occurs in fairly broad nearly level areas, it can be used as large fields in which power farming is practicable.

Nearly all areas are cleared. Most of them are in constant use for field crops. Corn, the most important of these, yields 20 to 60 bushels an acre. Some areas, especially those bordering the Tennessee River and the larger and more nearly level creek valleys, have been used almost exclusively for corn ever since they were cleared of forest. This soil is one of the best in the county for corn and is therefore highly useful where that crop is grown, particularly on farms specializing in livestock production.

Floods are less damaging than on most other soils of the first bottoms, but early in fall they may cause serious losses before crops can be harvested. Flooding occurs especially in areas along the Tennessee and Paint Rock Rivers. As the Tennessee River is now used for power development and floods are controlled, flood hazards probably have been eliminated in areas affected by high waters from that river, but other areas are still subject to occasional destructive overflows. These overflows, however, are also beneficial as they deposit new materials and help maintain the high fertility.

Practically no fertilizer is applied for corn and hay. Cotton, which is occasionally grown on some of the higher lying areas, usually receives light applications of a complete fertilizer. Some farmers have reported that corn yields are increased by the use of light applications of a complete fertilizer, especially on the areas seldom flooded.

Jefferson fine sandy loam, undulating phase (2–5% slopes) (JFU).—This phase occupies colluvial foot slopes and fans at the base of mountain slopes. A few areas are in places where drainageways that originate on plateaus or steep rocky slopes issue on high first bottoms. The parent material rolled or washed from sandstone formations and from Muskingum and Hartsells soils.

External drainage is good on the gentle slopes but somewhat rapid on the 4- to 5-percent slopes, and especially so in areas where surface runoff from adjoining higher slopes is rapid. Internal drainage is good, but in some large nearly level colluvial fans it may be somewhat slow in wet periods because seepage water causes a high water table. A large part of the soil is cleared. In uncleared areas the trees are largely deciduous hardwoods and pine, though there are some cedar and holly.

Profile description:

0 to 7 inches, light brownish-gray friable fine sandy loam; contains a fairly large number of water-worn pieces of quartz gravel, small cobbles, and angular sandstone fragments; in virgin or grass-covered areas to a depth of 2 to 3 inches the organic-matter content gives a dark-gray color; very strongly to strongly acid.
7 to 12 inches, brownish-gray to grayish-brown friable fine sandy loam to loam; contains many water-worn pieces of gravel and angular sandstone fragments; very strongly to strongly acid.
12 to 30 inches, brownish-yellow to grayish-yellow friable fine sandy clay; contains sandstone fragments less than 1 and up to 6 inches or more in diameter; strongly acid.
30 to 48 inches, grayish-yellow to brownish-gray fine sandy clay similar in texture to the overlying layer but slightly splotched or faintly mottled with shades of brown and gray; strongly acid.

This phase varies in texture, in the number and size of sandstone fragments, and in the thickness of the colluvium. Some limestone and chert fragments are present in places. These fragments are few except where colluvial material has been recently accumulated, and then they occur only where rapid-flowing intermittent drainage water deposits new material on the surface. In most places the rock fragments do not interfere with cultivation. In some areas, however, tillage can be improved by removing the larger fragments, and in a few areas cultivation would be hindered greatly if the fragments were not removed.

Accelerated erosion has been active in places but in general it has removed less than 50 percent of the surface soil. On long slopes where the gradient is more than 3 percent, terraces can be used effectively in reducing loss of soil material and conserving moisture.

Use and management.—Jefferson fine sandy loam, undulating phase, is desirable for general farming. It has good workability but is moderately low in plant nutrients. It absorbs moisture well, has good moisture-holding capacity, is responsive to good management, and can be built up to a good state of productivity. About 85 percent of the total area is used for field crops; the rest is used largely

for pasture. In general, it is well suited to cotton. A few of the lower lying nearly level areas on colluvial fans are best suited to corn, soybeans, cowpeas, and other hay crops. With good management general farm crops produce well, cotton yielding about 4/5 bale and corn about 40 bushels an acre.

Jefferson fine sandy loam, eroded undulating phase (2–5% slopes) (JFE).—This phase is widely distributed over various parts of the limestone valleys from Paint Rock River valley in the western part of the county to the tract east of the Tennessee River in the northeastern part. The soil is similar to the undulating phase in physical characteristics, position, and surface relief, but it has lost more surface soil and subsurface soil through accelerated erosion. The colluvial parent material is derived mainly from material of sandstone formations or from soil formed from weathered sandstone material. In general it is similar to the parent material of the other members of the series and that of the Allen soils. External drainage is good to excellent under native vegetation but somewhat rapid in cultivated fields where slopes are 4 to 5 percent. Internal drainage is generally good.

Use and management.—Jefferson fine sandy loam, eroded undulating phase, has at some time been cultivated; and at present most areas are used annually for field crops. Workability, including tilth, has been impaired, moisture absorption has been reduced, and susceptibility of the soil to washing has been increased by the loss of the friable surface soil through erosion. Most areas have lost 50 to 75 percent or more of the original surface soil through accelerated erosion, and a few have lost practically all the surface and subsurface soil. The productivity also has been reduced, but in most places the subsoil is fairly friable. Where erosion is reduced by properly built terraces, the eroded areas can be built up to a fair level of productivity, especially if winter legumes are grown as cover crops and turned under to supply organic matter and increase the nitrogen content.

Cotton, corn, and hay are the main crops. Cotton is commonly fertilized with 200 to 250 pounds of 6–8–4 or other high-grade fertilizer an acre. Yields range from 2/5 to 4/5 bale an acre. Corn is commonly side-dressed with 100 to 150 pounds of nitrate of soda, and yields range from 15 to 25 bushels an acre. If the soil is properly terraced and is improved by the use of winter legumes, higher yields can be expected. Soybeans are the most common hay crop, but annual lespedeza or sericea lespedeza is well suited.

Jefferson fine sandy loam, rolling phase (5–12% slopes) (JFO).—This phase occupies colluvial slopes adjacent to rough stony slopes in the limestone valleys. It is slightly eroded in many areas. It is characterized by a brownish-gray friable surface soil, a yellow friable fine sandy clay subsoil, and rolling or moderately sloping surface relief. Sandstone fragments are strewn over the surface and mixed through the soil.

External drainage is good to rapid. Internal drainage is usually good. The natural vegetation consists of deciduous hardwoods and some pine. Old-field pine is common on areas that have returned to forest vegetation.

Use and management.—About 65 percent of Jefferson fine sandy loam, rolling phase, is cultivated. Most of the rest is used for pasture, and a small part is idle or in forest. Little if any is in permanent pasture that has been improved by the use of amendments and proper seed mixtures.

This phase is responsive to good management, however, and when properly terraced to conserve moisture and prevent loss of soil material through erosion, it produces good yields of cotton. Corn does fairly well on terraced areas when it follows a winter legume. Depending on the season and management, cotton, the principal crop, yields 1/5 to 3/4 bale an acre, and corn yields 8 to 35 bushels. Soybeans, cowpeas, lespedeza, and other hay and feed crops are grown to some extent.

Jefferson fine sandy loam, eroded rolling phase (5–12% slopes) (JFN).—Small widely scattered areas of this phase occur at the base of rough stony slopes in many of the small valleys and coves. The phase is recognized by its gray to yellowish-gray surface soil, yellow subsoil, sandstone fragments on the surface and in the soil, and rolling or sloping relief. It differs from the rolling phase in the percentage of surface soil and subsurface soil that has been removed by sheet and shallow gully erosion. Some badly gullied areas are designated on the soil map by symbol.

External drainage is rapid and may be even excessive in the more severely eroded areas. Internal drainage is generally good, although where erosion is severe and surface runoff is excessive, less water penetrates to the subsoil. In the eroded areas the supply of soil moisture available during the growing season is considerably smaller than it would be if it had been conserved by preventing excessive runoff.

Use and management.—Less than half of Jefferson fine sandy loam, eroded rolling phase, is used each year for general farm crops, although practically all of it is cleared. The soil is fairly well suited to crops if erosion is controlled by terraces, but because of its relatively strong slopes and eroded condition in many places, erosion is not easily controlled by terraces alone. Some areas are best utilized for pasture or close-growing crops. Little of the soil is well suited to power machinery, for it has unfavorable slopes and occurs in small irregularly shaped areas. A fairly common practice is to alternate lespedeza pasture with cultivated crops. In this way fair to good yields are obtained because the lespedeza pasture generally increases the nitrogen and organic content.

Jefferson-Allen loams, eroded rolling phases (5–12% slopes) (JAN).—This complex occurs at the base of limestone slopes and consists of areas of Jefferson and Allen soils too intricately associated to justify their separation on the soil map. The Jefferson areas have gray surface soil and yellow subsoil; the Allen, grayish-brown surface soil and red subsoil. The Jefferson soil predominates. Rock fragments, mainly of sandstone and fairly numerous, are on the surface and mixed through the soil. The extreme range is from less than 3 to 36 inches or more in diameter, but most of the fragments range from less than 3 to 12 inches in diameter. In places large sandstone blocks project above the surface. Chert fragments are common in places, and limestone outcrops or loose limestone rocks occur in some areas.

External drainage is good to rapid under native vegetative cover but generally rapid to excessive in areas cultivated. Erosion has been

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fairly active and has removed one-half to three-fourths or more of the virgin surface soil. The present surface soil consists largely of subsurface soil and subsoil materials mixed by tillage with the remaining original surface soil. This surface layer is mostly brownish gray and ranges from a firm sandy loam to a generally friable sandy clay loam. In some places, however, it may be somewhat plastic. Internal drainage is commonly good but may be somewhat rapid in places.

Use and management.—Jefferson-Allen loams, eroded rolling phases, are difficult to work, largely because of the stony slopes, but their sandy surface soil produces a fairly good tilth. Erosion, however, has impaired tilth, moisture absorption, and moisture-holding qualities. It has increased surface runoff, the susceptibility of the soils to erosion, and the problems of conserving soil material or moisture, and has reduced the productivity.

About half of this complex is used annually for general farm crops. As it occurs in many places where other well-drained soils are relatively scarce, it may be the only well-drained land available for crops. Where used for cropland, terraces should prove effective in controlling erosion and conserving moisture. In some areas field crops are alternated with pasture.

Many areas are abandoned for crop use and are either idle or in permanent pasture. These areas are not easily accessible to roads, schools, churches, trade centers, or markets. Natural vegetation consists largely of deciduous hardwoods. Some pine and a few cedar occur in places; shortleaf and old-field pines occupy abandoned fields and cut-over areas.

Jefferson-Allen loams, hilly phases (12–25% slopes) (JAL).—This complex occurs in the limestone valleys on hilly or strongly sloping colluvial accumulations at the base of rough limestone slopes. It is characterized by the intricate association of soils with dominantly yellow or red subsoil, by rock fragments scattered over the surface, and by the influence of sandstone on the parent material. It differs from other Jefferson-Allen hilly complexes mainly in being less eroded, but in composition and derivation of parent material is similar to other Jefferson and Allen soils.

External drainage on areas under native vegetation is rapid to excessive and on areas cleared for crop production it is generally excessive. Internal drainage is good to rapid, but in cleared areas less moisture penetrates to the subsoil because of the excessive surface runoff.

Use and management.—About 80 percent of Jefferson-Allen loams, hilly phases, is in forest. Natural vegetation consists largely of deciduous hardwoods, but there are many pines and numerous cedars in places. Old-field pine is common in abandoned fields and cut-over areas. A small part of the complex is cleared and used to some extent for crops, but the most common use of the cleared land is pasture. The forested areas are frequently used for woodland pasture.

Jefferson-Allen loams, eroded hilly phases (12–25% slopes) (JAH).—This complex is similar in character of parent material, soil development, and slope to the complex of hilly phases but differs in that it has lost a relatively large part of the original surface soil through accelerated erosion. The color and texture of the present surface soil are similar to those of the associated eroded rolling phases.

External drainage is rapid to excessive, and internal drainage is generally good to rapid. Sheet and shallow gully erosion have been active on the cleared land, removing about half to more than three-fourths of the original surface soil. In places shallow gully erosion has removed even part of the subsoil. A few deep gullies have formed. Some small severely gullied areas are designated on the soil map by symbol.

The present surface soil consists largely of subsurface soil and subsoil material mixed with the remaining original surface soil by tillage. The color, which varies from place to place, is brownish gray to reddish brown. The texture ranges from fine sandy loam in places where much of the original surface soil remains to fine sandy clay in places where the present surface soil consists mainly of subsoil material. Sandstone fragments, ranging in diameter from less than 3 to more than 8 inches, are common on the surface and throughout the soil. Chert fragments are generally present and in places are numerous. Limestone fragments or outcrops are common in some areas.

Use and management.—Jefferson-Allen loams, eroded hilly phases, are difficult to work, largely because of the strong slopes and rock fragments. Under virgin conditions this complex had fairly good moisture-absorption and good moisture-holding qualities, but when cleared and subjected to accelerated erosion it lost some of its ability to absorb moisture. Its best use is for pasture and forest; most of it is in pasture at present. Sericea lespedeza should prove an exceptionally good crop for intermittent or temporary pasture. This crop requires approximately 2 years to become established, but when well established it will furnish abundant grazing for many years under good management.

Jefferson-Allen loams, severely eroded hilly phases (12–25% slopes) (JAR).—This complex is separated from the complex of hilly phases and one of eroded hilly phases on the basis of its severe erosion. Its slopes are more severely dissected than those of the eroded hilly phases. Shallow and deep gully erosion have removed practically all the original surface and subsurface soil, and plowing in most places is done almost entirely in subsoil material. There are a few very small areas in which much of the original surface soil remains. In some small areas the surface soil consists of soil material washed from nearby areas. External drainage is excessive, and internal drainage is good. Less moisture enters the soil because of the excessive external drainage.

Use and management.—All of Jefferson-Allen loams, severely eroded hilly phases, is cleared, but a small part has grown up with volunteer forest vegetation. A fairly large part is used for field crops, but the soil is difficult to work. A large part is idle, and a small part is pastured. Lack of moisture in the surface soil and subsoil tends to restrict the use of the soil for pasture. Many areas are well suited to sericea lespedeza for pasture, but under present conditions most areas can be used best for forest.

Jefferson-Allen loams, steep phases (25–35% slopes) (JAZ).—This complex is similar to the complex of hilly phases in practically all physical characteristics except slope, which is considerably steeper. Under forest cover the complex has rapid to excessive external drainage, but in cleared areas external drainage is generally excessive. Internal drainage everywhere is rapid.

Use and management.—The slopes are so steep and the workability and conservability of Jefferson-Allen loams, steep phases, so difficult that the use suitability is restricted mainly to forest. A small part, however, could be used for permanent pasture and a few small more favorable areas for crops. Most of these phases are forested mainly with deciduous hardwoods, but in places pines are fairly common. There are some cedars, especially in areas that contain limestone bedrock outcrops. The forest has been cut over from time to time for commercial products or for wood for fuel, fence posts, rails, and other farm and domestic purposes.

Jefferson-Allen loams, severely eroded steep phases (25–35% slopes) (JAs).—This complex is similar to the one of steep phases in surface relief and soil characteristics, but unlike those phases it has lost most of the original surface and subsurface soil through sheet and shallow gully erosion. The subsoil is exposed at the surface in many places, and a few deep gullies have formed. Long deep gullies and severely gullied areas are designated on the soil map by symbol. Plowing is nearly everywhere done in the subsoil. External drainage is excessive; internal drainage, rapid.

Use and management.—Most of Jefferson-Allen loams, severely eroded steep phases, at some time has been used for cultivated crops and pasture. Largely because of the serious erosion that has taken place, a large part of the complex is either idle or in volunteer forest vegetation. Some areas are used for pasture, none of which is improved. Sericea lespedeza could be grown on some areas, especially for periodic grazing.

Limestone rockland (hilly) (11–25% slopes) (LH).—This miscellaneous land type includes areas of hilly land with numerous limestone outcrops and large limestone boulders. It occurs most commonly on limestone ridges and knobs at the foot of sandstone mountains, on the less steep slopes below areas of Limestone rockland (rough), and on outlying limestone knobs some distance below these areas. Areas lie chiefly north and west of the Tennessee River. External drainage is very rapid to excessive and internal drainage is fair to slow.

The soil material among the rocks consists in most places of residue from weathered limestone and in places of weathered products of the shale that occurs as thin layers in the limestone. This material is poorly formed, heavy, tight, and sticky. In general it resembles Colbert silty clay, eroded undulating phase, in texture, consistence, and color, but on ridge crests its color and consistence are similar to those of Talbott soil. It is dominantly yellow in the upper part and mottled to different degrees with gray, brown, and red in the lower. On some converging very gentle slopes the upper part is nearly black and resembles Hollywood silty clay, level phase. On ridge crests the upper part is yellowish red to brownish red and resembles the upper part of Talbott silty clay loam, eroded rolling phase. The depth of the soil material varies from a few inches in some places to several feet in others, depending on the depth of the crevices and holes in or between the rocks.

In most places limestone outcrops cover more than 50 percent of the surface, but on some of the more rounded ridge tops and smoother benches they cover only about 20 percent. These outcrops project a few inches to more than 3 feet above the surface and in places form perpendicular walls or escarpments. In general, however, the outcrops project 10 to 36 inches above the surface at one side and lie even with it at the other. In some places only a thin mantle of soil covers the limestone.

Use and management.—Nearly all of Limestone rockland (hilly) is in forest (pl. 7, *A*). Some areas are in woodland pasture, but only few are cleared. A few benches have been cleared and used for subsistence crops by tilling between the rocks. The main tree is redcedar, although redbud is common. Extensive areas are covered with deciduous hardwoods and scattered cedars. Large chestnut, oak, beech, persimmon, cedar, and yellow-poplar trees were common in the native vegetation.

This land type is productive and probably well supplied with most plant nutrients, but poor physical characteristics reduce its productivity and the rocky surface excludes its use for cultivation. Under present conditions its best use is forest, but suitably located areas with relatively gentle slopes and a small part of the surface occupied by rock outcrops could be utilized for improved open pasture.

Rock-crushing plants have operated or are in operation in many places. They crush limestone rock for road gravel, agricultural lime, and other commercial uses.

Limestone rockland (rough) (25%+slopes) (LR).—Areas of this land type occur in wide nearly continuous belts that include most of the lower two-thirds of the rocky slopes lying between the sandstone plateaus and the limestone valleys. In many places in the limestone valleys the land occupies areas where ridges capped with sandstone have lost their capping. Like Rough stony land (Muskingum soil material), the land type includes the escarpments and most of the benches, sharp ridges, and other surface features between the rim of the sandstone plateaus and the floor of the limestone valleys. It also occurs on steep limestone mountains and hills in the limestone valleys. It is characterized as rough land and has greater variation in slope, limestone outcrops, drainage, and character of soil material among the outcrops than Limestone rockland (hilly) or Rolling stony land (Colbert soil material). In general characteristics, it is similar to Limestone rockland (hilly) except that the slopes are steeper.

The soil material among the rocks consists of residue from limestone weathered in place and wash from higher slopes that has lodged in holes and crevices of the limestone. Some of the material is derived from weathered shale. External drainage is very rapid to excessive except in areas on the included nearly level benches, where it is moderately slow to slow. Internal drainage is generally fair to good, but it is slow in areas affected by seepage water from higher lying areas. Small to large limestone sinks that receive much runoff and seepage water and discharge it into underground channels are common.

Use and management.—All of Limestone rockland (rough) is covered with forest consisting largely of cedar on the lower slopes and deciduous hardwoods on the upper slopes and benches. A mixture of cedar and deciduous hardwoods, however, predominates in many areas. In a few areas there is a fairly solid stand of pine and in other small areas just a scattering of pine. On the higher slopes the soil supports a greater proportion of deciduous hardwood in fairly solid stands than

Limestone rockland (hilly) or Rolling stony land (Colbert soil material). Most of the forest has been cut over at various times. In many areas lumbering is difficult, but most of the smoother ridge tops and nearly level benches facilitate the removal of logs to sawmills. In some places it is possible to use the land for woodland pasture.

Lindside silt loam (0–2% slopes) (LL).—This soil occupies level to very gently undulating areas on intermediately drained broad nearly level flood plains of creeks and rivers in the limestone valleys. The parent material consists mostly of relatively recent deposits washed from soils of the uplands and underlain by limestone or wash directly from weathered limestone, sandstone, and shale. In places the color comes from the soils from which the material has washed, but in most areas it appears to be largely due to soil development.

The native vegetation consisted largely of deciduous hardwoods. Several kinds of oaks and hickory, sweetgum, yellow-poplar, beech, dogwood, and ironwood are the principal trees. Reeds, other tall grasses, vines, and other underbrush are common.

External drainage is commonly fair to good, but the soil is subject to occasional overflow from adjacent streams. Internal drainage is good in the surface soil, usually good in the upper subsoil, and slow in the lower subsoil. The soil is moderately open and allows lateral internal drainage into creek channels or other fairly well established drain channels. The surface soil and upper part of the subsoil are moderately well to well drained a relatively short time after floodwaters subside.

Profile description:

0 to 8 inches, dark grayish-brown friable silt loam; relatively uniform in color but darker grayish-brown in the upper part because of the higher organic-matter content; neutral.

8 to 18 inches, faintly variegated or faintly mottled grayish-brown and yellowish-brown friable heavy silt loam to silty clay loam; readily broken under optimum moisture conditions to a fairly loose friable mass; somewhat sticky when wet; when dry cracks into moderately firm fragments not readily crushed by hand pressure; slightly acid.

18 to 30 inches, brownish-gray moderately friable silty clay loam to silty clay; faintly to highly mottled with brown, gray, yellow, and reddish brown; massive, heavier, and more mottled with increasing depth.

30 to 40 inches, light-gray plastic sticky clay; mottled with gray, yellow, and brown and splotched in places with dark reddish brown; slightly acid.

In some areas the soil varies in color, largely because of recently deposited material. In these areas the soil is more splotched, especially in the surface soil, than is common in areas over older alluvial deposits. The soil also varies somewhat in degree of drainage, being well drained in some small areas and poorly drained in others.

Use and management.—Lindside silt loam has good workability, good moisture absorption, and good moisture-holding qualities. Erosion is not generally serious except in those valleys in which soils are affected by swift waters during flood periods, as those that commonly affect soils in the Paint Rock River valley. Some areas have been drained by tiling, and some by straightening and deepening the main creek channels.

Most of the soil is cleared; about 80 percent of it is used for corn and other field crops, and the rest is used largely for pasture. It is very desirable for the production of corn, hay, and pasture. Fertilizer is not usually used. Corn yields 35 to 50 bushels, lespedeza from 1 to 1½ tons of hay, and soybeans from 1½ to 2½ tons of hay an acre. Cotton is also grown in some areas, yields ranging from ⅖ to nearly 1 bale an acre. The soil is used to some extent for the production of sorghum for sirup. The quality of the sirup is said to be better than that obtained on some of the darker colored soils, but not equal to that obtained on the mountains. The soil is exceptionally well suited to pasture.

Lindside silty clay loam (0–2% slopes) (LD).—This first-bottom soil is similar to Lindside silt loam in color and other profile characteristics, although it has finer texture, slightly darker surface soil, and grayer subsoil. The texture of the surface soil ranges from silty clay loam to silty clay, and the texture of the subsoil generally is silty clay. The soil occupies wide relatively level stream bottoms, where it is closely associated with other Lindside soils and with Egam and Melvin soils. In most places it occurs in the lower half of creek or river valleys or at a short distance from the main stream channels where floodwaters are slow enough to deposit fine-textured material after having deposited the coarser material in the upper valleys or nearer the stream channels. No areas, however, are in places occupied by temporary slack water. External drainage is fair, and water moves off soon after the soil has been flooded or heavy rains have stopped. Internal drainage is fairly good in the surface soil and upper subsoil but slow in the lower subsoil.

Use and management.—About 65 percent of Lindside silty clay loam is cleared and used for crops and pasture. The principal crops are corn and soybeans, although in wet years their use is somewhat hazardous and the soil is best suited to pasture. In seasons of favorable moisture or in relatively dry seasons, however, the soil seems to produce higher yields of corn and soybean hay than Lindside silt loam, although over a period of many years the average yields may be somewhat lower. Damage to field crops from overflows may be slightly greater than on the silt loam. Winter oats grow well in areas protected by artificial means from overflow. Only areas known to be relatively free from prolonged overflows are safe for winter grain. The soil is exceptionally well suited to permanent pasture.

Lindside silty clay (0–2% slopes) (LE).—This soil occupies relatively level areas on broad divides in first bottoms in the south-central part of the Paint Rock River valley, in the valley south of Woodville, and in Roseberry Valley northwest of Scottsboro. It is closely associated with the silty clay loam, which it resembles very closely, although it differs in having a finer texture and a more sticky and plastic subsoil. It is also associated with Melvin silty clay loam and silty clay and to some extent with Hollywood and Dunning soils. In places the surface soil is considerably darker than that of Lindside silt loam and the subsoil is grayer and more plastic, but on the whole the two soils are similar.

Use and management.—About 70 percent of Lindside silty clay has been cleared for cultivation. Most of it is used annually for corn and for soybean or lespedeza hay; the rest is used for woodland pasture. Corn and soybean hay do well in dry or relatively dry seasons. Local reports indicate that this soil is relatively difficult

to work during wet seasons and that crop yields in unfavorable seasons are low. The average yields are lower than on the silt loam.

Under management that includes the use of proper amendments and pasture mixtures, this soil produces excellent grazing. It may be advisable to use more of the soil for improved permanent pasture and less for field crops, so as to offset losses to the field crops grown in wet years.

Melvin silt loam (0–2% slopes) (ML).—This soil occurs in the upper parts of valleys and coves and in fairly narrow strips adjoining or close to the main channels in broad nearly level bottoms farther down the limestone valleys. Surface relief is level or nearly level, and external drainage is commonly slow. In many of the larger areas, however, shallow drainageways extend into the slightly higher areas and provide fair surface drainage, except in very wet seasons. Under optimum moisture conditions this soil has a mellow surface soil of fair to good moisture-absorption qualities, fair workability, and no erosion control problem. For best results, however, the slow internal drainage must be improved by ditches or by tiling, even for pasture. Internal drainage has been improved in some areas by tile drains and in others by open lateral ditches.

Profile description:

0 to 8 inches, pale-gray to light brownish-gray friable silt loam faintly mottled with gray and brown; slightly acid.
8 to 24 inches, light brownish-gray to grayish-yellow friable silty clay loam faintly to highly mottled with gray, brown, yellow, and reddish brown; generally more highly mottled, heavier, and more plastic and sticky with increasing depth; slightly to medium acid.
24 to 40 inches, gray heavy plastic silty clay; mottled with reddish brown and yellow; medium acid.

The color varies from dark brownish gray to ash gray in the surface soil and from yellowish brown to medium gray in the subsoil. Although the lower subsoil is generally heavy, sticky, and plastic, it is moderately heavy and moderately friable in some areas.

Use and management.—About 25 to 35 percent of Melvin silt loam has been cleared for crops, and about 20 to 25 percent for permanent pasture. The rest is in forest and is used both for forest products and woodland pasture. Natural vegetation consists largely of water and willow oaks, elm, sweetgum, blackgum, ash, and other water-tolerant trees in the wetter areas and various kinds of oaks and hickory, beech, persimmon, and some pine, cedar, and holly on the slightly higher areas.

The soil is probably best suited to pasture. Good improved permanent pasture can be established by the use of soil amendments and by seeding a suitable pasture mixture. For better pastures most areas require artificial drainage. The most common crops grown are grain sorghum, soybeans, and sorghum or corn. A small part of the cropland has been tiled, and the drainage has been improved to the extent that good results have been obtained. In general the soil is not suitable for winter legumes, but such summer legumes as crotalaria should prove beneficial in areas where corn is grown year after year.

Melvin silty clay loam (0–2% slopes (Mo).—Areas of this soil are widely distributed in most creek and river valleys in close association with Melvin silt loam and Egam and Lindside soils. The larger areas are in the wide nearly level first bottoms common on the stream flood plains in the lower half of the Paint Rock River valley. The surface relief is nearly level. Shallow drainageways extend into or across the areas.

In profile development and color the soil is similar to Melvin silt loam. In general, however, its areas are somewhat larger, the texture more uniform, and surface relief more uniformly nearly level. External drainage is a little slower than in areas of the silt loam, but the difference is not great. Internal drainage is slow and very similar to that of the silt loam. The vegetation is the same on both soils. The parent material is similar to that of the Lindside soils.

Use and management.—Probably not more than 25 to 35 percent of the cleared part of Melvin silty clay loam is cultivated. The main crops are corn, soybeans, and sorghum. The yields in favorable years are as good as on Melvin silt loam, but in wet years they are very low. Corn is the main crop in a large area south of Woodville that has been improved by tile drainage. The soil is well suited to pasture where artificially drained. Shallow open ditches are generally used.

Melvin silty clay (0–2% slopes) (ME).—Most of this soil is in the Paint Rock River valley. It is similar to the silty clay loam in most physical characteristics, although it is heavier and has a slightly darker surface soil. In color and surface soil texture, it resembles Lindside silty clay, but it occupies somewhat lower positions on the flood plains and is grayer and more mottled in the upper part of the subsoil.

The very dark-gray or dark brownish-gray moderately friable silty clay surface soil ranges from 2 to 8 inches thick but averages 6 inches. Under optimum moisture condition, or when moderately dry, the surface soil is very granular; when wet it is very sticky and plastic. The 12- to 18-inch subsoil consists of yellowish-gray to grayish-yellow sticky plastic silty clay to clay and grades to sticky plastic clay with increasing depth. It generally is faintly to intensely mottled with gray, brown, yellow, and reddish brown in the lower part, but in some places it is medium gray.

Use and management.—About a third of Melvin silty clay is under forest cover and is used for forest products and woodland pasture. About a third is used for corn or soybean hay. Yields are good in favorable years, but in wet ones the soil is difficult to till because of its poor external and internal drainage. The rest of the soil is in open pasture, a use for which it is excellent. Artificial draining, however, is required for best use of this soil for either crops or pasture.

Monongahela loam, level phase (0–2% slopes) (MNV).—This phase occurs in small irregularly shaped areas on low hummocks or nearly level divides on low stream terraces in the limestone valleys. It is closely associated with the undulating phase; with Tyler, Holston, and Tupelo soils; and in many places with Colbert, Jefferson, Melvin, and Lindside soils. The alluvial parent material is derived from a mixture of sandstone, shale, and limestone materials, but in most places it consists largely of sandstone material. External drainage is moderate to slow, and internal drainage is slow. The forest cover is chiefly deciduous hardwoods and some pine and cedar. Old-field

pine is common in cut-over areas and in some abandoned fields. There are many vines and various kinds of underbrush.

Profile description:

0 to 6 inches, pale-gray to pale brownish-gray friable very fine sandy loam; medium acid.

6 to 10 inches, pale grayish-yellow friable heavy very fine sandy loam; crushes readily to a loose mass under optimum moisture conditions; slightly plastic when wet; strongly to medium acid.

10 to 30 inches, light grayish-yellow to dark grayish-yellow moderately friable very fine sandy clay to fine sandy clay; mottled with gray, yellow, and light reddish brown; becomes more yellow and friable with depth; breaks into angular and subangular gray-coated fragments ¼ to ¾ inch in diameter; strongly acid.

30 to 50 inches, intensely mottled gray, yellow, and reddish-brown heavy, stiff and compact very fine sandy clay; almost impervious to moisture; strongly acid.

Variations are common. The texture of the surface soil ranges from fine sandy loam to silt loam, and the combined depth of the surface soil and subsurface soil ranges from 4 to 12 inches over the heavy subsoil. The surface soil is commonly pale gray, but it is yellowish gray or brownish gray in places. The subsoil ranges from pale yellow to yellowish brown and from faintly mottled to intensely mottled. The depth to the almost impervious layer ranges from 12 to 36 inches, the common range being 18 to 30 inches.

Use and management.—Monongahela loam, level phase, has good tilth conditions and is otherwise relatively easy to work. Moisture absorption is good in the surface soil, but the movement of moisture below the surface soil is restricted by the tight compacted layer in the lower profile. Erosion is not serious on the mild slopes, but in some places it is sufficient to justify the use of terraces. Fertility is moderate to low, and the reaction is medium to strongly acid.

Probably more than 90 percent of this phase has been cleared, and most of the cleared land is used annually for field crops. Corn and hay are the principal crops. Sorghum, potatoes, cotton, and peanuts are grown to some extent. Soybeans and annual lespedeza are the main hay crops. The soil is suited to permanent pasture. For the establishment of permanent pasture this land requires fairly heavy applications of lime and of phosphate or basic slag, a well-prepared seedbed, seeding with a good pasture mixture, and possibly other good management.

Monongahela loam, undulating phase (2–5% slopes) (MNU).—This phase occurs on intermediate to moderately low stream terraces in the limestone valleys. Areas are generally slightly larger and somewhat higher and better drained than those of the level phase. It is closely associated with the level phase and resembles it in most physical characteristics, but has somewhat browner surface soil, yellower subsoil, slightly stronger surface relief, and greater erosion.

External drainage is good, but in areas where clean-cultivated crops are grown it is somewhat rapid. Internal drainage is commonly good in the surface soil and upper subsoil but somewhat slow to very slow in the lower subsoil. The soil is fairly easily eroded in areas having slopes greater than 3 percent. A few areas in which half to more than three-fourths of the original surface soil has been removed by erosion are included.

Use and management.—Monongahela loam, undulating phase, has good tilth and fair to good workability in other respects. It has fair to good moisture absorption in the surface soil, but movement of moisture in the subsoil is restricted by a tight nearly impervious layer in the lower part. Internal drainage, however, is somewhat better than in the level phase.

Most of this phase is cleared and is used for general farm crops, chiefly cotton, corn, and hay. In uncleared areas the trees are principally deciduous hardwoods. Cotton is planted much more commonly than on the level phase. Cotton yields ⅓ to ¾ bale an acre under management that includes application of 200 to 350 pounds of 6–8–4 or other high-grade fertilizer. Corn yields 10 to 25 bushels an acre under management that includes side dressing with 150 to 225 pounds of nitrate of soda an acre. Lespedeza produces ½ to 1 ton of hay an acre; and soybeans, 1 to 1½ tons of hay. Winter legumes grow fairly well on this soil, which is better suited to them than the level phase largely because of its better surface drainage.

The productivity of the soil can be improved by properly terracing the stronger slopes, by applying needed soil amendments, and by growing winter legumes or other green manures to increase the organic content. In some places this phase is in close association with more poorly drained soils, as the Tupelo and Tyler soils of the low stream terraces and the Melvin, Lindside, and Egam of the first bottoms. In these places it may be desirable to use the soil for permanent pasture, to which it is fairly well suited, but it requires moderate to heavy applications of lime and of phosphate or basic slag.

Muskingum fine sandy loam, hilly phase (10–20% slopes) (MFL).—This phase occurs on the hilly slopes of most sandstone plateaus. It is somewhat common on narrow ridges or broken lands and along drainageways that penetrate into the broad relatively level plateaus. In forested areas external drainage is fair to rapid, but it is rapid to excessive in cleared areas unless protected. Internal drainage is good to rapid but in cleared areas is somewhat rapid to excessive. Seepage water issues from the soil in wet to moderately wet seasons, especially in forested places.

This phase differs from the other Muskingum soils in being fairly deep to bedrock and relatively free of bedrock outcrops or rock fragments on the surface. In general the depth to bedrock ranges from 12 to 36 inches. This soil closely resembles Hartsells fine sandy loam, rolling shallow phase, but has stronger surface relief. The parent material is derived mainly from products of weathered sandstone but in places comes from products of weathered shale. In some places it consists of loose crumbly sandstone material and fairly well-weathered sandstone material in the surface soil but shows practically no subsoil development. In other places the surface soil and subsoil are similar, particularly in color, to Hartsells fine sandy loam, rolling shallow phase, from which the soil is separated chiefly on the basis of slope. The surface soil is dominantly grayish brown to brownish gray, and the subsoil is yellowish gray, grayish yellow, or yellowish brown. Included with this soil are small areas in which the subsoil is red to reddish brown.

Use and management.—Muskingum fine sandy loam, hilly phase, is mostly in forest. The vegetation consists mainly of hardwoods, with

oaks predominating, but there are some pines, especially Virginia pine or scrub pine. Shortleaf and old-field pines are common in abandoned fields and areas that have been cut over for timber. A small part is used for crops, mainly corn, cowpeas, soybeans, and lespedeza and to a lesser extent, cotton.

Chiefly because of the strong slope, low fertility, shallow depth to bedrock, and, in places, stony nature, this soil is very poorly suited to crops and poorly suited to pasture. Nonetheless, most areas properly fertilized, limed, and seeded afford fairly good grazing, especially early in spring. The shallower more exposed parts are not productive of good grass, even under a relatively high level of management, and are best suited to forest. Some of the most favorably situated areas are suitable for apple, peach, and plum orchards.

Muskingum fine sandy loam, eroded hilly phase (10–20% slopes) (MFH).—This phase occurs in small areas well distributed over the sandstone plateaus. It is similar to the hilly phase, except that half to more than three-fourths of the original surface soil has been removed by erosion, and in places all the surface soil and some of the subsoil. There are some deep gullies. External drainage is rapid to excessive. Internal drainage is fair to rapid in most areas and excessive in others.

Use and management.—Most of Muskingum fine sandy loam, eroded hilly phase, was cultivated by the early settlers because they found the strongly sloping areas of the sandstone plateaus more productive than the smooth ones. After farmers began to use mineral fertilizer on a large scale, however, they came to prefer cultivating the smooth areas because they were easier to till, were superior in their ability to hold moisture, and responded better to management, including measures for conserving soil and moisture. Some areas once cultivated now are grown up with a forest of old-field pine, sassafras, persimmon, and sweetgum.

This phase is very poorly suited to crops. It produces only poor pasture, but when properly fertilized, limed, and seeded, affords fairly good grazing, especially early in spring. The shallower more exposed parts, however, are not productive of good grass even under a relatively high level of management and probably are best used for forest. Some of the most favorably situated areas are suited to apple, peach, and plum orchards.

Muskingum stony fine sandy loam, steep phase (20%+ slopes) (Msz).—This phase occurs on steep slopes along drainageways that have cut deeply into the sandstone formation and extend into the sandstone plateaus. Some areas border sinks formed in the sandstone plateaus, and all lie entirely above the limestone formations. The soil occurs both above and below the rock escarpment making up Rough stony land (Muskingum soil material). In places there are outcrops of sandstone bedrock and many sandstone fragments. Nearly everywhere this soil is derived from weathered sandstone material. In a few areas, however, mostly on the northern part of Sand Mountain and on several small isolated plateaus, the soil is derived in part from weathered shale material.

Under forest cover external drainage is rapid to excessive, and in cut-over or burnt-over areas it is very rapid to excessive. Under forest cover internal drainage is good to rapid, but very little moisture penetrates to the bedrock except along bedding planes and through fissures in the rock. The resistance of the bedrock to penetration of moisture causes seepage water to issue from the soil, especially in wet periods.

Use and management.—None of Muskingum stony fine sandy loam, steep phase, is suitable for tillage. Some small areas of Muskingum fine sandy loam, hilly phase, Barbourville-Cotaco fine sandy loams, and other soils that can be used for home gardens, orchards, or subsistence crops are included, but these form only a small part of the total area. This steep phase is used to some extent for woodland pasture. The best use for most of the soil, however, is forest. The forest cover consists largely of deciduous hardwoods. Forests stands are relatively thick on the east and north slopes. The stands are thin on south and west slopes, except where the slopes receive moisture from seepage water or where they are partly shaded by opposite slopes in narrow gorges.

Muskingum stony fine sandy loam, hilly phase (10–20% + slopes) (MSL).—This phase occurs on sandstone plateaus along and above the rock escarpment, and along intermittent drainageways extending into the plateaus. It is very similar in surface relief to the steep phase, with which it is closely associated in most places, but it differs in having milder slopes. It is derived mainly from weathered products of sandstone, in places intermixed with products of weathered shale. Under forest cover external drainage is rapid to very rapid and internal drainage good to rapid. Nearly all of the phase is in forest, but where convenient, some areas could be used for woodland pasture.

Ooltewah silt loam (0–2% slopes) (Os).—This soil occurs in small areas scattered throughout the limestone valleys. The parent material consists of recent colluvial material and to some extent alluvial material derived from surrounding soils on the stream terraces and limestone uplands. These materials have accumulated in poorly drained depressions and first bottoms and on poorly drained low stream terraces. The soil resembles Abernathy silt loam, level phase, in the surface soil and Guthrie silt loam in the subsoil. The soil occurs mainly in small shallow depressions and drainheads in stream terraces and uplands and at or near the base of slopes. Its surface relief is level or nearly level.

In most areas external and internal drainage are too slow to permit use of the soil for ordinary field crops unless drainage is improved. External drainage depends on the position of the soil; in depressions it is very slow, whereas in drainheads and in areas at the base of slopes it may be fairly good after the soil is clear of briers, underbrush, vines, and trees. Internal drainage is very slow but can be improved to some extent by open ditches or tile. The greatest benefit to drainage by these methods, however, is the removal of excess water from the surface.

Profile description:

0 to 10 inches, grayish-brown to grayish-red friable silt loam to silty clay loam; medium to slightly acid.

10 to 14 inches, pale grayish-brown or yellowish-brown silty clay loam; grades to mottled pale-gray heavy silty clay loam or silty clay with increasing depth; medium acid.

14 to 30 inches, pale brownish-gray to bluish-gray silty clay; mottled or splotched with yellow, brown, reddish brown, and nearly black; fairly uniform throughout but usually heavier and more sticky and plastic with depth; medium acid.

The soil varies considerably in color and in the character of the parent material and its depth to other material. The parent material is generally friable throughout, but the material beneath it is tight, plastic, and sticky.

Use and management.—Most of Ooltewah silt loam has been cleared of brush, trees, and briers and drained by open ditches. The soil has no true native vegetation, because the parent material accumulated after accelerated erosion became active in the surrounding higher lying soils. The trees and most of the other vegetation are native to the underlying soil that was covered by recent colluvial material. The soil is used for corn and for soybeans and other hay and forage crops. Small parts are used for pasture; others are not cleared.

When adequately drained, the soil is productive. The slow external and internal drainage, however, delay its warming in spring. Flooding or ponding during heavy rains may damage growing crops. Owing largely to these unfavorable features, crop yields have a wider range than on the Abernathy soils. Corn may fail in very wet years but yields 50 bushels or more an acre in very favorable years. Corn is not fertilized. Soybeans yield ½ to 2½ tons of hay an acre.

Where the soil has been thoroughly drained artificially and is protected from flooding, crop yields average nearly as much as on Abernathy silt loam, level phase. The soil can be improved so that it will provide excellent grazing. Small areas within permanent pastures can be used to best advantage for pasture.

Philo-Atkins silt loams (0–2% slopes) (PA).—This level or nearly level complex of imperfectly and poorly drained soils occurs in narrow first bottoms along streams in the sandstone plateaus. The soils of this complex are similar to the Sturkie and Prader soils in the limestone valleys. They are derived from alluvium that consists of material washed from areas of interbedded sandstone and shale. External drainage is slow to very slow, and internal drainage, fair to poor.

Profile description of the Philo soil:

0 to 3 inches, dark brownish-gray to grayish-brown friable very fine sandy loam; contains considerable organic matter; very acid.
3 to 8 inches, grayish-yellow to grayish-brown friable very fine sandy loam.
8 to 18 inches, yellowish-brown friable silty clay loam to silty clay; very strongly acid.
18 to 48 inches, faintly to intensely mottled yellow, light-brown, and gray friable fine sandy clay to very fine sandy clay that is grayer with depth.

Variations are common. The texture of the surface soil varies from fine sandy loam to silty clay loam, but it usually is fine sandy loam to very fine sandy loam. The parent material varies from old colluvium to very recent alluvium.

Profile description of the Atkins soil:

0 to 2 inches, very dark or nearly black silt loam; high organic-matter content; very strongly acid.
2 to 6 inches, gray moderately friable to moderately sticky silty clay loam; in places highly leached and nearly ash gray, but generally mottled with brown, yellow, reddish brown, and bluish gray; very strongly acid.

6 to 24 inches, gray heavy silty clay mottled with reddish brown, yellow, and bluish gray; sticky and plastic; very strongly acid.

In some places the surface soil is fine sandy loam or very fine sandy loam. The parent material varies considerably from place to place.

As mapped this complex includes a relatively large total acreage of Lickdale silt loam occurring in areas too small to map separately. This included soil occupies drainheads on Sand Mountain and other mountains. It is characterized by a dark-gray to pale-gray or pale yellowish-gray surface soil and mottled yellow, gray, bluish-gray, and reddish-brown subsoil. In forested areas it varies from ash gray to yellowish gray because there are different quantities of organic matter in the upper 2 to 3 inches. In texture it varies from fine sandy loam to silt loam. The depth of the soil to rock ranges from less than 10 to about 48 inches. Rock outcrops occur in places. The soil is subject to considerable seepage water that issues from higher lying soils.

Use and management.—Only a small part of Philo-Atkins silt loams has been cleared for cultivation. Many areas are not suitable for cultivation or open pasture, because they occur in narrow first bottoms that tend to wash badly when the soil is not held together by the roots of trees and underbrush. The danger of washing is especially great in flood periods. Most of the complex is in forest consisting of water-tolerant deciduous hardwoods and some swamp pine. The most common use is woodland pasture, and some cleared areas are in regular pasture.

This complex is well suited to pasture where it is cleared and improved by the use of amendments. Under proper management it should be well suited to corn, sorghum, soybeans, and other hay and forage crops. The Philo soil has the best drainage and nearly everywhere can be used for corn, sorghum, soybeans, or other crops. Most Atkins areas require artificial draining before they can be tilled. Draining these areas, however, is generally simple. The usual method is by digging open ditches or by deepening and straightening the natural drainage channels and removing the vegetation.

Pope fine sandy loam (0–2% slopes) (PF).—This soil occurs in level or nearly level and gently undulating to billowy or hummocky well-drained areas in first bottoms along streams in the sandstone plateaus. The alluvial parent material is derived from sandstone or from Hartsells, Muskingum, Hanceville, and Enders soils. External and internal drainage are good. The soil is occasionally flooded by adjacent streams.

Profile description:

0 to 8 inches, grayish-brown to brown friable fine sandy loam to very fine sandy loam; strongly acid.
8 to 24 inches, brown to yellowish-brown fine sandy clay loam to very fine sandy clay; fairly uniform in color but in places faintly mottled with gray and brown; strongly acid.
24 to 42 inches, faintly mottled brownish-yellow and yellowish-gray friable heavy fine sandy loam; somewhat lighter in color with increasing depth; very strongly acid.

This soil varies from fine sandy loam to very fine sandy loam and from well to somewhat imperfectly drained. The more imperfectly drained areas have a mottled subsoil. In age and character the alluvium from which the soil is derived varies from relatively recently accumulated loose friable material to relatively old material. Over

the relatively old material the soil has a loose friable surface soil and a heavy somewhat plastic subsoil.

Use and management.—The greater part of Pope fine sandy loam has not been cleared for cultivation, because it occurs in narrow first bottoms that tend to wash badly during floods if they are cleared and not protected by vegetation. Many areas also are in sparsely settled localities and have not been cleared. On the whole the soil is fairly productive and easy to till and has good moisture-absorbing and moisture-holding qualities.

Corn, sorghum, and soybeans are the principal crops. Corn yields 15 to 35 bushels an acre, and sorghum, 150 to 200 gallons of sirup. Soybeans yield about 1½ tons of hay an acre. Fertilizer is seldom used for crops. The soil is well suited to pasture and is commonly used for improved open pasture.

Pottsville loam, hilly phase (10–20% slopes) (PLL).—This phase occupies hilly to steeply sloping areas on the sandstone plateau. It occurs largely on the northern half of Sand Mountain, where material weathered from acid shale is dominant or nearly dominant. The shale, some of which is hard, is interbedded with thin layers of sandstone and siltstone. It varies considerably from place to place, even within relatively short distances, because the layers of sandstone and siltstone differ in type, thickness, and texture.

Under native vegetation external drainage is rapid to excessive, and in cleared areas it is nearly everywhere excessive. This drainage is caused largely by the strong slopes and the very slow movement of moisture in the parent material. Rapid erosion of the loose friable surface soil therefore results. Internal drainage is good to slow, and moisture movement is very slow in the underlying unweathered shale and thinly bedded sandstone and siltstone. Under virgin conditions, however, this phase has good moisture-absorbing quality. The main trees in the uncleared areas are deciduous hardwoods, but there is some pine.

Profile description:

0 to 9 inches, pale grayish-yellow to pale yellowish-gray very fine sandy loam to gritty silt loam; in virgin areas enough organic matter is in the upper 2 or 3 inches to impart a dark color; material loose friable and nearly single grained in the upper part of layer but slightly heavier with increasing depth; very strongly acid.

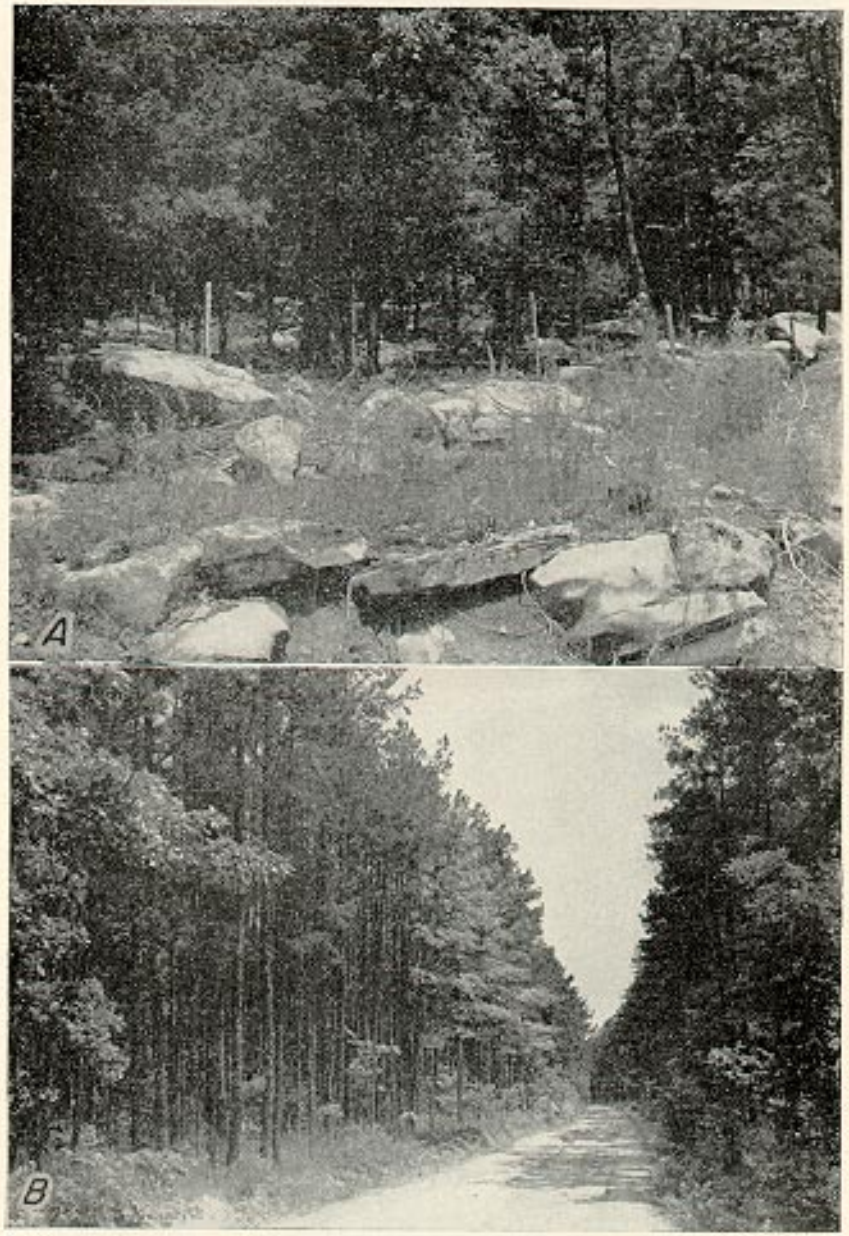
9 to 24 inches, grayish-yellow to yellowish-red friable very fine sandy clay; some partly weathered rock material in lower part of layer; very strongly acid.

24 to 36 inches, streaked reddish-brown, gray, yellow, and pink partly weathered shale and thinly bedded very fine-textured sandstone and siltstone; strongly acid.

Little uniformity exists either in the color or composition of the underlying material except that some type of shale or shale and thinly bedded sandstone and siltstone is everywhere present. Small intricately associated areas of Muskingum soils and other soils are included.

Use and management.—A large part of the land opened on the northern part of Sand Mountain by the early settlers consisted of Pottsville soils. Only a small part of Pottsville loam, hilly phase, is now used each year for crops. Cotton, corn, cowpeas, lespedeza, and other hay and forage crops are grown. The soil is difficult to work, chiefly on account of its strong slopes, and the yields are relatively

Soil Survey of Jackson County, Ala. PLATE 7



A, Forest on Limestone rockland (hilly).
B, Excellent stand of shortleaf pine on an abandoned field of Hartselle fine sandy loam soils.

Severe erosion on Rough gullied land (Dewey, Cumberland, and Colbert soil materials).

low. Pasture does fairly well, but soil and moisture, however, are difficult to conserve even when the land is in pasture. Under present economic conditions the soil probably can be used best for forest.

Pottsville loam, eroded hilly phase (10–20% slopes) (PLH).—This soil is closely associated with the hilly phase and resembles that phase in surface relief, position, and character of parent material. It has been so damaged by accelerated erosion, however, that half to nearly all the original surface soil has been lost everywhere, and in places all the original surface soil and some of the subsoil have been eroded away. Sheet and shallow gully erosion are most prevalent but there is some deep gully erosion.

The present surface soil to plow depth consists of original surface soil mixed by tillage with subsoil material. It ranges from reddish yellow, where a fairly large part of the original surface soil remains, to streaked red, yellow, gray, and somewhat pink, where most of it is subsoil material. The subsoil consists largely of partly weathered shale and sandstone. In places little weathered rock material is present, and the surface soil rests directly on shale or thinly bedded sandstone.

Use and management.—All of Pottsville loam, eroded hilly phase, has at some time been cultivated, but most areas have been partly or entirely abandoned for crop use, largely because of erosion. Corn, the principal crop in the tilled areas, produces relatively low yields of 5 to 12 bushels an acre. A large part of the soil is used for pasture. Some of it has reverted to forest vegetation, mainly to shortleaf or old-field pine. Largely because of the steep slopes, shallow depth to bedrock, and poor moisture-absorbing quality, especially in the open areas, this phase is best used for forest.

Prader very fine sandy loam (0–2% slopes) (PD).—Most of this soil occupies first bottoms in the upper parts of the limestone valleys and small coves bordered or nearly surrounded by sandstone plateaus from which the sandy material in the alluvium of the first bottoms is derived. The alluvial material is derived from sandstone, limestone, and in places shale. Some soil areas occur far down the valleys, where swift floodwaters have deposited the sandy material. A few areas are in tributary valleys of the Paint Rock River valley, but most of them are in the wide nearly level first bottoms in the main limestone valley and in valleys of large creeks west of the Tennessee River.

This level or nearly level soil is associated with Sturkie and Bruno soils, but in profile characteristics it resembles closely Atkins and Melvin soils of the first bottoms, Guthrie soil of the depressions, and Tyler and Robertsville soils of the low stream terraces. Runoff and internal drainage are slow under natural conditions. Internal drainage, however, can be improved artificially because the surface soil and upper part of the subsoil are friable and fairly easily permeable to moisture. In the forested areas the native vegetation consists largely of water-tolerant deciduous hardwoods. Some cedar, holly, and swamp pine grow in places.

Profile description:

0 to 8 inches, pale-gray to brownish-gray friable very fine sandy loam faintly mottled or splotched with gray, yellow, and brown; in virgin areas the dark upper 2 to 3 inches contain organic matter; slightly acid.

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8 to 24 inches, pale-gray to grayish-yellow moderately friable very fine sandy clay loam to silty clay faintly to intensely mottled with brown, reddish brown, yellow, and gray; slightly acid.
24 to 36 inches, bluish-gray heavy plastic sticky clay mottled with brown, reddish brown, and yellow; slightly acid.

The texture of the surface soil ranges from light fine sandy loam to silty clay loam. The subsoil in places consists of stratified silty clay loam and loose sandy material.

Use and management.—Probably more than 80 percent of Prader very fine sandy loam is cleared, but less than half of the cleared land is used for crops. The rest is utilized mainly for pasture, a use to which it is limited unless it can be satisfactorily drained artificially. Corn, soybeans, and lespedeza are the most common crops, and yields are fairly good in areas improved by artificial drainage. Corn yields 10 to 40 bushels an acre, but the average is comparatively low because of unfavorable conditions during wet seasons. Little or no fertilizer is used for corn. Soybeans produce 1½ to 2½ tons of hay an acre, and lespedeza produces ¾ to 1½ tons, depending on drainage and season.

Robertsville silt loam (0–2% slopes) (RL).—This soil occupies low stream terraces, chiefly in the lower parts of the large creek valleys, where it is closely associated with Taft, Tupelo, and Capshaw soils of the limestone valleys. It resembles Tyler very fine sandy loam in color and other profile characteristics, but unlike that soil was derived largely from limestone. These level or nearly level areas are more widely distributed throughout the valleys than the Tyler areas. Both external and internal drainage are slow. The slow internal drainage is difficult to improve because of the heavy tight lower subsoil.

Profile description:

0 to 6 inches, nearly white or very pale-gray to pale brownish-gray loose friable silt loam; organic matter in the upper 1 or 2 inches gives a dark color; strongly acid.
6 to 10 inches, light yellowish-gray friable silt loam; a few iron concretions; slightly mottled; finer textured and somewhat plastic with increasing depth; strongly acid.
10 to 30 inches, mottled pale yellowish-gray and brownish-yellow moderately friable heavy silty clay loam to silty clay splotched with reddish brown and reddish yellow; somewhat plastic when wet; heavier, tighter, and more plastic with depth; strongly to very strongly acid.
30 to 48 inches, mottled pale-gray and light reddish-brown plastic sticky clay; strongly to very strongly acid.

In general, it is fairly uniform in texture and color, but in areas bordering sandy soils or those receiving deposits of very fine sandy material, its friability varies somewhat. Although the surface relief is level or nearly level, slight undulations provide better drainage in places, and in these there is a yellower subsoil.

Use and management.—Probably 40 percent of Robertsville silt loam is cleared or partly cleared land used mainly for pasture. A small part of the cleared land is used for corn, sorghum, soybean hay, and lespedeza. It is better suited to forest and pasture than to field crops, and a large area is in forest consisting mainly of water-tolerant deciduous hardwood trees. When treated with lime and phosphate, the soil produces good pasture.

Rolling stony land (Colbert soil material) (2–12% slopes) (RsC).—Limestone outcrops and boulders are numerous in this soil type. The areas are distributed in many parts of the county, most of them on relatively gentle slopes at the base of steep stony slopes but a few on isolated knolls and on broad moderately rounded ridge tops in tracts of steep stony land. Although surface relief is predominantly rolling, there are some sharp breaks consisting largely of exposed bedrock and some small nearly level areas lying immediately above these sharp breaks.

The very heavy, sticky, and plastic soil among the rocks is Colbert soil material. The surface soil is dark olive drab to yellowish olive. The upper subsoil is yellow, and in the lower part it is mottled yellow, gray, red, and reddish brown. External drainage is rapid. Internal drainage is slow to very slow, largely because of the tight heavy soil material and the shallow depth to bedrock.

Use and management.—Practically all of Rolling stony land (Colbert soil material) is in cut-over forest. The trees are numerous in some places and few in others. They are mainly cedar but include redbud, willow, plum, and others. Some areas are used for woodland pasture and some for partly cleared pasture. In the partly cleared areas the pasture plants are probably volunteer and consist of lespedeza, hop clover, Dallis grass, and other common pasture plants.

The soil is productive, especially of grasses and clovers, but is too stony for cultivated crops. In general, its best use is for woodland pasture and trees. Some areas are suitable for open pasture, but very little can be done to improve the land even for pasture. The less stony areas could be cleared of trees and underbrush so that clovers and grasses might have more favorable growing conditions.

Rolling stony land (Muskingum soil material) (5–10% slopes) (RLM).—This land type consists of areas in nearly level saddles and on small plateaulike knobs and gentle to relatively strong slopes on the sandstone plateaus. It is associated with the shallow phases of Hartsells soils and with Crossville loam. Sandstone outcrops and boulders occupy much of the surface. The outcrops are nearly even with the surface in some places and project above it in others. The soil among the rocks consists of brown to light-brown friable earthy material derived from weathered sandstone mixed in some places with weathered shale.

The relief is predominantly rolling, although in some areas it is undulating. External drainage is fair to rapid, and internal drainage is good to fair in most areas but is slow where bedrock is near the surface. In wet seasons seepage water from the slopes generally makes the shallow areas wet, but in warm dry weather these areas are droughty.

Use and management.—Most of Rolling stony land (Muskingum soil material) is in forest. Natural vegetation consists largely of deciduous hardwoods. Pines are fairly common, especially on cut-over areas and on formerly cleared areas now grown up with forest vegetation. Scrub pine or Virginia pine was native to many of the areas that have shallow soil. Some of the soil is used for woodland pasture and some for open permanent pasture. Some small less stony areas are planted to home gardens, corn, and potatoes, but nearly everywhere the land is too stony for tilled crops. Selected areas can be improved for open pasture by the use of lime and phosphate or basic slag and by seeding with suitable pasture plants.

Rough gullied land (Dewey, Cumberland, and Colbert soil materials) (5–25% slopes) (RgD).—This rolling and hilly land type includes rough gullied areas occurring mostly on foot slopes in the red serrated hills along the Tennessee River. Some areas are widely distributed in other parts of the county and are associated with a great number of different soils in the limestone valleys and coves. Nevertheless, most areas were Dewey, Cumberland, and Colbert soils before accelerated erosion destroyed their profiles. The parent material is derived largely from limestone and shale and in some areas partly from sandstone. External drainage is very rapid to excessive. Internal drainage is generally good, but only a small quantity of moisture enters the soil because of the surface runoff.

Use and management.—All of Rough gullied land (Dewey, Cumberland, and Colbert soil materials) was once productive, but erosion has been so severe that it is now in nearly worthless pasture, practically idle, or abandoned to pines and a few other trees (pl. 8). It is so severely gullied and difficult to build up that individual owners cannot use it as cropland. Large machinery for terracing the land or large outlays of time and money are required to prepare the eroded surface for tillage or to hold it until improved pasture or other vegetation can build back a soil. Its best use, therefore, is for trees and volunteer pasture. Once established, kudzu might produce good periodic grazing and would help reclaim the soil from its eroded condition. The hilly areas are generally more severely gullied and more difficult to build up and maintain in a productive condition than the rolling ones.

Rough gullied land (Muskingum soil material) (6–20% slopes) (RgM).—This land type occurs mainly in the limestone valleys in close association with Allen and Jefferson soils. It is chiefly of material from sandstone, although there is some limestone material. A few areas are closely associated with Hartsells and Hanceville soils and consist mainly of material weathered from sandstone and acid shale. The areas are rolling to hilly, and external drainage is very rapid to excessive. Internal drainage is moderate to rapid. This soil is very difficult to reclaim for crop or pasture use and under present economic conditions is best used as woodland.

Rough stony land (Muskingum soil material) (20%+slopes) (RsM).—This land type is more complex in content, character of parent material, surface relief, and position than any other miscellaneous land type in the county. It occurs largely on the upper third of the rough stony slopes that extend from the sandstone plateaus to the floors of the limestone valleys. It includes many of the steeply sloping areas that lie below the sandstone formation and are covered by colluvial sandstone material. In places, especially in the upper parts of the valleys, coves, and hollows that are nearly surrounded by sandstone plateaus, this land covers practically all of the slopes. It also includes the sandstone escarpments and steep slopes of about the same elevation.

This land type is closely associated on the stony slopes with Limestone rockland (rough). These two stony lands are separated on the soil map by arbitrary boundaries, which roughly divide the steep rocky slopes covered mainly with sandstone material from the areas

in which the soil material exposed at the surface is almost wholly from limestone. Rough stony land (Muskingum soil material) consists largely of colluvial accumulations of sandstone material on limestone bedrock. Between the sandstone fragments is soil material derived mostly from sandstone. In places there are limestone outcrops, but the soil material among these outcrops is derived from sandstone colluvial material. The areas occupied by sandstone escarpments and by steep sandstone slopes above the limestone formation contain partly colluvial and partly residual material from sandstone.

On most slopes the sandstone formation ranges from about 100 to 200 feet thick. It is underlain by soft clay or moderately hard acid shale ranging from a thin layer to about 30 feet thick. In many places the clay or shale layer at the base of the sandstone formation makes a fairly definite nearly level to moderately sloping bench a few feet to more than 100 feet wide. On these slopes of mixed rock formation, soil areas large enough to show on the soil map are classified and mapped, but most of the areas are too small to be mapped separately, and the soils are too complex to be classified as definite soil types or phases.

The land type is similar to Hilly stony land (Muskingum soil material) in physical characteristics and external appearance but differs in surface relief, which is rough and generally steep. Slopes range from 20 to about 80 percent but are in most places from 20 to 40 percent. External drainage nearly everywhere is rapid to excessive, but on some of the benches it is fairly slow. In places the surface runoff disappears into sinks that have outlets in underground channels. The water may reappear at the surface somewhere down slope or in the valleys as springs. The outlets of the underground channels may be a great distance from the sinks into which the surface water empties, and some of them even may be on the opposite side of the mountain. Internal drainage is restricted and slow in places and fair to good in others, depending greatly on the depth of the sandy colluvial material to underlying limestone.

Use and management.—The escarpments and other exposed rocks on Rough stony land (Muskingum soil material) do not support vegetation, but little of the area is barren of plant life. The land is mainly in forest, to which it is best suited. The forest should be protected from fires to insure both the quality and quantity of the forest products. A few areas are in woodland pasture. Some areas are large enough for game preserves, especially for deer and turkey, but at present none of the land is used for this purpose.

Scrubby oaks, pines, briers, and in places cedars grow where there is enough soil in the cracks and crevices of the rocks. Sedges and grasses grow where the soil is too shallow to support trees. Most of the other parts of this rough stony land are in forest consisting largely of deciduous hardwoods, including various oaks and hickories, ash, yellow-poplar, beech, elm, ironwood, persimmon, buckeye, black walnut, and dogwood. Pines are common in places, and cedar is present in some localities, especially in ravines that penetrate into the underlying limestone and in areas of limestone outcrops. On many slopes, especially on the east and north, there are giant-sized dead chestnut trees, some more than 100 feet high. The present trees are

small and their stands light compared with the large trees and heavy timber stands the early settlers found. Considerable timber for lumber and other forest products, however, is taken annually from these areas.

This land is not suited to cultivation, because of the rocky surface and steep slopes. A few small areas of less stony surface and milder slope have been cleared for home gardens, orchards, or small plots of corn or potatoes. These areas are included because their small size does not justify their separation on the soil map. However, they are not representative of the land type as a whole.

Sequatchie fine sandy loam, undulating phase (2–5% slopes) (SFU).—This phase is fairly well distributed over moderately low to intermediate stream terraces throughout the limestone valleys. Many areas are in the valleys south of Scottsboro, near Lim Rock and Rash, north of Woodville, and west of Bridgeport and Stevenson. The alluvial parent material consists largely of sandstone material and to some extent limestone and shale materials.

Accelerated erosion is fairly active in most of the areas and has removed a fourth to half or more of the surface soil. External and internal drainage are generally good. External drainage, however, is slightly rapid in places, especially where sheet and shallow gully erosion have removed half or more of the surface soil. Severely sheet eroded or shallow gullied areas are designated on the soil map by symbol. The native vegetation is similar to that of other well-drained soils in the limestone valleys.

Profile description:

0 to 9 inches, dark grayish-brown to brownish-gray friable loose fine sandy loam to very fine sandy loam; strongly to medium acid.
9 to 14 inches, faintly variegated or slightly mottled yellowish brown and reddish-brown friable very fine sandy clay to fine sandy clay loam; slightly acid.
14 to 27 inches, yellowish-brown to yellowish-red friable fine sandy clay to very fine sandy clay; breaks readily into subangular fragments ¼ to ½ inch in diameter and becomes redder with depth; medium acid.
27 to 40 inches, yellowish-red friable to moderately friable fine sandy clay; becomes faintly mottled with yellow and brown in lower part of layer; strongly acid.

This soil varies in color and texture from place to place. In some areas fine to coarse water-worn pieces of gravel and pebbles are on the surface and in the soil. This phase is redder than the level phase, probably because of its stronger relief and more advanced profile development.

Use and management.—Nearly all of Sequatchie fine sandy loam, undulating phase, is cleared land used annually for general farm crops. It is very desirable for this use, as it is easy to till and easily penetrated by roots, has good moisture-holding capacity, and is very responsive to good management. Winter legumes for use as green manure do exceptionally well.

The field crops commonly grown include cotton, corn, soybeans, potatoes, sweetpotatoes, peanuts, and sorghum. Some areas are used for home gardens and orchards. Cotton yields ⅔ to 1½ bales an acre under management that includes applications of 250 to 400 pounds of 6–8–4 or other high-grade fertilizer. Corn yields 20 to 50 bushels an acre if it follows a winter legume or is side-dressed with 150 to 225 pounds of nitrate of soda an acre.

Sequatchie fine sandy loam, level phase (0–2% slopes) (SFV).—This phase occurs mainly on low stream terraces and occupies slightly higher areas than the closely associated soils in the first bottoms. It is similar to the undulating phase in most profile characteristics but differs in having level or nearly level surface relief and in being younger because it is developed from younger alluvial parent material. External drainage is slow. Internal drainage is good, especially in the surface soil and upper part of the subsoil. The native vegetation is similar to that on other well-drained soils in the limestone valleys.

Use and management.—Nearly all of Sequatchie fine sandy loam, level phase, is cleared for cultivation, and only a small part is in forest. The phase is suited to corn, cotton, soybeans, peanuts, sorghum, and potatoes, yields of which are fairly good. Winter legumes do less well than on the undulating phase because of the somewhat slower external drainage, but in most years they do fairly well. The soil is generally better suited to corn, soybeans, peanuts, and sorghum than to cotton.

Corn yields range from 25 to 40 bushels an acre when the crop is side-dressed with 150 to 225 pounds of nitrate of soda an acre or when it follows a winter legume. Winter legumes planted after cotton that has been fertilized with 250 to 350 pounds of 6–8–4 or other high-grade fertilizer are not fertilized. When legumes are grown in rotation with corn or other crops not treated with a complete fertilizer, however, an application of 400 to 600 pounds of basic slag seems to be required at the time of seeding. Cotton produces ⅖ to 1 bale an acre under management that includes applications of 250 to 350 pounds of 6–8–4 or other high-grade fertilizer an acre. Soybeans produce ½ to 2 tons of hay an acre.

The control of erosion is no management problem. Drainage, however, may be improved in some areas by ditches to carry off accumulated surface water.

Stony alluvium (Muskingum and Colbert soil materials) (0–2% slopes) (STM).—This land type consists of a mixture of angular rock fragments, cobblestones, pieces of gravel, pebbles, and fine to coarse soil particles deposited in higher parts of first bottoms in the limestone valleys by swift floodwaters. Most of the areas are near heads of narrow valleys and coves, especially at the mouth of long rock-walled hollows and deep V-shaped gulches, where swift runoff waters from steep stony slopes are discharged in relatively narrow first bottoms. Much coarse material consisting of sandstone, limestone, or chert fragments, or a mixture of these, is deposited on valley floors during heavy rains. In places the material between the rocks is dark colored and resembles the subsoil material of Egam silty clay loam. In other places it is mainly brown and resembles Bruno loamy fine sand or Lindside silt loam, or consists of a mixture of sand, sandy loam, and clay.

Use and management.—Stony alluvium (Muskingum and Colbert soil materials) is used mainly for pasture. A small part is in forest, and a little is cultivated. Small patches within the larger areas are sufficiently free of rocks and so situated that they can be used for corn, soybeans, or garden plots, especially if protected from flooding. The soil is suited best to pasture, however, and in most areas is productive of all common pasture plants. About the only practice nec-

essary for growing fair to good pasture is to keep the better soil areas cleared of briers and underbrush. Some forest cover must be kept on the land to hold back swift floodwater, otherwise the soil soon washes away.

Sturkie fine sandy loam (0–2% slopes) (St).—This level to nearly level soil occupies areas in the relatively wide first bottoms in all parts of the limestone valleys. The larger areas, however, occur mostly in the upper parts of the valleys and coves. The parent material consists largely of sandstone material derived directly or indirectly from the sandstone formation capping the high plateaus that almost surround the limestone valleys but it also contains some shale and limestone material. External drainage is fair to good, and internal drainage fair to slow. The soil is subject to overflow from adjacent streams. The overflows occur especially in winter but may come during the growing season and damage crops considerably.

Profile description:

0 to 8 inches, pale grayish-brown fine sandy loam; in the upper 3 inches organic matter gives a dark grayish-brown color; slightly acid.
8 to 20 inches, brownish-yellow friable fine sandy loam to fine sandy clay loam; becomes faintly mottled with gray and brown in lower part of layer.
20 to 42 inches, pale grayish-yellow or light-gray mottled with yellow and brown very friable fine sandy clay loam or very fine sandy clay; becomes somewhat plastic and sticky with depth; slightly acid.

The main variation is in content of fine and very fine sand. In places the surface soil is very spotty and ranges from loamy fine sand to silt loam within short distances. The subsoil is generally fairly heavy and in places is sticky and plastic in the lower part.

Use and management.—Not more than 60 percent of Sturkie fine sandy loam has been cleared, and not more than 50 percent of the cleared land is used annually for tilled crops. The most common use for the rest of the cleared land is permanent pasture. The soil is suited to pasture, and under good management yields are good. Natural vegetation consists chiefly of deciduous hardwoods.

The main crops are corn, soybeans, lespedeza, and sorghum. Selected well-drained areas are used for potatoes, sweetpotatoes, and home gardens. Corn produces 20 to 40 bushels an acre with little fertilization. Soybeans produce 1¼ to 2 tons of hay an acre, and lespedeza yields ¾ to 1½ tons, depending on the season.

Swaim silty clay loam, rolling phase (5–12% slopes) (Sco).—Sloping colluvial areas of tough clayey material derived chiefly from limestone are occupied by this soil. Much of it lies on gentle valley slopes adjacent to the rough mountainous slopes from which some of this soil material has been carried by runoff water. The areas are intermingled with Colbert soils and other soils of the Swaim series. Like the other Swaim soils, this one is widely distributed throughout the Paint Rock River valley, the many tributary valleys along the western side of the Tennessee River valley, and to the east of the Tennessee River in the northeastern part of the county. Internal drainage is slow and runoff is great.

Part of this phase, especially the areas along the drainways, consists of young or comparatively recent local alluvium, whereas the higher lying parts are of older colluvium and accordingly have more definite surface and subsoil layers. The lower lying or younger parts resemble Abernathy silt loam, undulating phase, in some respects, and the higher lying parts, Hermitage silty clay loam, eroded rolling phase. This soil, however, differs from the Abernathy and Hermitage soils in having a decidedly finer texture and a firmer more plastic consistence.

Profile description:

0 to 5 inches, yellowish-brown to grayish-brown moderately friable silty clay loam; somewhat sticky and plastic when wet.
5 to 9 inches, yellowish-brown to reddish-yellow firm silty clay loam with a fine nut structure; relatively hard when dry, sticky and plastic when wet.
9 to 24 inches, yellowish-brown or light reddish-brown silty clay with a medium nut structure; sticky and plastic when wet.
24 to 40 inches, mottled yellow, gray, and brown stiff plastic silty clay.

This medium acid soil has a moderate quantity of organic matter in the surface layer. In some places, especially in the northern part of the Paint Rock River valley, chert is common throughout the soil mass. The soil material in some places, chiefly in the vicinity west of Fabius, contains an appreciable quantity of sand and sandstone fragments. Here the parent material consists of a small quantity of material from sandy soils of the sandstone plateaus and rough mountain slopes mixed with material of limestone origin.

Use and management.—The clayey texture of the surface soil and the compact tough subsoil make this soil a little difficult to work and conserve. Tillage is somewhat difficult, and the soil cannot be worked under a wide range of moisture conditions. The subsoil is only slowly permeable, and rapid runoff presents a serious hazard on moderate slopes.

The native vegetation was predominantly deciduous hardwoods. All of the soil has been cleared and cultivated, and most of it is now used for crops. Cotton, corn, and lespedeza predominate. A moderate application of mixed fertilizer is used on cotton, but in general other crops receive little or no treatment. Some legume crops are grown for cover and green manure. Many areas are used for cotton several years in succession. Under average conditions, cotton yields about 220 pounds of lint; corn, 30 bushels; and lespedeza, about ¾ ton an acre.

Moderately long rotations, consisting chiefly of close-growing legume and hay crops, are well suited. Tillage operations should be with the contour. Strip cropping is of value in reducing runoff hazard on the longer slopes. Legume cover crops following row crops can be expected to improve the organic-matter content, contribute to the general fertility, and decrease erosion in winter. Lime and fertilizer are required to maintain the soil in a highly productive state. Mixed legume-and-grass pasture produces well, but fertilization, liming, and proper seeding are necessary in order to establish a good stand. Moisture conditions, however, are notably less favorable for pasture through the drier midsummer season than in many more permeable friable soils.

Swaim silty clay loam, eroded rolling phase (5–12% slopes) (Scn).—This phase is widely distributed throughout the Paint Rock River valley, the main tributaries along the western side of the Ten-

nessee River valley, and those to the east of the river in the northeastern part of the county. This phase has a finer textured less friable surface layer than the rolling phase and represents areas of the rolling phase that have lost approximately 50 to 75 percent of their original surface soil through erosion.

The plow layer, or surface 6 inches, is a mixture of the original surface soil and subsoil materials and in general is dark yellowish-brown or reddish-yellow silty clay loam or silty clay that is hard when dry and sticky and moderately plastic when wet. Below a depth of about 18 inches the soil is mottled yellow, gray, and brown plastic silty clay. This soil is strongly acid and low in organic matter.

In some places, especially in the northern part of the Paint Rock River valley, chert is common throughout the soil mass. In other places, especially northwest of Fabius, where the soil material contains an appreciable quantity of sand and sandstone fragments, the parent material consists of a small quantity of material from sandy soils of the standstone plateaus and rough mountain slopes mixed with material of limestone origin.

Use and management.—All of Swaim silty clay loam, eroded rolling phase, has been cleared. About 50 percent is used for crops, and the rest is used chiefly as pasture. A rotation of tilled crops and lespedeza pasture is common. Cotton receives moderate applications of complete fertilizer, but other crops are less commonly fertilized. Yields under average management are a little lower than on the rolling phase.

This is a moderately productive soil, but good management is required if it is to be built up and maintained at a high level of producivity. Runoff is active on most areas, as percolation of moisture is much slower than in many of the more friable soils, and the slope, though not strong, is sufficient to accelerate runoff where the soil is not well protected by a vegetative cover. Workability is a little more difficult than that of the rolling phase because there is more clay in the plow layer.

Moderately long rotations consisting chiefly of close-growing small-grain and hay crops and legume winter cover crops following the row crops, are suited. Permanent pasture is suited where it has been properly fertilized, limed, and seeded, although the carrying capacity of the pasture is less well maintained through the dry late summer than on some other soils having better moisture relations.

Swaim silty clay loam, severely eroded rolling phase (5–12% slopes) (Scd).—This soil is widely distributed throughout the Paint Rock River valley and tributary valleys of the Tennessee River valley, especially those on the western side. It is associated with other Swaim soils. Differing from the rolling phase chiefly in having a decidedly less friable more clayey plow layer, it represents areas of the rolling phase that have lost practically all of their original surface soil and in places part of the subsoil as a result of erosion. The surface 10- or 12-inch layer is yellowish-brown or reddish-yellow heavy plastic silty clay, below which the soil is mottled yellow, gray, and brown plastic silty clay.

The very slow percolation through the plow layer and the sublayers, together with the moderate slope, causes runoff to be excessive and difficult to control. The entire profile is medium to strongly acid and low in content of organic matter. Some areas have a moderate quantity of chert throughout, and a few have a notable admixture of sandy material.

Use and management.—All of Swaim silty clay loam, severely eroded rolling phase, has been cleared and cultivated. The soil is now used chiefly for pasture, but a small part is under a reestablished forest cover in which pine predominates. Because of its low fertility, unfavorable moisture relations, and poor tilth, this land is only fair for crops.

Long rotations consisting chiefly of adequately limed and fertilized close-growing pasture, hay, and fall-sown small grains can be used to advantage in stabilizing the soil and increasing its productivity. Tillage on the contour and perhaps strip cropping are helpful in keeping runoff at a minimum. Many areas are best used for permanent pasture, but those most difficult to stabilize and maintain productive should be reforested.

Swaim silty clay loam, undulating phase (2–5% slopes) (Scu).—Much of this soil lies on gentle valley slopes adjacent to the rough mountain slopes from which a great part of the soil material has been removed. The phase is associated with other Swaim soils and those of the Colbert and Talbott series. It is widely distributed throughout the Paint Rock River valley, the tributary valleys along the western side of the Tennessee River valley, and east of the Tennessee River in the northeastern part of the county. These colluvial areas consist of recently deposited clayey material derived chiefly from limestone. Internal drainage is slow, but runoff is less rapid than on the rolling phase.

Profile description:

0 to 5 inches, grayish-brown to reddish-brown moderately friable silty clay loam, somewhat sticky and plastic when wet; weakly acid.
5 to 10 inches, yellowish-brown to light reddish-yellow heavy silty clay loam; moderately friable under optimum to moderately dry moisture conditions; sticky and plastic when wet.
10 to 26 inches, yellowish-brown silty clay mottled with yellow, brown, gray, and red in the lower part; has a medium nut structure; sticky and plastic when wet; strongly to medium acid.
26 to 40 inches, mottled yellow, gray, and brown stiff plastic silty clay; strongly acid.

The surface soil has a moderately high content of organic matter. A few areas have a moderate quantity of chert throughout the soil mass, and in places some sandstone fragments and noticeable quantities of sand are intermixed with the soil. Stoniness, however, is not common.

Use and management.—The native vegetation of Swaim silty clay loam, undulating phase, was predominantly deciduous hardwood. Practically all the acreage has been cleared, and much is used now for crops. Corn is the dominant crop, and cotton, soybeans, and lespedeza are common. Cotton is treated with a moderate quantity of mixed complete fertilizer, but other crops generally are not fertilized. Where crops follow cotton, however, they probably benefit to some extent from the treatments for the cotton. Under average management, cotton yields about 280 pounds of lint an acre; corn, about 30 bushels; and soybeans, about 1½ tons of hay. Johnson grass is a common hay crop in places, but many farmers consider it too much like a weed and do not encourage its growth.

The phase is fairly productive and has good workability. It is not difficult to conserve, although runoff is active on the more sloping

parts. It must have some fertilizer, lime, and organic matter if it is to be improved and maintained in a high state of productivity. Rotations of moderate length consisting of row crops alternated with close-growing hay and fall-sown small grains are feasible. The use of legume winter-cover crops would protect the soil and increase the organic matter.

Swaim silty clay loam, eroded undulating phase (2–5% slopes) (SCE).—This phase is widely distributed throughout the Paint Rock River valley, the tributaries of the Tennessee River valley from the west and northwest, and east of the Tennessee River valley in the northeastern part of the county. It is associated with other Swaim soils and Colbert and Talbott soils. It has a finer textured but less friable surface layer than the undulating phase but otherwise closely resembles it. In general it represents areas of the undulating phase that have lost approximately 50 to 75 percent of their original surface soil through erosion.

The plow layer, or surface 6 inches, is a mixture of original surface soil and subsoil materials and in general is dark yellowish-brown or reddish-yellow silty clay loam or silty clay that is hard when dry and sticky and moderately plastic when wet. Below a depth of about 20 inches is mottled yellow, gray, and brown plastic silty clay. The soil is medium to strongly acid and moderately low in organic matter. Some areas have a moderate quantity of chert throughout the soil mass and some sandy material intermixed.

Use and management.—All of Swaim silty clay loam, eroded undulating phase, has been cleared and cultivated, and most of it is now used for general farm crops. It is well suited to most crops commonly grown and is considered somewhat better suited to cotton, which is the dominant crop, than to corn. Lespedeza, soybeans, and cowpeas are also planted. Crop yields for the most part are a little lower than on the undulating phase.

The soil is fertile, has fairly good tilth, and has fairly good moisture relations. Nonetheless, plants are injured by dry weather somewhat sooner than on some of the more permeable soils. The runoff is a little greater than on the undulating phase, but under good management this soil is suited to moderate-length rotations. When properly fertilized, limed, and seeded, it is productive of pasture.

Taft silt loam (0–2% slopes) (Ts).—This soil occurs on level or nearly level low stream terraces in the limestone valleys, occupying areas only slightly higher than those of Robertsville silt loam. The irregularly shaped areas are fairly widely distributed but are most common in those parts where soil material is derived from chert ridges and sandstone plateaus. The most nearly typical areas are on the low stream terraces extending from the valley southwest of Stevenson to Fackler and south of Bellefonte and on the low stream terraces in the valley of North Sauty Creek southwest of Scottsboro. In these places the parent material is modified by loose floury silt derived from chert ridges. In the valley of North Sauty Creek the soil is closely associated with Tyler, Holston, Sequatchie, Robertsville, Capshaw, and Etowah soils.

This soil is intermediate in drainage between Robertsville and Capshaw soils. It is similar in color profile and drainage to Tupelo silt loam soils, but differs in having a friable subsoil. The alluvial parent material is derived largely from limestone and is similar to that of Robertsville, Capshaw, and Etowah soils. External drainage is slow, but its movement is increased somewhat by shallow swales that penetrate into or extend across the soil areas. Internal drainage is fairly slow and becomes slower in the lower subsoil. The water table is near the surface most of the time in winter and in wet periods. Internal drainage can be easily improved with ditches or tile because the subsoil is friable and loose.

The natural vegetation consists mainly of deciduous hardwoods common to soils of similar drainage in the limestone valleys. It includes some water-tolerant trees. Scattered pines grow in places on well-drained hummocks, and cedars grow along shallow swales, especially along those that carry lime-bearing waters from limestone slopes in the uplands.

Profile description:

0 to 5 inches, pale-gray to yellowish-gray loose floury silt loam; organic matter gives upper part of layer a fairly dark color, especially under moist conditions; strongly acid.

5 to 14 inches, pale grayish-yellow friable heavy silt loam grading to silty clay loam; uniform in color when moist; when dry, faintly variegated with gray, yellow, and light brown; strongly acid.

14 to 28 inches, faintly mottled pale grayish-yellow, yellowish-brown, and light reddish-brown friable silty clay loam to silty clay; somewhat plastic in lower part of layer; very strongly acid.

28 to 42 inches, pale-gray silty clay mottled with yellowish brown and reddish brown; friable when moderately dry but sticky and plastic when wet; very strongly acid.

Variations in the color of the profile are common; the color varies from gray to yellow or brownish yellow, especially in the subsoil, but is commonly pale. Slight variations in drainage are strongly reflected in the color of the soil. The better drained areas are more yellow and less gray and have fewer splotches or mottlings. The splotches and mottlings are gray, yellow, brown, and in places red and reddish brown.

Use and management.—Probably 70 percent of Taft silt loam has been cleared for cropland and permanent pasture. Some of the uncleared land is in woodland pasture. Corn, soybeans, lespedeza, and cowpeas are the dominant crops. The soil is fairly responsive to management and gives fair to good crop yields. Some artificial draining is ordinarily necessary for good crop production. Cotton is planted on a few selected better drained areas. The soil is not well suited to winter legumes, because it has a high water table. Winter oats and other small grains are seldom grown except where the soil is artificially drained to prevent water from standing on the surface and to provide outlets for internal drainage. This soil is well suited to pasture grasses.

Talbott silt loam, undulating phase (2–5% slopes) (TBU).—Most of this phase occupies gentle upland slopes in the limestone valleys directly below and adjacent to the rough mountainous slopes. Some areas, however, are in the central part of the Tennessee River valley and disassociated from the rough mountainous slopes. Argillaceous limestone bedrock occurs at a depth of 24 to 90 inches and in places at more than 120 inches. Although the Talbott soils generally consist of clayey residuum formed in place, much of the material has

been water-shifted from adjacent areas of Colbert and Talbott soils, rolling stony land types, and limestone rockland types. Talbott soils resemble the Dewey, differing essentially in having a more plastic clayey subsoil and a shallower depth to bedrock. Internal drainage is slow.

Profile description:

0 to 9 inches, brown granular silt loam grading with depth to more compact silty clay loam.
9 to 30 inches, yellowish-red or reddish-yellow stiff silty clay containing some nearly black concretions.
30 to 72 inches, reddish-yellow tight or compact silty clay; faintly mottled with yellow; very plastic when wet; grades with depth to mottled red, yellow, and gray plastic clay over bedrock limestone.

This medium acid soil does not have a high organic-matter content. The surface soil ranges from grayish brown to reddish brown; the subsoil, from yellowish brown to brownish red. Chert fragments and limestone rock fragments are common in places, and small rock outcrops occur in some areas.

Use and Management.—The native vegetation on Talbott silt loam, undulating phase, consisted chiefly of deciduous hardwoods, with pines or cedars intermixed in places. Most of the acreage is now used for crops. At one time the soil was used almost exclusively for cotton, but now lespedeza, soybeans, and corn are also commonly grown. Winter legumes and fall-sown small grains are used in the rotations in many places. Cotton is fertilized, but under common management other crops receive little or no fertilizer and legume cover crops are not grown regularly.

The phase is moderately productive and fairly easily worked. Because of its compact clay subsoil, however, it requires special care if runoff is to be adequately controlled. Lime, phosphorus, and organic matter are especially necessary in order to maintain a high state of productivity and good tilth. Moderately long rotations including close-growing fall-sown grains and legumes and, in places, contour tillage are good management practices.

Where the soil receives good management and 300 to 400 pounds of 6–8–4 fertilizer or its equivalent is applied, cotton yields 300 to 400 pounds of lint an acre. Under good management that includes turning under a winter legume or side dressing with 150 to 225 pounds of nitrate of soda, corn yields 35 to 45 bushels an acre. Soybean hay, seeded after a crop of cotton grown under good management, produces 1½ to 2 tons. Lespedeza yields about 1½ tons of hay under the same conditions.

Talbott silty clay loam, eroded undulating phase (2–5% slopes) (Tce).—Most of this phase occupies gentle upland slopes in the limestone valleys directly below and adjacent to the rough mountainous slopes. Some areas are in the central part of the Tennessee River valley. The soil occurs in association with other Talbott soils. In general, it is reddish-brown silty clay loam, but on the more exposed parts where subsoil material predominates, the material is yellowish-red stiff silty clay. Below a depth of about 24 inches the soil is reddish-yellow, faintly mottled with yellow, tight or compact silty clay. This material is very plastic when wet, and it grades with depth to mottled red, yellow, and gray plastic clay. Bedrock limestone is at a depth of 48 to 84 inches.

The surface soil is thinner and has more nearly a silty clay loam texture than Talbott silt loam, undulating phase. It represents areas of the silt loam that have lost 50 to 75 percent of the original surface soil through erosion. The 4- to 6-inch plow layer consists of mixed original surface soil and subsoil materials. The average relief is a little more rolling than that of the silt loam, and internal drainage is slower.

Use and management.—All of Talbott silty clay loam, eroded undulating phase, has been cleared, and most of it is now used for general farming. Cotton predominates, but winter oats are common, and soybeans and lespedeza are the most important hay crops. Yields are more variable than on the less eroded silt loam phase.

Although productive, this phase has a higher clay content and shallower depth to plastic clay subsoil than the less eroded silt loam phase. It is therefore less desirable for crop production. The quantity of moisture available to crops is lower, as is also the general fertility. The plow layer is a little more difficult to till, and runoff control is somewhat more of a problem. More care is required to maintain a high state of fertility and to keep the soil material stable. In general, close-growing crops are a more essential part of the rotation, and tillage operations are more hazardous.

Talbott silty clay loam, eroded rolling phase (5–12% slopes) (Tcn).—The small to moderate-sized tracts of this phase are associated with other Talbott soils and those of the Colbert series. Most of them are on gentle slopes at the base of rough mountainous slopes in the limestone valleys. This phase represents areas of Talbott soil having a rolling surface and a plow layer consisting of a mixture of original surface soil and subsoil material.

In general 50 to 75 percent of the original surface layer has been lost through erosion, and the plow layer consists of reddish-brown silty clay loam. On the more exposed slopes or knobs the plow layer consists almost wholly of yellowish-red stiff silty clay. Below 20 inches is reddish-yellow tight or compact silty clay faintly mottled with yellow. This layer is very plastic when wet and grades with depth to mottled red, yellow, and gray plastic clay. Bedrock limestone is at a depth of 48 to 80 inches or more. In places some chert or limestone fragments occur throughout the soil mass, and there are small rock outcrops in a few places. The entire soil is medium acid.

Use and management.—All of Talbott silty clay loam, eroded rolling phase, has been cleared. About 70 percent is used for crops, and most of the rest for pasture. A small part has reverted to forest, chiefly pine. Cotton, lespedeza, soybeans, and corn are the dominant crops, and yields under average conditions are a little lower than for Talbott silt loam, undulating phase. The stronger slope and moderately eroded condition make this soil somewhat less desirable for crop production than the silt loam. The moisture-holding capacity is a little lower, tilth conditions on the more eroded parts are unfavorable, and control of runoff is more difficult.

Adequate fertilization and liming, moderately long rotations consisting chiefly of close-growing fall-sown grain and hay crops, and periods of perennial pasture are necessary to maintain this soil in a relatively high state of productivity. Tillage operations on the contour and strip cropping help to control runoff. This soil responds well

to good management, and yields of 30 bushels of oats or about 1 ton of lespedeza an acre can be expected under such treatment.

Talbott silty clay loam, severely eroded rolling phase (5–12% slopes) (TcD).—This phase is distinguished from the undulating phase of Talbott silt loam by its reddish stiff silty clay plow layer and its rolling surface. It represents rolling or sloping parts of Talbott soils that have lost practically all of their original surface soil and in places part of the subsoil as a result of erosion. Most of the areas are small, and a great many are composed of single slopes in more extensive areas of less eroded Talbott soils. Internal drainage is slow, and owing to the slow rate of absorption, runoff develops quickly.

The upper 15 or 20 inches are yellowish-red or reddish-yellow stiff silty clay, below which the soil is reddish-yellow, faintly mottled with yellow, tight or compact silty clay becoming more mottled with depth. There are some small rock outcrops. The entire soil is strongly acid and low in organic matter. Small gullies are common but most of them can be obliterated by tillage. A few limestone boulders and in places limestone bedrock are exposed in some of the deep gullies.

Use and management.—All of Talbott silty clay loam, severely eroded rolling phase, has been cleared and cropped, but some now is lying idle or has been reforested by volunteer pine. Permanent pasture of mixed legumes and grasses is well suited where the soil is not required for crops. Unfavorable tilth, low moisture-holding capacity, and strong slope limit the suitability of the soil for crops, and yields generally are low. Serious erosion losses cannot be prevented where row crops are grown frequently.

Under average conditions little fertilization is practiced on areas that have been cropped, and the soil is eroding. When properly fertilized, limed, and seeded, permanent pasture has a fair carrying capacity. Nevertheless, the capacity is notably lower than that of more permeable soils that have a better supply of moisture available to plants. Sericea lespedeza for pasture or hay is a suitable crop, but care and fertilization are required in developing a stand. After the crop becomes established, it yields an abundance of forage if it is properly cut or grazed. Use of long rotations, chiefly of close-growing grains, hay, and pasture crops, and adequate fertilization and liming are of great value in improving the productivity.

Tellico clay loam, eroded rolling phase (2–12% slopes) (TLN).—This upland soil has developed over interbedded shale, sandstone, and limestone. It occupies undulating to rolling moderately wide ridge tops and benches on the red serrated hills along the Tennessee River. The areas are associated with the Armuchee soils, which occupy the stronger slopes. Many areas are almost inaccessible because of adjacent strong Armuchee slopes and the arms or embayments of Guntersville Reservoir. Runoff is slightly excessive and internal drainage moderate. Erosion is active in cultivated areas, and much of the original surface layer has been lost. The native vegetation consisted chiefly of deciduous hardwoods with some pine and cedar intermixed.

Profile description:

0 to 6 inches, reddish-brown friable clay loam consisting of a mixture of the original surface layer and upper subsoil material; some sand.

6 to 10 inches, reddish-brown friable but firm clay loam or silty clay; very sticky when wet, waxlike when moderately dry.

10 to 24 inches, very friable brownish-red silty clay; breaks to soft crumbs but is sticky when wet; numerous small dark concretions.

24 to 48 inches, variegated or mottled dark reddish-brown and yellow massive silty clay; crumbles easily but sticky when wet; grades to unweathered shale with depth.

The surface layer varies in texture from loam to clay loam, depending chiefly on the degree of erosion. In places the surface 6 or 8 inches may consist of the original loam surface soil, but there are localities where the soil consists entirely of silty clay subsoil material. Unweathered shale is at a depth of about 3 to 6 feet on the slopes, but at greater depth on the more gently sloping benches and slope bases, especially in those parts where there are accumulations of colluvial material. Most areas are practically chert free, but chert fragments throughout the entire soil mass are common to some areas. The fragments, however, are seldom sufficiently abundant to interfere materially with tillage.

Use and management.—Although Tellico clay loam, eroded rolling phase, is moderately fertile, it is strongly acid throughout its entire depth and therefore requires lime for many crops. It is easily worked and responds well to good management but is notably subject to erosion. Under good management it is suited to most crops commonly grown. Most of it has been cultivated, and about 60 percent of it is now cropped. Most of the untilled acreage is in pasture; although small parts are idle or in forest.

Cotton is the chief crop, and lespedeza, corn, and soybeans are commonly grown. Lespedeza is commonly rotated with cotton and is used for both hay and pasture, chiefly pasture. Under common management, which includes some fertilization, cotton yields about 280 pounds of lint an acre. With moderately heavy applications of fertilizer (300 to 400 pounds of 6–8–4), 300 to 400 pounds of lint an acre are obtained. Yields of lespedeza hay vary, depending on the rainfall distribution during the growing season. Corn is not commonly grown, but when it follows a winter legume it yields about 30 bushels an acre.

Owing to the susceptibility of the soil to erosion, moderately long rotations consisting chiefly of fall-sown grain crops, legumes, and grasses are required. Contour tillage and strip cropping may be feasible in controlling erosion. Permanent stands of sericea lespedeza and kudzu are well suited to areas not required for regular cropping.

Tellico clay loam, severely eroded rolling phase (5–12% slopes) (TLD).—Practically all of this phase occurs as small areas on the serrated hills along the Tennessee River and in Hog Jaw Valley. It represents areas of rolling Tellico soils from which practically all of the original surface layer has been lost as a result of erosion. Most areas have gullies, some of which are deep and constantly being enlarged. The soil is associated with the eroded rolling phase and the Armuchee soil. The plow layer consists of reddish-brown clay loam or silty clay that is usually friable but firm when moderately moist and very sticky when wet. At a depth of 40 inches the soil is mottled or variegated brownish-red and yellow silty clay. Unweathered or partly weathered shale is at a depth of 2 to 5 feet.

Use and management.—All of Tellico clay loam, severely eroded rolling phase, has been cultivated, but most of it is now either idle or

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used as unimproved pasture. Chiefly because of its low productivity and the difficulty of conserving it when cropped, it is best suited to either permanent pasture or forest. Annual lespedeza, hop clover, Dallis grass, and certain other common grasses are well suited. In order to establish a good vegetative cover, heavy fertilization and liming will be required. Kudzu and sericea lespedeza are suited and with proper fertilization will establish a good cover within a short time.

Tupelo silt loam, level phase (0–2% slopes) (Tuv).—Like other Tupelo soils, this phase occupies moderately low stream terraces consisting of alluvium, chiefly of limestone origin, with which some material from sandstone and shale is intermixed. Relatively large areas are widely distributed throughout the broader tributary valleys of the limestone valleys. Internal drainage is slow to very slow, chiefly because of the compact tight subsoil.

Profile description:

0 to 6 inches, yellowish-gray friable silt loam.
6 to 10 inches, faintly mottled grayish-yellow and light yellowish-brown moderately friable silty clay; plastic when wet.
10 to 30 inches, mottled yellowish-brown and gray tight clay; sticky and plastic when wet; easily broken or cracked into hard irregular fragments when dry.
30 to 48 inches, pale-gray to bluish-gray heavy sticky clay somewhat mottled with brownish yellow and very dark brown.

The surface layer in general is medium acid, and the sublayers very strongly acid. The depth to bedrock limestone ranges from 2 or 3 feet in some places to more than 8 feet in others. Iron concretions are sufficiently abundant in places to form a fairly solid hardpan at a depth of 12 to 30 inches. These small hardpan areas generally occur as strips 5 to 10 feet wide and 50 to 100 feet or more long. They are generally in shallow draws, swales, or small depressions too small to be shown separately on the soil map.

Use and management.—About 50 percent of Tupelo silt loam, level phase, is in native forest consisting chiefly of deciduous hardwoods—water, post, and white oaks, and shell or scaly-bark and black hickories. Willows, maples, elms, ironwood, beech, yellow-poplar, red or sweetgum, blackgum, dogwood, and cedar are among the less common trees. Much of the acreage not forested is used for crops, chiefly corn and hay and pasture crops.

The soil is not difficult to work, although tillage operations are retarded by slow internal drainage. Chiefly because of its low fertility, compact subsoil, and poor internal drainage, the soil is not well suited to such tilled crops as cotton and alfalfa. It is a cold soil, and the planting of many crops has to be delayed in spring. Under natural drainage conditions it is relatively well suited to pasture grasses and some clovers, but productive pasture also requires adequate fertilization and liming and proper seeding.

Erosion is not a hazard, and under proper management, including adequate fertilization, liming, and surface drainage, the soil responds fairly well. Artificial drainage by open ditches greatly improves this soil for crops and makes it productive of cotton in some areas. Winter oats and cover crops do fairly well on the drained areas, although even these areas become wet in some seasons and crops are damaged. Summer legumes and lime are useful in increasing productivity.

Tupelo silt loam, undulating phase (2–5% slopes) (Tuu).—This soil occurs in association with the level phase and with soils of the Capshaw, Monongahela, and Colbert series. It is very gently rolling or undulating, except along the sharp breaks of the stream terraces adjacent to the bottom lands, where the gradient may be 7 percent. Few of the terraces, however, rise more than 4 feet above the adjacent bottom lands. Drainage is somewhat better than for the level phase, but the characteristics of the two soils are otherwise similar. The subsoil of the undulating phase, however, is more consistently yellow, and the areas are more irregular in size and shape.

Use and management.—The fertility of Tupelo silt loam, undulating phase, is moderately low, but its workability is fair to good. Its moisture-holding quality is fair to good, but the tight compact subsoil limits its suitability somewhat. Cotton and alfalfa ordinarily do not produce nearly so well as on the Dewey and Waynesboro soils.

About 80 percent of this soil is cleared and cropped, and parts have been artificially drained by surface ditches. Corn, cotton, sorghum, and pasture are the chief crops. Some fertilizer is used for cotton, but only a small quantity is applied to the other crops. Under average conditions, corn yields about 15 bushels an acre where artificial drainage has not been installed.

This phase responds well to adequate fertilization, and exacting management is not required to keep it from eroding. Its better surface drainage makes it more suitable than the level phase for fall-sown crops, as oats and winter-legume cover crops. Nonetheless, its relative wetness in winter is a danger to such crops. Corn can be expected to respond well if 400 to 600 pounds of 16-percent phosphate fertilizer is followed 30 to 40 days later by a side dressing of 150 to 225 pounds of sodium nitrate. Where lespedeza and soybeans do not follow a heavily fertilized crop, they can be improved by moderately heavy applications of phosphorus.

Tyler very fine sandy loam (0–2% slopes) (Tv).—This very poorly drained soil consists largely of material derived from sandstone and shale with some limestone material intermixed. Most of it occupies nearly level low stream terraces. Slightly depressional swales or shallow drains extend into these terraces from first bottoms and other adjoining lowlands. The small separate tracts are fairly well distributed throughout the upper parts of the larger creek valleys and coves of the limestone valleys. Some fairly large areas are in the lower part of the Paint Rock River valley. The soil is commonly associated with Holston and Monongahela soils. Both surface and internal drainage are very slow. In many respects this soil resembles Robertsville silt loam, the chief distinguishing characteristic being that the Tyler soil is more sandy.

Profile description:

0 to 3 inches, gray to nearly white very fine sandy loam.
3 to 10 inches, pale yellowish-gray very fine sandy loam; slight or faint brown and yellow mottlings.
10 to 28 inches, mottled grayish yellow and brown moderately friable but decidedly firm very fine sandy clay or silty clay; more compact and plastic with depth.
28 to 44 inches, mottled bluish-gray, brown, and brownish-yellow plastic clay; in places the bluish and yellowish mottlings are lacking.

The entire profile is medium to very strongly acid and very low in organic matter. The texture of the surface soil is coarser in many of the areas at the upper ends of the valleys, these areas being closer to the soils of the sandy plateaus and mountain slopes. The depth of the surface layer ranges from 7 to about 12 inches, and the color of the subsoil from gray to mottled grayish yellow, brown, and gray.

Use and management.—Tyler very fine sandy loam is largely in forest, and the chief use for the cleared land is pasture. The native vegetation is chiefly deciduous hardwoods, with water and post oaks, ash, elm, yellow-poplar, and beech predominating. The limited part cropped is used for soybeans, sorghum, lespedeza, and corn. Under average management, which includes limited fertilization but no cover crops or artificial drainage, yields are usually low. Corn yields about 8 bushels, and lespedeza, about ⅗ ton an acre.

Chiefly because of its very slow drainage and low fertility, this soil is poorly suited to crops. Much of it, however, will afford good pasture if adequate lime and fertilizer are applied, proper seeding is carried out, and good surface drainage is established. Surface drainage by means of ditches improves suitability for both crops and pasture. Tile drainage is less feasible in most places because of the tight or very slowly pervious clay subsoil. Drained areas are used for corn, lespedeza, grain sorghum, and soybeans. Selected better drained areas are planted to cotton, and yields are satisfactory.

Waynesboro fine sandy loam, undulating phase (2–5% slopes) (WNU).—This phase is associated with other members of the Waynesboro series and with Holston and Sequatchie soils. It occurs as small irregular well-drained areas on relatively high stream terraces. Like the other Waynesboro soils, the parent material is a mixture derived from sandstone, shale, and limestone. The native vegetation was predominantly deciduous hardwoods, chiefly oak and hickory.

Profile description:

0 to 7 inches, grayish-brown very friable fine sandy loam or loam.
7 to 12 inches, yellowish-brown friable fine sandy loam or loam grading with depth to sandy clay loam.
12 to 28 inches, yellowish-red friable clay loam that becomes deeper red with depth; nutlike structure; firm but moderately permeable to both roots and moisture.
28 to 66 inches, brownish-red or deep red friable clay loam; breaks easily into nutlike fragments; moderately sticky and plastic when wet; generally finer textured in the lower part.

The entire soil mass is medium to very strongly acid, the lower part being more acid than the surface layer. The content of organic matter is greater than that of the Holston soils but is not so great as that of the Cumberland. The texture of the sublayers varies. In many places the soil is relatively free of sand and is made up of silty clay loam or silty clay. In other places there are streaks or thin layers of coarse gravel, pebbles, or chert in the deep subsoil. In some areas gravel, stones, pebbles, and cobbles occur throughout the soil mass, and in a few places these are sufficiently abundant to interfere somewhat with tillage. Some of the more gravelly areas, which are northeast and east of Stevenson, have a grayer surface soil and more friable subsoil than is typical. The thickness of alluvium over bedrock or cherty residuum varies greatly, the depth in some places being more than 15 feet, and in a few others, not more than 3 or 4 feet.

Use and management.—Waynesboro fine sandy loam, undulating phase, is moderately fertile, relatively high in moisture-holding capacity, and favorable in tilth. Practically all of it has been cleared and is being cropped, chiefly to cotton, corn, and hay, mostly lespedeza. Some fertilization is practiced, and a few legume cover crops are grown. This phase, however, is planted in row crops most of the time. Under average conditions cotton yields about 360 pounds of lint an acre, and corn about 35 bushels an acre.

This soil is relatively well suited to moderately intensive use where it is adequately fertilized, its organic matter is maintained at a high level, and runoff is controlled. It is easily worked and not difficult to conserve. A rotation consisting of row crops grown once in 3 or 4 years and followed by legume cover crops and small-grain and hay crops is well suited. When cotton is grown under such a cropping system and is fertilized with 400 pounds of 6–8–4 fertilizer or its equivalent, it can be expected to yield from 1 to 1¼ bales an acre. This phase is very productive of pasture when properly fertilized, limed, and seeded.

Waynesboro fine sandy loam, eroded undulating phase (2–5% slopes) (WNE).—This phase is associated with other members of the Waynesboro series and with the Holston and Sequatchie soils. It differs from the undulating phase chiefly in having a somewhat thinner and finer textured surface layer, the result of the loss of surface soil material through erosion. The 4- to 6-inch plow layer is grayish to yellowish brown and ranges in texture from fine sandy loam to sandy clay loam. There are patches on the more exposed knobs or swells where the plow layer consists mostly of clay loam subsoil material. Surface drainage is moderate to rapid. Drainage on the whole is favorable for crops.

Use and management.—Most of Waynesboro fine sandy loam, eroded undulating phase, is well located for its use as cropland. In general the Waynesboro soils are among the most desirable in the county for cotton, but they do not rank so high as several other soils in suitability for corn. All of this phase has been cleared, and nearly all of it is cropped, chiefly to cotton, corn, and hay. The yields of cotton, the dominant crop, are less affected by soil losses through erosion than the yields of corn and lespedeza. Present management practices are similar to those for the undulating phase, but yields of most crops are a little lower.

Like the undulating phase, the soil is moderately productive, easily worked, and fairly easily conserved. It is slightly less favorable because of its loss of soil material through erosion, but is suited to moderate-length rotations and responds well to careful management and adequate fertilization. Legume cover crops are of great value in maintaining fertility and protecting the soil against erosion. Legume hay crops, as red clover and alfalfa, require at least moderate applications of lime, but under proper fertilization, liming, and seeding they produce well.

Waynesboro fine sandy loam, rolling phase (5–12% slopes) (WNO).—This phase occurs almost entirely in the main parts of the limestone valleys, where it is associated with other Waynesboro soils and those of the Sequatchie and Holston series. This soil is distin-

guished from the undulating phase by its stronger slope and greater variability in the thickness of the surface layer. On the more sloping parts the surface layer may be less than 4 inches deep, whereas on the lower slopes or basin parts it may exceed 10 inches. Surface drainage is rapid, and internal drainage moderate.

Use and management.—Most of Waynesboro fine sandy loam, rolling phase, is cleared and used for general farm crops, chiefly cotton, corn, and hay. Some sericea lespedeza and legume cover crops are grown. Row crops occupy this soil much of the time, and most crops, especially cotton, receive moderate applications of fertilizer.

This is a moderately productive soil, but because of its rolling surface its workability is not so good as that of the undulating phase. More exacting water-control measures must be used to protect it from erosion. The best management practices include moderately long rotations and consistent use of winter cover crops. Where at all feasible, tillage should be on the contour, and terraces should be used in places. Under a high level of management, cotton yields 400 pounds of lint to the acre; corn, 38 bushels; and alfalfa, 3 to 3½ tons. Like other Waynesboro soils, this phase is productive of pasture where fertility is brought to a high level, adequate lime is applied, and the land is properly seeded.

Waynesboro fine sandy loam, eroded rolling phase (5–12% slopes) (WNN).—Practically all of this phase occurs in the main parts of the limestone valleys. Although the relief is in general rolling, most areas include narrow smoother strips along ridge crests and drainways. Most areas are small and irregular in shape and are associated with other members of the Waynesboro series with soils of the Sequatchie and Holston series. Surface drainage is rapid, and internal drainage moderate. The phase represents areas of the rolling phase that have lost a significant quantity of surface soil through erosion.

The plow layer, ordinarily 4 to 6 inches thick, consists in most places of a mixture of fine sandy loam surface soil with the more reddish clay loam in the upper subsoil. The texture ranges from fine sandy loam to clay loam. Areas where the plow layer consists almost wholly of clay loam subsoil material are included. On the other hand the plow layer in the least eroded parts may be 6 to 10 inches thick and consist predominantly of grayish-brown fine sandy loam. Gravel, cobbles, pebbles, or chert fragments are common in a few areas and may be sufficiently abundant in places to interfere materially with cultivation.

Use and management.—All of Waynesboro fine sandy loam, eroded rolling phase, has been cleared, and a great part of it is now used for general farm crops. Cotton, corn, and hay crops, chiefly lespedeza, predominate, cotton being the most commonly planted. The phase is in row crops much of the time, and some legume cover crops are grown. Moderate quantities of mixed fertilizer are applied, especially for cotton. Cotton yields about 280 pounds of lint an acre; corn, about 23 bushels; and lespedeza, about ¾ ton.

This soil is suitable for crops requiring tillage, but because of its slope, moderately long rotations consisting chiefly of close-growing crops are required if its productivity is to be maintained. Legume cover crops following row crops are effective in protecting the soil against the effects of runoff in winter and in increasing organic-matter content and fertility. Tillage operations should be on the contour where feasible, and stripcropping and terracing might be beneficial in places. Alfalfa, cotton, and clovers are productive where the soil has been properly fertilized and prepared. Productive pasture can be maintained where these practices are followed and can be expected to be effective in stabilizing the soil and in building up its fertility. Sericea lespedeza is well suited and of special value on the more severely eroded parts. This crop is suitable for hay and periodic grazing and can supplement other pasture to advantage.

Waynesboro fine sandy loam, eroded hilly phase (12–25% slopes) (WNH).—This phase occurs in association with other soils of the Waynesboro series and in places with Fullerton and Armuchee soils. Most of the areas are small and very irregular in shape, and consist of a complex of short strong slopes, narrow ridge tops, and narrow drainageways. A few, however, occupy single slopes on terrace escarpments. Some narrow ridge strips that are relatively smooth are also included. External drainage is rapid to very rapid, and internal drainage is moderate. The native vegetation consisted of deciduous hardwoods and a few pines in places.

The thickness of the separate layers is in general less than that of the undulating phases of Waynesboro soils; and the depth to bedrock, especially on the lower parts of the slopes, is much less. In places bedrock limestone or cherty limestone residuum may outcrop. Most of the acreage has been eroded to such extent that the plow layer consists of a mixture of original surface soil material and upper subsoil material. About 50 percent of the acreage has lost practically all the original surface soil, and the plow layer is yellowish-red friable but firm clay loam.

Use and management.—All of Waynesboro fine sandy loam, eroded hilly phase, has been cleared and cultivated or pastured at some time. A great part of it is used as permanent pasture or is lying idle. Much of the idle acreage has been reforested naturally with pine, and a few areas have been planted to pine. The crops most commonly grown are corn, cotton, and lespedeza. Most of the pasture vegetation consists of common lespedeza, hop clover, Dallis grass, and several other native grasses. A small acreage is in sericea lespedeza.

Chiefly because of its strong slopes and eroded condition, this phase is not well suited to crops requiring tillage, although where carefully managed and adequately fertilized, the more favorable areas can be used under a long rotation consisting of close-growing small grains, hay crops, and pasture. In order to establish a good grazing vegetation, lime and phosphorus are especially needed, and most areas will require moderately heavy seeding. If row crops are to be grown, they should be grown in long rotations and all tillage operations should be on the contour.

Waynesboro loam, severely eroded rolling phase (5–12% slopes) (WLD).—Most of this phase occurs as small irregular tracts in association with other Waynesboro soils and those of the Holston and Sequatchie series. It is widely distributed throughout the main part of the limestone valleys. It represents areas of the rolling phase that have lost practically all of the original surface layer as a result of erosion. In general it has a steeper average gradient than the rolling phase and occurs to a greater extent on single slopes rather than broad

areas that include smoother narrow ridge tops. It differs from Waynesboro fine sandy loam, undulating phase, chiefly in having a reddish clay loam plow layer and a rolling rather than undulating surface. Surface drainage is rapid; internal drainage, moderate to slow.

Profile description:

0 to 16 inches, yellowish-red friable clay loam; deeper red with depth; permeable but firm; much slower water absorption than the fine sandy loam surface layer of uneroded Waynesboro soils.
16 to 45 inches, brownish-red or deep red friable clay loam that forms nut-like fragments when broken.

The entire soil is medium to strongly acid and is low in fertility and organic matter. Gravel, cobbles, pebbles, and chert fragments occur throughout the soil mass in a few places.

Use and management.—All of Waynesboro loam, severely eroded rolling phase, has been cleared and cropped, but much of it is now idle or is being used for permanent pasture. Some areas have grown up in a volunteer stand of pine, and a very small part has been reforested by planting. Cotton and hay, chiefly lespedeza, are the principal crops. Cotton predominates, but yields are low. The pasture vegetation is common lespedeza, Dallis grass, hop clover, and native grasses. Very little pasture has been improved by seeding or fertilization.

Chiefly because of its low fertility and the difficulty of controlling runoff water, this soil is not well suited to intensive use. It is difficult to work, and exacting practices are required to control runoff. Under proper management, however, it responds well and is capable of producing fairly good pasture, hay crops, and some few row crops. Proper management requires especially long rotations consisting of close-growing hay and pasture crops and adequate fertilization, incorporation of organic matter, and the application of lime. Tillage should be along the contour, and strip cropping should be used on the longer slopes. Sericea lespedeza is well suited, especially to the more exposed eroded parts. In places the land should be under a forest cover.

Wolftever silt loam, level phase (0–2% slopes) (Wsv).—This phase occurs for the most part on low stream terraces along the Tennessee River in the northeastern part of the county. It is associated with the Huntington and Lindside soils of the first bottoms and Etowah soils of the stream terraces. The parent material is mixed Tennessee River alluvium, which consists of material derived chiefly from limestone, sandstone, and shale. A small percentage, however, is from metamorphosed and granitic rocks. The alluvium is many feet deep. Surface and internal drainage are slow. Most areas are sufficiently high to be free of normal overflow, but many are inundated when especially high floods occur. The native vegetation is made up predominantly of deciduous hardwoods.

Profile description:

0 to 5 inches, brown to grayish-brown silt loam that crumbles easily to a mellow mass.
5 to 18 inches, yellowish-brown silty clay loam that grades within a very few inches to compact silty clay; lower part of layer faintly mottled with yellow and gray; when broken material forms blocky or nut-sized fragments.

18 to 30 inches, somewhat more friable yellowish-brown silty clay mottled with yellow and gray; mottling increases with depth.
30 to 42 inches, mottled yellowish-brown and yellowish-gray silty clay containing gritty material, mainly fine chert fragments; chert content varies greatly from place to place.

The entire profile is medium to strongly acid, and the content of organic matter is not high. The texture of the surface layer ranges to very fine sandy loam in places. Mica flakes are present below a depth of about 20 inches in areas along the Tennessee River. Some areas in the Paint Rock River valley contain chert throughout the soil mass, others are very cherty below a depth of about 30 inches, and others have a thin fine sandy loam surface layer just above the subsoil. A few areas have patches in which there is an abundance of very fine concretions.

Use and management.—About 90 percent of Wolftever silt loam, level phase, has been cleared and is now used for crops or pasture. Corn, cotton, soybeans, Johnson grass, and lespedeza for hay predominate. Some red clover is grown on areas in the Paint Rock River valley. Cotton is not so well suited as soybeans. The phase is planted to row crops much of the time, and fertilization is practiced regularly only for cotton. Under average conditions corn yields about 30 bushels, and lespedeza about 1 ton an acre.

This moderately productive soil is fairly easily worked and not difficult to protect from erosion. The compact subsoil makes it less suitable for agriculture, as it interferes with root development and limits water-holding capacity. In general late crops are injured by lack of moisture. With adequate fertilization, including the addition of organic matter, however, this soil is relatively well suited to moderately intensive use. When properly fertilized, limed, and seeded, it is productive of pasture. As with other crops, drought limits pasture growth late in summer.

Wolftever silt loam, undulating phase (2–5% slopes) (Wsu).—This undulating soil differs from the level phase chiefly in having stronger slopes. The surface is undulating or very gently billowing. The thickness of the surface layer varies a little more than does that of the level phase. In general the soil occupies positions a little higher than does the level phase. There may be small patches on the stronger slopes that have lost a significant part of the surface layer through erosion, but on the whole, surface drainage is moderate and internal drainage is slow. Most of the soil is associated with undulating phases of Etowah soils.

Use and management.—Practically all of Wolftever silt loam, undulating phase, has been cleared and is now used for corn, cotton, hay, and pasture. It is better for cotton than the level phase and is suited to lespedeza, soybeans, and similar crops. Under average conditions most crops yield a little less than on the level phase; cotton, however, yields a little more.

The phase is moderately productive and fairly easily worked. Although the more sloping parts are subject to moderate erosion where care is not taken to maintain a good vegetative cover, it is usually not difficult to prevent loss of fertility or soil. The moisture-holding capacity is less than for some of the more friable soils, and root development is somewhat restricted by the compact subsoil. This soil is

responsive to good management. Under average conditions it is suited to rotations of moderate length if it is adequately limed and fertilized. Legume cover crops will improve fertility and tilth and protect the soil from erosion.

USE AND MANAGEMENT OF IMPORTANT SOIL GROUPS

Each soil of Jackson County has characteristics that distinguish it from the others. Many of the soils, however, require approximately the same management and may be grouped together for purposes of discussion. The management requirements of soils of each group[6] are discussed with respect to two broad uses: (1) Crops that require tillage and (2) permanent pasture.

Although the best use and management of any soil on a particular farm involves consideration of many conditions peculiar to that farm, many management practices apply to conditions on a number of farms. The choice of what practice shall be used on a given farm depends upon conditions peculiar to that farm. For example, nitrogen may be maintained by the use of legumes, manure, commercial fertilizer, or a combination of the three. The best method for maintaining nitrogen depends on what sources of that nutrient are most cheaply available to the farmer. In suggesting management practices for the various soils, it is also realized that some of them may not be financially feasible on some farms.

The soils are placed in 20 groups for discussion of their general suitability for crops and important management requirements. The fertility, workability, and conservability of each soil are given. Fertility refers to the relative supply of plant nutrients in the soil where fertilizers have not been applied for 8 or 10 years. Even the most fertile soils in this county will be improved by fertilization. Workability indicates the ease of tillage, harvesting, and other field operations. Conservability refers to the ease with which fertility and workability can be maintained, principally the ease of conserving soil material and plant nutrients and maintaining good tilth.

Specific recommendations in regard to the choice of crops, suitable varieties and rotations, fertilizer practices, tillage, and erosion control practices are found in Alabama Experiment Station bulletins and circulars and in the handbook (*3*) prepared by the Alabama Polytechnic Institute.

GROUP 1

Group 1 is made up of imperfectly and well drained fine-textured slightly acid soils of the first bottoms in the limestone valleys. With the exception of Abernathy silt loam, undulating phase, they are subject to floods. They are fertile and smooth, their slope ranging from nearly level to very gently sloping. Aside from the Egam types and Lindside silty clay, they are readily permeable to both moisture and plant roots. Moisture relations in general are nearer optimum for plants than in the soils of any other group, although internal drainage

[6] These groups are represented on the accompanying soil map by distinguishing colors.

for the Ooltewah and Lindside soils is sufficiently retarded to cause the subsoil to have excess moisture below a depth of 15 to 20 inches for part of the growing season.

This group of soils is very productive. Much of the acreage not protected from floods has its fertility constantly replenished by fresh sediment deposited by floodwaters. Most of the soils can be easily worked, as the surface is smooth and the plow layer ordinarily of good tilth. The plow layer of the silty clay loam and silty clay types, however, has somewhat less favorable tilth because of its heavy texture. The Egam, Lindside, and Ooltewah soils do not become dry enough to permit tillage so soon after rains or floods as the Huntington and Abernathy soils. Because of their capacity for retaining plant nutrients and their freedom from erosion, none of these soils, however, is difficult to maintain in a high state of fertility.

All the soils are good to excellent for crops and pasture, although the range of crops to which they are suited is somewhat restricted. They are well suited to corn, soybeans, lespedeza, red and alsike clovers, orchard grass, and many pasture plants. In general, they are not well suited to small grains, as they are subject to floods and grains frequently lodge. The better drained soils may be suitable for alfalfa, although floods are still a hazard. The more permeable better drained areas are fairly well suited to cotton and many truck crops, especially late-planted vegetables.

Management requirements are less exacting than for the soils of any other group. Relatively high yields can be obtained under fairly short rotations for many years in succession without the use of fertilizer or other amendments. As a result of favorable moisture conditions crops are able to make use of an abundant supply of plant nutrients, and most of them will respond to fertilization with manure, commercial fertilizer, or green-manure crops. A rotation consisting of corn or other row crops followed by a hay crop such as lespedeza or red clover for 1 year is suited to most of the soils. The row crop, as well as the hay crops, can be expected to respond to proper fertilization. Vegetables can well be followed by a legume winter-cover crop to be turned under the following spring. Truck crops respond well to fertilization.

No special tillage or cropping practices are required for the control of runoff, although care must be taken not to till the soils, especially the finer textured ones, while they are too wet, as they will become cloddy. The lower lying areas can be improved by artificial drainage, but in many areas suitable outlets may not be available, and the increased yield of common field crops, such as corn or hay, may not be enough to justify the expense.

Permanent pastures are good to excellent without special management practices. Proper fertilization, however, will improve their quality and carrying capacity, and a few areas may show a response to lime. Pastures can be improved by periodically clipping undesirable plants and by regulating grazing. Undergrazing is as harmful to good pasture as overgrazing, and therefore management should strive for a proper balance between the two.

The fertility, workability, and conservability of the soils in management group 1 are given in table 7.

TABLE 7.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 1*

Soil	Fertility	Workability	Conservability
Abernathy silt loam:			
Level phase	Very high	Very good	Excellent.
Undulating phase	do	do	Very good.
Egam silt loam	High	do	Do.
Egam silty clay loam	do	do	Do.
Huntington silt loam	Very high	do	Excellent.
Lindside silt loam	do	Good	Do.
Lindside silty clay	do	Fair	Very good.
Lindside silty clay loam	do	Good	Do.
Ooltewah silt loam	do	do	Do.

GROUP 2

The imperfectly and well drained sandy medium to slightly acid soils of the first bottoms in the limestone valleys form group 2. These soils consist predominantly of fine sandy loams. Bruno loamy fine sand, however, has a coarser texture and consequently looser consistence. The soils are characterized by a nearly level or very gently undulating surface and are subject to overflow. Compared with the soils of group 1 they have more rapid internal drainage and somewhat lower fertility and are somewhat deficient in lime. Internal drainage is good, although the Bruno soils, especially the loamy fine sand, are somewhat excessively drained.

Although these soils are lower in natural productivity than those of group 1, they are of relatively high productivity when adequately fertilized, as their workability and moisture relations, except in Bruno loamy fine sand, are favorable for crops. They are less subject to excessive moisture than the soils of group 1. In many places, however, Bruno loamy fine sand is sufficiently loose to hinder some field operations. Conservation against erosion losses is no problem, but maintenance of a high state of fertility is more difficult because the soils of this group have less capacity for retaining plant nutrients than those of group 1.

All these soils are suited to a somewhat wider range of crops than are the soils of group 1. They are suited to practically all crops common to the area. Sturkie fine sandy loam probably is not well suited to alfalfa, however, and both the Abernathy and Sturkie fine sandy loams may not be suited to crops that are damaged by winter floods. The Bruno soils are especially well suited to certain truck crops, as melons, beans, and potatoes.

Like the soils of group 1, those of group 2 are well suited to intensive use in short rotations, providing they are adequately fertilized. Regular application of nitrogen, phosphorus, and potash, as well as lime and organic matter, is required to maintain a high state of productivity. Shallow-rooted crops, especially the hay and pasture grasses, are less productive than on soils of group 1, owing to the lower moisture-holding capacity of the upper soil layers. Hay and pasture crops, as alfalfa and sweetclover, may be expected to do well on the Abernathy and Bruno soils, but bluegrass, Bermuda grass, and common white clover are not so productive. These soils therefore may be utilized better for rotations consisting largely of row crops.

The fertility, workability, and conservability of the soils in management group 2 are given in table 8.

TABLE 8.—*Fertility, workability, and conservability of soils in Jackson County, Ala., in management group 2*

Soil	Fertility	Workability	Conservability
Abernathy fine sandy loam	Medium	Very good	Very good.
Bruno fine sandy loam	do	do	Do.
Bruno loamy fine sand	Low	do	Good.
Sturkie fine sandy loam	Medium	do	Do.

GROUP 3

Imperfectly and well drained sandy strongly acid soils of the first bottoms in the sandstone plateaus make up group 3. These fine sandy loams occur on first bottoms and gentle colluvial slopes along drainways. They are strongly acid and lower in fertility than the soils of groups 1 and 2. Their surface is nearly level or very gently sloping, and they are permeable both to roots and water. In general, moisture relations are favorable to crops, although some parts of the Barbourville-Cotaco complex have slow internal drainage and excess moisture in the subsoil much of the time.

The natural productivity of the soils of group 3 is not high, but owing to their favorable moisture relations and consistence, crops respond well when properly fertilized. Both soils of this group are easily worked, although moisture in the wetter parts somewhat restricts tillage during wetter periods. The danger of erosion does not limit the use of these soils, and good tilth is easily maintained. Plant nutrients are not so easily conserved as in the finer textured soils of group 1.

The soils of this group are fair to good for crops and pasture. Corn and certain hay crops are probably among the better suited crops. These soils are well suited to intensive use, providing they are adequately fertilized. They require moderately heavy and regular applications of nitrogen, phosphorus, and potash, as well as lime and organic matter, if a high state of fertility is to be maintained under intensive use. Corn, soybeans, and potatoes and certain other truck crops can be grown in short rotations, especially on Pope fine sandy loam. The Barbourville-Cotaco complex is not so well suited to potatoes or like crops but well suited to corn and many of the hay and pasture plants. On this complex, however, close-growing grasses and clovers do not grow so luxuriantly as on the soils of group 1.

The fertility, workability, and conservability of the soils in management group 3 are given in table 9.

TABLE 9.—*Fertility, workability, and conservability of soils in Jackson County, Ala., in management group 3*

Soil	Fertility	Workability	Conservability
Barbourville-Cotaco fine sandy loams	Medium	Very good	Very good.
Pope fine sandy loam	do	do	Do.

GROUP 4

Group 4 consists of red fine-textured permeable level to undulating soils of the limestone valleys. These soils have friable surface layers, predominantly of silt loam, and contain a moderate quantity of organic matter. Their subsoils are firm silty clay loam to silty clay but are permeable to both roots and moisture. Bedrock is deep.

In general, the soils are fertile, have relatively favorable moisture relations, and are capable of retaining a relatively large supply of available plant nutrients. They are good to excellent for the production of crops and pasture. Their productivity is high, and workability is very good. They are easily protected against losses either of soil material or of plant nutrients, although the more sloping parts are somewhat subject to erosion. They are well suited to practically all crops common to the area and on the whole are probably among the most suitable soils for cotton.

Although the soils of this group are not so well suited to intensive use as are those of groups 1 and 2, they are suited to moderately short rotations. A rotation of cotton or corn followed by small grains seeded to legume hay that will remain 1 or more years is very satisfactory. Alfalfa or red clover are two of the best hay crops where the fertility is at a high level. If a short rotation is desired, red clover may be the better hay crop. If hay is desired for 3 or 4 years in the rotation, alfalfa is probably better. Other intertilled crops may be substituted for cotton or corn, and a rotation may be shortened to consist of intertilled crops every other year if a winter legume green-manure crop is grown following the intertilled crop. Such a short rotation, however, is probably suited only to the smoother areas and will require the maintenance of a high state of fertility.

Fertilization at regular intervals is required to maintain the fertility at a high level. Much of the nitrogen can be supplied through the growing of legume cover crops, but where the other elements are maintained at a high level, it is likely that some nitrogen fertilizer can be used to advantage. Phosphorus and lime, however, are probably the chief fertilizers required. Some potash is recommended, especially for row crops and alfalfa. Vetch, Austrian peas, and crimson clover are among the better legume cover crops for use as green manure because they are more effective than many others in increasing the nitrogen and organic-matter content of the soils. Crotalaria as a volunteer reseeding crop in corn is also beneficial.

Mixed fertilizers are effective in maintaining a high fertility, and good results have been noted where most of this fertilizer has been applied to the legume seeding. Suitable applications are the equivalent of 1 ton of ground limestone, 300 pounds of 20-percent phosphate fertilizer, and 25 pounds of potash an acre for red clover and the equivalent of 2 tons of ground limestone, 500 pounds of 20-percent phosphate fertilizer, and 20 to 50 pounds of potash an acre for alfalfa. The quantity of each element should vary with the past management or with the fertility level at the time of application. Where barnyard manure is available in sufficient quantity, potash applications may be less justified. Observations of experiments indicate that light applications of borax are needed to correct boron deficiencies for alfalfa. Most vegetable crops require heavy applications of phosphorus, potash, and nitrogen.

The soils of this group can be tilled through a relatively wide range of moisture conditions, but not when they are wet. Where short rotations are used, tillage should be on the contour, especially on the more sloping parts, and terracing may be justifiable on the more sloping parts where row crops are grown at frequent intervals. Terraces are not required where the soil is kept under a luxuriant close-growing vegetative cover much of the time.

With adequate liming, applications of phosphorus, and proper seeding, high-quality pasture can be obtained. Some nitrogen and potash, however, may be needed to establish a good stand. Dallis grass, annual lespedeza, white clover, bluegrass, orchard grass, and Bermuda grass are well suited and produce abundantly where these soils are in a high state of fertility. To insure the best pasture, weeds should be kept clipped and extremes of too heavy growth and excessive grazing should be avoided.

The fertility, workability, and conservability of the soils in management group 4 are given in table 10.

TABLE 10.—*Fertility, workability, and conservability of soils in Jackson County, Ala., in management group 4*

Soil	Fertility	Workability	Conservability
Cumberland loam, undulating phase	High	Very good	Very good.
Cumberland silt loam, undulating phase	do	do	Do.
Cumberland silty clay loam, eroded undulating phase	do	do	Good.
Dewey cherty silt loam, eroded undulating phase	do	Good	Very good.
Dewey silt loam, undulating phase	do	Very good	Do.
Dewey silty clay loam, eroded undulating phase	do	do	Good.
Etowah loam:			
Level phase	do	do	Excellent.
Undulating phase	do	do	Very good.
Etowah silt loam:			
Level phase	do	do	Excellent.
Undulating phase	do	do	Very good.
Etowah silty clay loam, eroded undulating phase	do	do	Do.
Hermitage silty clay loam, eroded undulating phase	do	do	Good.

GROUP 5

Group 5 consists of red fine-textured permeable rolling soils of the limestone valleys. These soils differ from those of group 4 chiefly in their greater slope, the gradient of most of the areas ranging from 5 to 12 percent. Because erosion has been more active, the friable silt loam surface layer is thin. The severely eroded rolling phases have lost the friable silt loam surface layer, and their plow layer consists of firm silty clay of less favorable tilth and moisture-absorbing quality than that for other soils of the group. Large quantities of chert are scattered throughout the entire depth of the cherty Dewey types, interfering with tillage and lowering the general level of fertility. With the exception of the severely eroded rolling phases, however, these soils make good cropland and good to very good pasture land. They are suited to practically all crops commonly grown, although they are less well suited to frequent row cropping than the soils of the first four groups. Close-growing crops as hay, pasture, and small grains are particularly well suited.

Chiefly because of their stronger slope and consequently greater susceptibility to erosion, the soils cannot be planted to row crops so frequently as those of group 4 if they are to be maintained at a high level of productivity. Where properly fertilized, soils of group 5 may be planted to 4- or 5-year rotations consisting of 1 year of row crops and 3 or 4 years of close-growing crops. A 4- or 5-year rotation of cotton or corn, small grains, clover and grass, and grass and clover for hay or rotated pasture is suitable. A longer rotation of cotton or corn for 1 year, small grains for 1 year, and alfalfa for 3 to 4 years is also satisfactory. Other intertilled crops may be used in place of corn.

Like the soils of group 4, the soils of group 5 require systematic fertilization if their productivity is to be maintained at a high level. Legume cover crops used as green manure contribute much in maintaining the organic and nitrogen supply, but applications of phosphate fertilizer and potash, either in the form of commercial fertilizer or barnyard manure, are required. Moderate applications of lime at regular intervals are needed, especially for alfalfa, red clover, and like legume crops.

Where these soils are maintained at a high level of fertility and properly seeded, they support good pasture of excellent carrying capacity. Phosphorus and lime are probably the chief fertilizer elements necessary. Bluegrass, annual lespedeza, white clover, and Bermuda grass are well suited pasture plants. Regular clipping of weeds and other undesirable growth is generally required in maintaining high-quality pasture. Grazing off surplus vegetation is as important as avoiding overgrazing.

The fertility, workability, and conservability of soils in management group 5 are given in table 11.

TABLE 11.—*Fertility, workability, and conservability of soils in Jackson County, Ala., in management group 5*

Soil	Fertility	Workability	Conservability
Cumberland silt loam, rolling phase	High	Good	Good.
Cumberland silty clay loam:			
Eroded rolling phase	do	do	Do.
Severely eroded rolling phase	Medium	Poor	Fair.
Dewey cherty silt loam, eroded rolling phase.	High	Fair	Good.
Dewey cherty silty clay loam, severely eroded rolling phase.	Low	Poor	Fair.
Dewey silt loam, rolling phase	High	Good	Good.
Dewey silty clay loam:			
Eroded rolling phase	do	do	Fair.
Severely eroded rolling phase	Medium	Poor	Do.
Etowah silt loam, rolling phase	High	Good	Good.
Etowah silty clay loam:			
Eroded rolling phase	do	do	Do.
Severely eroded rolling phase	Low	Fair	Fair.
Hermitage silty clay loam, eroded rolling phase.	High	Good	Good.

GROUP 6

Group 6 consists of yellow and yellowish-red well-drained permeable level to undulating soils of the sandstone plateaus, colluvial slopes, and stream terraces. These moderately fertile soils are deep to bedrock or other strata that might interfere with the movement of moisture or roots. Their moisture relations in general are favorable to plant growth. These soils are fair to good cropland and good to very good pasture land. They are moderately productive, easily worked, and retain plant nutrients and good tilth fairly well. They present no special problems in the control of erosion, although the more sloping areas should be tilled on the contour. Both strip cropping and construction of broad-based terraces are used advantageously (pl. 9, *A*).

Under a high level of management these soils are fairly well suited to moderately short rotations. In this respect they are like the soils in group 4. If they are to be used intensively, however, more fertilizer and lime will be required to produce comparable yields. Intertilled crops such as cotton, corn, and vegetables grown in 3- or 4-year rotations with small grains and legume hay crops are well suited. Legume cover crops to be turned under as green manure can well follow the row crops where a winter grain crop is not planted. Greenmanure crops contribute much toward maintaining the nitrogen and organic matter supply of soils in a rotation of this nature. Where

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these crops are not regularly used, manure and nitrogen-bearing fertilizers will be required. Legume crops in general respond well to lime and phosphorus; alfalfa and red clover usually require applications of these materials.

The Hartsells soils of this group are especially well suited to cotton and give high yields where they have been heavily fertilized. Cotton fertilized with 300 to 600 pounds of 6–8–4 commonly yields 300 to 760 pounds of lint an acre. Heavier applications can be expected to give greater yields and are considered practical by many farmers. Hartsells soils are also particularly well suited to the production of sorghum for sirup. Little fertilizer is applied for sorghum because the sirup generally is of better quality where fertilization is not practiced.

These soils are productive of pasture plants, but adequate fertilization, liming, and proper seeding are required to establish a good vegetative cover. In general, pastures on soils of groups 4 and 5 are more luxuriant, more persistent, and of higher quality than pastures on soils of this group.

The fertility, workability, and conservability of the soils in management group 6 are given in table 12.

TABLE 12.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 6*

Soil	Fertility	Workability	Conservability
Allen fine sandy loam:			
Eroded undulating phase	Medium	Very good	Good.
Undulating phase	do	Excellent	Do.
Crossville loam	do	Very good	Do.
Enders silt loam:			
Undulating phase	Low	do	Do.
Eroded undulating phase	do	do	Do.
Hanceville fine sandy loam:			
Eroded undulating phase	Medium	do	Do.
Undulating phase	do	Excellent	Do.
Hartsells fine sandy loam:			
Eroded undulating phase	Low	Very good	Do.
Undulating phase	do	Excellent	Do.
Holston loam:			
Level phase	do	do	Very good.
Undulating phase	do	Very good	Good.
Jefferson fine sandy loam:			
Eroded undulating phase	do	do	Do.
Undulating phase	do	do	Do.
Sequatchie fine sandy loam:			
Level phase	Medium	Excellent	Very good.
Undulating phase	do	do	Do.
Waynesboro fine sandy loam:			
Eroded undulating phase	do	Very good	Good.
Undulating phase	do	Excellent	Do.

GROUP 7

Group 7 consists of yellow and yellowish-red well-drained permeable rolling soils of the sandstone plateaus, colluvial slopes, and stream terraces. These soils are distinguished from those of group 6 chiefly by their more rolling surface. Slopes range from 5 to 12 percent. The thickness of the surface layer averages less than that of the soils of group 6, chiefly because of erosion. The plow layer in most places consists of a mixture of original surface soil material with subsoil material. A small area, made up of severely eroded soils, has a plow layer of firm silty clay loam subsoil material that has notably less favorable tilth than the plow layer in less eroded areas.

These soils are fair to good cropland and fair to good pasture land. Hay crops, close-growing small grains, and pasture are better suited than row crops, although row crops may be grown if moderately long rotations are used. On the whole these soils are easily worked, but their susceptibility to erosion is a problem. Fields should be cultivated on the contour, and a relatively close-growing cover should be kept on the ground as much as possible. A 4- or 5-year rotation composed of corn or cotton 1 year, small grain 1 year, and clover and grass for hay or pasture for 2 or 3 years is suitable. A longer rotation of cotton or corn, small grain, and alfalfa for 3 to 5 years is also satisfactory.

All these soils require moderate applications of lime, phosphorus, and probably potash. The nitrogen and organic supply must be maintained either by green-manure crops or barnyard manure. As with the soils of groups 4, 5, and 6, some of the nitrogen may well be added as commercial fertilizer in starting hay, pasture, or winter cover crops or in growing row crops. Terracing and other mechanical means of runoff control are feasible in places, especially where the land is frequently planted to row crops. In general, where the soils are not needed consistently for row crops, runoff can be effectively controlled if a high state of fertility is maintained and rotation of close-growing crops is used.

Where smoother soils of moderate to high productivity are available for crops, the soils of group 7 are best used as permanent pasture. They are productive of pasture where properly fertilized, limed, and seeded. A mixture of Dallis grass, annual lespedeza, and white clover is considered suitable, and where the fertility is at a high level, Kentucky bluegrass and orchard grass may be of value. Bermuda grass also affords an effective protective cover and much pasture. Clipping of weedy or other undesirable growth is almost invariably required if pasture vegetation is to maintain its highest productivity.

The fertility, workability, and conservability of the soils in management group 7 are given in table 13.

TABLE 13.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 7*

Soil	Fertility	Workability	Conservability
Allen fine sandy loam:			
Eroded rolling phase	Medium	Good	Good.
Rolling phase	do	do	Do.
Allen loam, severely eroded rolling phase.	Low	Poor	Fair.
Enders silt loam:			
Eroded rolling phase	do	Good	Do.
Rolling phase	do	do	Good.
Hanceville fine sandy loam:			
Eroded rolling phase	Medium	do	Do.
Rolling phase	do	do	Do.
Hartsells fine sandy loam:			
Eroded rolling phase	Low	do	Fair.
Rolling phase	do	do	Do.
Jefferson-Allen loams, eroded rolling phases.	do	do	Do.
Jefferson fine sandy loam:			
Eroded rolling phase	do	do	Do.
Rolling phase	do	do	Good.
Waynesboro fine sandy loam:			
Eroded rolling phase	Medium	do	Do.
Rolling phase	do	do	Do
Waynesboro loam, severely eroded rolling phase.	Low	Poor	Fair.

GROUP 8

Group 8 contains reddish-yellow undulating soils with plastic subsoils. These soils are moderately shallow to bedrock limestone. Their surface or plow layers are heavier in consistence than those of soils in group 4. Their profile is medium to strongly acid. Owing chiefly to their more plastic and clayey texture, moisture relations are less favorable than in soils of group 4.

These soils are moderately productive, especially for selected crops grown under proper management. Their workability is good but it varies according to the quantity of surface soil material lost through erosion. The more eroded parts have a finer texture, heavier consistence, and accordingly less favorable tilth. Care must be taken to prevent erosion. If the soils are tilled when too wet they will clod and their tilth will be impaired. Plant nutrients are retained well where erosion losses can be kept at a minimum.

These soils are fairly good for either crops or pasture. They are probably better suited to small grains, hay, and pasture than to corn and cotton. The close-growing crops are more suitable chiefly because the soils are susceptible to erosion and unfavorable in tilth. Rotations should be of at least moderate length to keep the soils under close-growing vegetation as much as possible. When row crops are grown they should be followed directly by a cover crop. Oats, wheat, red clover, and alfalfa are well suited. These soils are not very favorable for truck crops because they are not so easily worked or cultivated as some of the more loamy soils, and root crops cannot be expected to develop well.

The supplies of organic matter, plant nutrients, and lime must be replenished regularly when the soils are cultivated. Organic matter should be maintained at a high level, inasmuch as it has a direct affect on tilth and moisture-holding capacity. Because shallow-rooted crops are damaged in prolonged dry periods, alfalfa, red clover, sweetclover, and like deeper rooted hay crops are preferable.

Practically all areas of these soils require fertilization and liming if legumes are to be grown successfully. Where a high state of fertility is maintained, Kentucky bluegrass, Dallis grass, annual lespedeza, orchard grass, and white clover do well. Pasture commonly dries out sooner in the dry midsummer and the early fall than on most of the soils of the first seven groups.

The fertility, workability, and conservability of the soils in management group 8 are given in table 14.

TABLE 14.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 8*

Soil	Fertility	Workability	Conservability
Swaim silty clay loam:			
Eroded undulating phase	Medium	Fair	Fair.
Undulating phase	do	Good	Good.
Talbott silt loam, undulating phase	do	do	Do.
Talbott silty clay loam, eroded undulating phase.	do	do	Do.

GROUP 9

Group 9 is composed of reddish-yellow rolling soils with plastic subsoils. These soils differ from those of group 8 chiefly in their more rolling surface, the gradient of which ranges from 5 to 12 percent. In general the surface, or plow layer, is finer textured and has less favorable tilth, chiefly because a larger percentage of the original surface soil material is lost through erosion. In much of the area the plow layer is silty clay loam, and in places severely eroded it is plastic silty clay.

These soils are poor to fair for crops and poor to good for pasture. They are less favorable for agricultural use than group 8 soils because they have less moisture-holding capacity, less favorable tilth, and greater susceptibility to erosion, caused chiefly by their rolling surface and slow permeability. Runoff is great. In general the soils are better suited to hay and pasture crops than to row crops.

Relatively long rotations in which row crops are not frequently grown must be used if productivity is to be maintained. In order to keep the soils under a close-growing vegetation as much as possible, rotations should last 5 to 7 years or more. Where fertility is maintained at a high level, alfalfa is well suited and probably should be

grown for as many years as a good stand can be maintained. Areas not required for cultivation can be left in permanent pasture, as the soils are well suited to that use. When used as pasture the soils are adequately protected from erosion. Tilled crops should be followed by close-growing fall-sown small grains if possible, and row crops should be followed by a cover crop. Tillage operations should be on the contour, but terracing may not be feasible. Strip cropping, especially on the longer slopes, may be of some practical value. Where severely eroded patches of these soils occur in areas better suited to tillage, it may be best to establish a permanent sod on them.

The fertility, workability, and conservability of the soils in management group 9 are given in table 15.

TABLE 15.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 9*

Soil	Fertility	Workability	Conservability
Swaim silty clay loam:			
Eroded rolling phase	Medium	Fair	Fair.
Rolling phase	do	Good	Do.
Severely eroded rolling phase	Low	Poor	Poor.
Talbott silty clay loam:			
Eroded rolling phase	Medium	Fair	Fair.
Severely eroded rolling phase	Low	Poor	Poor.

GROUP 10

Group 10 consists of reddish-yellow and yellow undulating permeable soils from dolomitic limestone material. These soils have great depth to bedrock. Although they are low in lime, phosphate, and potash and not high in fertility, they have good tilth and relatively favorable moisture relations and are easily worked.

The natural productivity of these soils is low, but prevention of losses of soil and plant nutrients and the development of good tilth are not too difficult. Because these soils have generally low fertility and lower capacity to retain plant nutrients, they are less favorable for agricultural use than soils of groups 1, 2, 3, and 4. They make fair to good cropland and pasture land, however, and under proper management are suited to practically all crops commonly grown. The Clarksville soils, however, must be exceptionally heavily fertilized if they are to produce moderate to large yields of alfalfa and similar crops.

The soils of group 10 are suited to 3- or 4-year rotations if adequately fertilized. A suitable rotation is cotton or corn followed either by 1 year of small grain and 1 or 2 years of hay or pasture or by 2 or 3 years of hay and pasture. At least moderately heavy applications of lime, phosphate, potash, and organic matter are required to maintain fairly high productivity. These materials probably should be added in small quantities at relatively frequent intervals rather than in large quantities less frequently. The soils are fairly

well suited to many truck crops because they have fairly good tilth, respond reasonably well to fertilization, and hold an adequate supply of moisture at all times except the driest part of the growing season.

These soils are less well suited to pasture than those of several preceding groups because it is more difficult to maintain a grazing cover of as high productivity and quality. Where adequately fertilized, limed and seeded, however, Dallis grass, annual lespedeza, white clover, and like pasture plants produce well. Clipping is usually necessary to keep down weedy growth.

The fertility, workability, and conservability of the soils in management group 10 are given in table 16.

TABLE 16.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 10*

Soil	Fertility	Workability	Conservability
Clarksville cherty silt loam:			
Eroded undulating phase	Low	Fair	Good.
Undulating phase	do	do	Do.
Fullerton cherty silt loam:			
Eroded undulating phase	do	Good	Do.
Undulating phase	do	do	Do.
Fullerton silt loam:			
Eroded undulating phase	Medium	Very good	Do.
Undulating phase	do	do	Do.
Greendale cherty silt loam:			
Eroded undulating phase	Low	Good	Do.
Level phase	do	do	Very good.
Undulating phase	do	do	Do.

GROUP 11

Reddish-yellow rolling permeable soils from calcareous rock material make up group 11. These soils differ from those of group 10 chiefly in having a rolling surface, their gradient ranging from 5 to 12 percent, and in general a finer textured surface, or plow, layer. Most of the soils are more eroded than those of group 10. The plow layer consists mostly of a mixture of subsoil material with remnants of the original surface layer. In places where all the surface layer has been lost through erosion, the plow layer is firm silty clay that is moderately compact when dry and moderately plastic when wet.

The natural fertility is low to moderate, tilth is fair to good, capacity to hold moisture available to plants is fair to good, and productivity is fair. The workability is good, although the rolling surface and chert make field operations slightly difficult. These soils are not particularly hard to conserve, although the rolling slope makes erosion more of a hazard than on the smoother soils of group 10. Plant nutrients apparently are a little less easily conserved than in soils of group 4.

The soils are poor to fair for crops and fair to good for pasture. They are suited to 4- to 5-year rotations but, where feasible, can well remain under permanent sod for moderately long periods. They are capable of supporting a rotation consisting of corn, cotton, or some

other row crop followed by a fall-sown small grain and 3 or 4 years of hay and pasture.

Relatively heavy and frequent fertilization is required if the soils are to be maintained at a moderately high level of productivity when used for a crop rotation. Organic matter must be added in the form of green-manure or barnyard manure, and moderate quantities of lime, phosphate, and potash must be applied. Two tons of calcium carbonate an acre, or its equivalent, is an average application for these soils. Legume cover crops such as vetch are particularly useful in maintaining the organic-matter and nitrogen contents, although other legumes commonly grown for hay are also valuable. Lespedeza, one of the more common hay crops, does not adequately protect the soil from erosion late in winter and early in spring, and is therefore not suitable if grown alone. Mixtures of clovers and grasses are better suited where these soils do not stay under permanent sod crops for long periods.

Tillage should be on the contour. Broad-based terraces may be justified in places, and strip cropping may be practical and beneficial on the longer smoother slopes. In many places, however, these soils have slopes too complex to permit feasible strip cropping.

When properly fertilized, limed, and seeded these soils produce good pasture. The soils of groups 1, 2, 4, and 5 afford somewhat better grazing, however, as high-quality vegetation is more easily maintained on them. Where not required for tilled crops, soils of this group can well be used for pasture for long periods. Complete fertilization and liming are necessary if a good pasture cover is to be maintained, and a mixture of Dallis grass, white clover, and lespedeza is usually suitable. Where the fertility is at a high level, bluegrass and orchard grass are productive. Clipping of weedy vegetation is necessary if a clean highly productive pasture cover is to be maintained.

The fertility, workability, and conservability of the soils in management group 11 are given in table 17.

TABLE 17.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 11*

Soil	Fertility	Workability	Conservability
Clarksville cherty silt loam:			
Eroded rolling phase	Low	Fair	Fair.
Rolling phase	do	do	Do.
Fullerton cherty silt loam:			
Eroded rolling phase	do	Poor	Do.
Rolling phase	do	Fair	Good.
Fullerton cherty silty clay loam, severely eroded rolling phase.	do	Poor	Fair.
Fullerton silt loam, eroded rolling phase.	Medium	Good	Good.
Greendale cherty silt loam, eroded rolling phase.	Low	Fair	Fair.
Tellico clay loam:			
Eroded rolling phase	Medium	Good	Do.
Severely eroded rolling phase	do	Poor	Do.

GROUP 12

Imperfectly drained undulating and nearly level soils on stream terraces make up group 12. These soils have silt loam surface layers, level to undulating surfaces, and slow to moderate internal drainage. They consist of mixed alluvium and occupy moderately low stream terraces in the limestone valleys. Some are wet during moister seasons of the year, and a very small area is subject to occasional flooding.

In general the soils have low to moderate fertility, good to very good workability, and very good conservability. The Monongahela probably has the lowest content of available plant nutrients, and the Capshaw and Wolftever have the highest. The moisture is excessive during parts of the growing season, but for many crops drainage is sufficient. The Wolftever soils are inclined to be droughty during the driest seasons. Tillage operations are restricted because of the excessive moisture during the wetter periods. The fine texture and heavy consistence of some soils further restrict tillage. Maintenance of good tilth in the finer textured soils therefore presents somewhat of a problem. Erosion is not much of a hazard, and plant nutrients are retained well. The soils cannot be worked when too wet, as most of them develop an unfavorable cloddy structure. No special practices are required to control runoff, but a considerable part of the area could be improved for general crop use by artificial drainage where feasible.

In general these soils are fair to good cropland and fair to very good pasture land. Few of them are suited to alfalfa, and cotton does not produce well on much of the area. Corn, soybeans, certain other row crops, and lespedeza, redtop, and pasture plants are among the best suited crops for most soils. The Capshaw soils, however, being the best drained of the group, are suited to most crops commonly grown.

Where adequately fertilized the soils can be given relatively intensive use, including frequent planting of row crops. The moderately low fertility and restricted drainage, however, make them less suited to intensive use. Their moist condition makes them especially suited to certain hay crops and pasture. Plant nutrients and lime require replenishment at regular intervals, and organic matter must be maintained either by turning under green-manure crops or by applying barnyard manure.

All these soils are productive of pasture when adequately fertilized, limed, and properly seeded. Dallis grass, annual lespedeza, and white clover are considered suitable. Where the fertility is at a high level, Kentucky bluegrass and orchard grass produce well. Many of the moister areas are particularly favorable for pasture, as the vegetation grows a greater part of the drier season than it does on some of the other higher lying soils. In general, clipping of weedy growth is necessary to keep down undesirable vegetation.

The fertility, workability, and conservability of the soils in management group 12 are given in table 18.

TABLE 18.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 12*

Soil	Fertility	Workability	Conservability
Capshaw silt loam:			
Level phase	High	Very good	Very good.
Undulating phase	do	do	Do.
Monongahela loam:			
Level phase	Low	Good	Good.
Undulating phase	do	do	Do.
Taft silt loam	do	do	Very good.
Tupelo silt loam:			
Level phase	do	do	Do.
Undulating phase	do	do	Good.
Wolftever silt loam:			
Level phase	Medium	do	Very good.
Undulating phase	do	do	Good.

GROUP 13

Group 13 is composed of shallow well-drained permeable undulating and rolling soils. These strongly acid soils are shallow to bedrock sandstone or shale, which occurs at an average depth of 18 to 26 inches. Internal drainage is good. Natural fertility is low. The soils have favorable tilth, but the quantity of moisture available to plants is not generally adequate.

The soils respond well to fertilization. Adequate fertilization with phosphorus, potash, and nitrogen is necessary in obtaining high yields. Organic matter is naturally low and must be replenished at regular intervals in order to maintain high productivity. Moderate applications of lime are required for practically all legumes, especially red clover and alfalfa. Workability is good except for occasional rock outcrops. Conservability is fair to good, depending chiefly on the slope. The ability of these soils to hold plant nutrients is not high, and therefore fertilization should be in smaller quantities but at more frequent intervals than is required for many of the finer textured friable soils.

In general these soils are fair to good for crops and pasture. They are not well suited to intensive use, chiefly because of their generally moderate to strongly sloping surfaces, shallow depth to bedrock, and low fertility. Rotations of at least moderate length should be used, and cover crops should be sown following row crops where the land otherwise would be left fallow. Areas that must be used for row crops such as corn should be seeded to crotalaria, vetch, or some other cover crop at the time the row crop is last cultivated. Sericea lespedeza is a good hay or pasture crop. Redtop, annual lespedeza, and red clover are suitable hay crops, and where the area is not needed for row crops, the soil can be kept in meadow for extended periods.

If cultivated, the more rolling parts should be tilled on the contour. Strip cropping may be justified on the longer slopes. On many farms the soils are best used for permanent pasture, but proper seeding and adequate fertilization are necessary to establish and maintain a good stand of pasture. A mixture of Dallis grass, annual lespedeza, and white clover is well suited.

The fertility, workability, and conservability of the soils in management group 13 are given in table 19.

TABLE 19.—*Fertility, workability, and conservability of the soils of Jackson County, Ala., in management group 13*

Soil	Fertility	Workability	Conservability
Enders silt loam:			
Eroded rolling shallow phase	Low	Good	Poor.
Rolling shallow phase	do	do	Do.
Hartsells fine sandy loam:			
Eroded rolling shallow phase	do	do	Do.
Eroded undulating shallow phase	do	Very good	Good.
Rolling shallow phase	do	Good	Fair.
Undulating shallow phase	do	Very good	Good.

GROUP 14

Red fine-textured permeable hilly soils make up group 14. These soils are deep to bedrock, permeable to both roots and moisture, and relatively fertile. In severely eroded areas the plow layer is compact silty clay with unfavorable tilth. A greater part of the acreage, however, has a friable silt loam or silty clay loam plow layer.

Natural productivity is moderately high. Workability is poor to fair, as the strong slope interferes with field operations. The severely eroded areas are particularly difficult to work because of their strong slopes and the unfavorable tilth of the plow layer. Where a good vegetative cover is maintained, plant nutrients are not difficult to conserve. Under cultivation the soils are seriously damaged by erosion because the rate of runoff is high.

These soils are poor to fair for crops and fair to very good for pasture. They are not well suited to row crops but are well suited to alfalfa and red clover and practically all of the commonly grown pasture plants. Where feasible, they should be kept in permanent meadow and pasture. Where row crops must be grown, at least moderately long rotations should be used. In these rotations cover crops should follow the row crops directly if other fall-sown close-growing crops are not sown. Where row crops are grown once in 4 or 5 years, erosion is a definite hazard.

Although these soils are relatively fertile, they must be regularly fertilized and limed if their fertility is to be maintained at a high level. Lime is required especially for alfalfa and red clover, which give good yields when grown under a high level of management. Areas that are cultivated should be tilled along the contour. Strip cropping may be of value in controlling runoff on the longer slopes. In general the soils are too steep for terracing.

Permanent pasture of Dallis grass, annual lespedeza, and white clover produces well where adequate lime and phosphorus have been

applied. Under these conditions, Kentucky bluegrass, orchard grass, and Bermuda grass, have a high carrying capacity. As on most other soils, weedy vegetation must be clipped in order to keep down undesirable vegetation.

The fertility, workability, and conservability of the soils in management group 14 are given in table 20.

TABLE 20.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 14*

Soil	Fertility	Workability	Conservability
Cumberland silty clay loam:			
Eroded hilly phase	High	Fair	Poor.
Severely eroded hilly phase	Medium	Poor	Do.
Dewey silt loam, hilly phase	do	Fair	Fair.
Dewey silty clay loam:			
Eroded hilly phase	do	do	Poor.
Severely eroded hilly phase	do	Poor	Do.

GROUP 15

Group 15 consists of reddish-yellow and yellow fine-textured hilly soils from calcareous rock material. These soils are permeable to both roots and moisture. Their depth to bedrock in general exceeds 4 or 5 feet, although parts of the Armuchee-Tellico complexes are shallower. Natural fertility is not high and runoff is rapid. The tilth of the plow layer is fair to good, but the severely eroded phases have a compact silty clay plow layer that has very poor tilth. The chert content of most of these soils is sufficient to interfere with tillage.

This group represents very poor to fair cropland and poor to fair pasture land. The soils do not have high productivity, but under proper management most of them respond well and can be made productive of certain crops and pasture. Strong slopes and a moderately cherty nature give them fair to poor workability. The severely eroded phases have poor workability. The prevention of erosion is difficult on all soils under a system of management that involves frequent tillage. Good tilth is not particularly difficult to maintain except on the more eroded areas, but the capacity of these soils to retain plant nutrients is not so great as that of similar soils in group 14. The soils are best suited to hay and pasture crops.

Proper management involves keeping the soils under as nearly a permanent sod as possible. A permanent pasture mixture of grasses and legumes is best where the acreage is not required for row crops. These soils are of moderate to low fertility, and fairly heavy fertilization with nitrogen, phosphorus, and potash in addition to applications of about 2 tons of lime an acre will be required to establish a good permanent pasture cover. A mixture of Dallis grass, annual lespedeza, and white clover is suited, as is also Bermuda grass. Where the fertility is at a high level, Kentucky bluegrass and orchard grass make useful pasture plants. Weedy vegetation usually must be clipped in order to keep down undesirable plants.

On farms where some of these soils must be used for crops, long to very long rotations are best. In general row crops should not be grown more than once in 6 or 7 years. With such a system, a row crop should be followed directly either by a legume cover crop or by a fall-sown small grain. Where small grains follow row crops, the soils should be seeded to mixed legume and grass for meadow or pasture that will remain 4 or 5 years if feasible. On areas tilled even at infrequent intervals, tillage should be with the contour, and strip cropping may be of value in restraining erosion on the longer slopes. Terracing is not commonly considered a feasible practice on soils having a slope as steep as these.

The fertility, workability, and conservability of the soils in management group 15 are given in table 21.

TABLE 21.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 15*

Soil	Fertility	Workability	Conservability
Armuchee-Tellico silty clay loams:			
Eroded hilly phases	Low	Fair	Poor.
Severely eroded hilly phases	Very low	Poor	Do.
Clarksville cherty silt loam:			
Eroded hilly phase	Low	do	Do.
Hilly phase	do	do	Do.
Fullerton cherty silt loam:			
Eroded hill phase	do	do	Do.
Hilly phase	do	do	Do.
Fullerton cherty silty clay loam, severely eroded hilly phase.	Very low	do	Do.
Hermitage cherty silty clay loam:			
Eroded hilly phase	Medium	Fair	Do.
Severely eroded hilly phase	Low	Poor	Do.

GROUP 16

Yellow and yellowish-red well-drained medium-textured permeable hilly soils make up group 16. These soils resemble those of group 15 in that they have hilly surfaces, are permeable to both roots and moisture, and are low to moderate in fertility. They differ from soils of group 15 in being predominantly from acid sandstone and shale. Some are moderately deep to bedrock, whereas others are shallow, their depth ranging from 10 to 36 inches. The tilth of the plow layer is good. Stoniness is not common, although a few tracts have some stones or rock outcrops.

The natural fertility of these soils for crops requiring tillage is low to fair, and the workability is poor to fair, chiefly because of the strong slope. The few stony areas are difficult to cultivate, and the small severely eroded acreage has very unfavorable tilth. The prevention of erosion losses on practically all these soils is difficult. The capacity to retain plant nutrients is low, and in general, the best use is permanent pasture.

As for group 15, good management requires that the soils remain under a permanent close-growing vegetation most or all of the time. A mixture of Dallis grass, annual lespedeza, and white clover is suitable for seeding pastures. At least moderate fertilization with nitrogen, phosphorus, and potash and applications of lime are necessary in establishing a good pasture cover. Sericea lespedeza is a suitable crop and may be a good one to establish on the less productive areas.

For areas of these soils that must be cropped, very long rotations consisting chiefly of close-growing crops must be used. A rotation consisting of 1 year of corn followed by small grain seeded with hay or pasture crops is suitable. In this rotation the hay or pasture is left on the land for 3 or 4 years or longer. Care should be taken to establish close-growing vegetative cover directly following the row crop. Legume cover crops to be plowed under as green manure are of great value to these soils as well as to those of group 15.

The fertility, workability, and conservability of the soils in management group 16 are given in table 22.

TABLE 22.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 16*

Soil	Fertility	Workability	Conservability
Allen fine sandy loam, eroded hilly phase.	Medium	Fair	Poor.
Allen loam, severely eroded hilly phase.	Low	do	Do.
Jefferson-Allen loams:			
Eroded hilly phases	do	do	Do.
Hilly phases	do	do	Do.
Severely eroded hilly phases	do	Poor	Do.
Muskingum fine sandy loam:			
Eroded hilly phase	do	Fair	Do.
Hilly phase	do	do	Do.
Pottsville loam:			
Eroded hilly phase	do	do	Very poor.
Hilly phase	do	do	Do.
Stony alluvium (Muskingum and Colbert soil materials).	Very low	Very poor	Good.
Waynesboro fine sandy loam, eroded hilly phase.	Medium	Fair	Poor.

GROUP 17

Group 17 is made up of yellow very plastic undulating to rolling soils shallow to bedrock limestone. The plow layer is relatively heavy, the texture ranging from silty clay loam to silty clay. Practically all these soils have some rock outcrops, and a few of them have sufficient stone and rock outcrops to interfere materially with or prohibit tillage.

Natural fertility is low to medium, chiefly because the clayey material does not have much capacity for holding moisture available to plants. The heavy compact plow layer makes the soils difficult to work, and the abundance of stone and rock outcrops on the stony types practically prohibits tillage in places. Runoff develops quickly on most areas, and consequently the soils are difficult to protect from erosion. Good tilth is also difficult to maintain, as the range of moisture conditions under which the plow layer can be cultivated without developing clods is very narrow. Most row crops are not well suited, but many of the legumes and grasses for hay and pasture are fairly productive where the fertility of the soils is at a high level. The yields of all crops, however, are restricted by unfavorable moisture conditions.

A large part of the area, especially that occupied by the severely eroded phases and stony types, is best used as permanent pasture. Where some row crops must be planted, moderately long rotations should be used. Large yields, however, cannot be expected of most row crops, because sufficient soil moisture for good growth during the drier parts of the growing period is not commonly available. Early maturing crops, as fall-sown small grains, can be expected to give more consistently good yields. Regular fertilization, application of lime, and the incorporation of organic matter are necessary to maintain a fairly good productivity. Where fertility is at a high level, alfalfa and red clover are fairly well suited to the better parts. In general these soils are well suited to the more desirable pasture plants, as Bermuda grass, annual lespedeza, white clover, and bluegrass. Adequate fertilization, liming, and proper seeding are necessary.

The fertility, workability, and conservability of the soils in management group 17 are given in table 23.

TABLE 23.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 17*

Soil	Fertility	Workability	Conservability
Colbert silty clay:			
Eroded undulating phase	Medium	Fair	Poor.
Eroded rolling phase	do	Poor	Do.
Severely eroded rolling phase	Very low	Very poor	Do.
Severely eroded undulating phase	do	Poor	Do.
Colbert silty clay loam:			
Rolling phase	Medium	Fair	Do.
Undulating phase	do	do	Do.
Colbert-Talbott stony silty clay loams, severely eroded rolling phases.	Very low	Very poor	Do.
Rolling stony land (Colbert soil material).	Medium	do	Good.

GROUP 18

Group 18 consists of strongly acid poorly drained soils. The soils have a nearly level surface and occur as alluvial soils of the bottom lands or stream terraces. They are light-colored, apparently low in plant nutrients, and strongly acid. During wetter seasons, they are

waterlogged or ponded, but during the driest parts of the year most of them are excessively dry. The surface layer in general has good tilth, but the subsoil, especially of the Robertsville and Tyler types, is tight compact clay. The workability is poor, but the conservability is good as erosion is no hazard. The capacity for retaining plant nutrients in a form available to plants is high. Good tilth is somewhat difficult to maintain in many areas because the plow layer is much of the time either very wet or very dry.

Chiefly because of widely fluctuating moisture conditions, low fertility, and strongly acid condition, productivity is low. A few areas are fairly productive of certain crops, but in general they are best suited to permanent pasture or forest. Soybeans, corn, and sorghum for hay and forage produce fairly well during seasons of relatively favorable moisture conditions.

Fertilization is required for all crops, and the incorporation of organic matter is particularly beneficial. A pasture mixture of Dallis grass, annual lespedeza, and white clover is suited. In most areas Kentucky bluegrass, orchard grass, and Bermuda grass produce good grazing when the land is drained, brought to a high level of fertility, and adequately limed.

Special practices for the control of runoff are not required. The yields could probably be greatly increased by artificial drainage, but the feasibility of drainage depends upon finding suitable outlets and upon producing benefits which exceed the cost. Those soils that have a tight compact clay subsoil require intricate and probably costly drainage systems for effective removal of excess water.

The fertility, workability, and conservability of the soils in management group 18 are given in table 24.

TABLE 24.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 18*

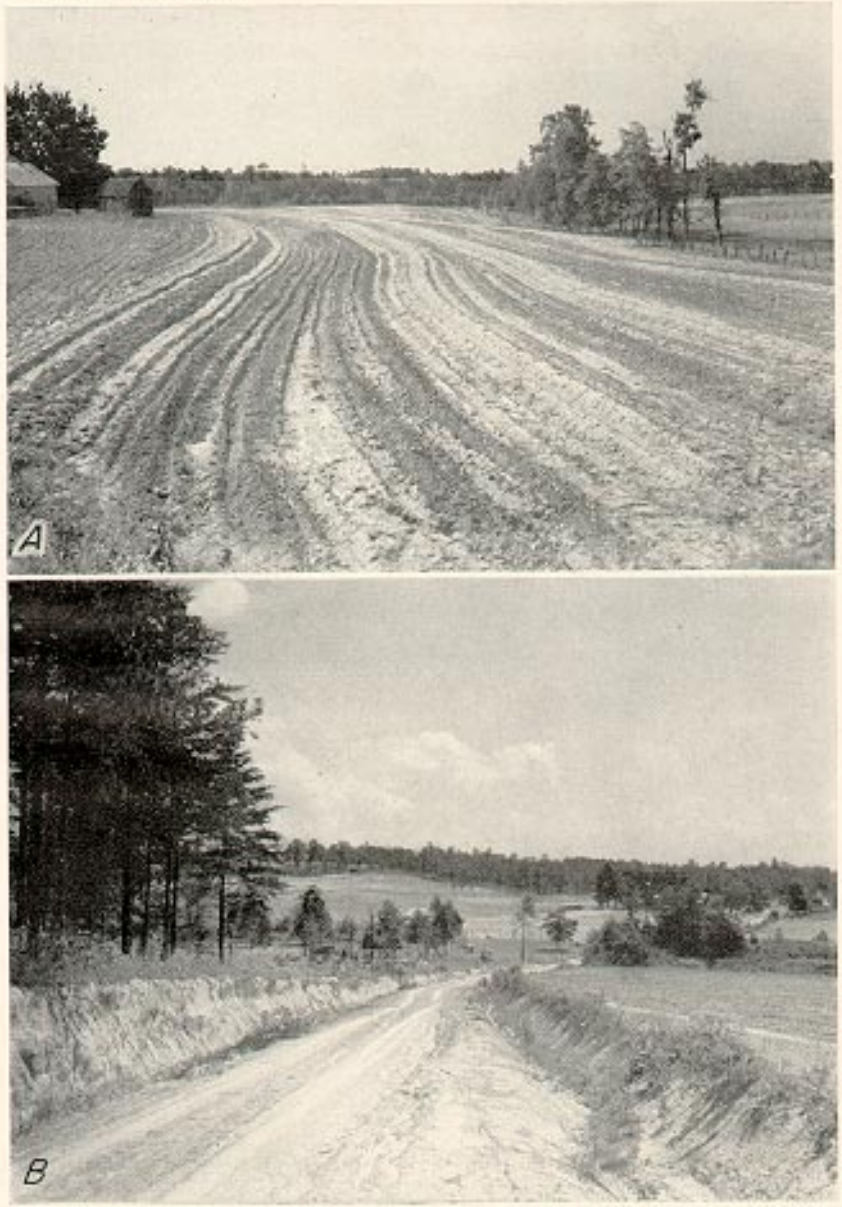
Soil	Fertility	Workability	Conservability
Guthrie silt loam	Low	Poor	Good.
Philo-Atkins silt loams	do	Good	Very good.
Robertsville silt loam	do	Poor	Good.
Tyler very fine sandy loam	do	do	Do.

GROUP 19

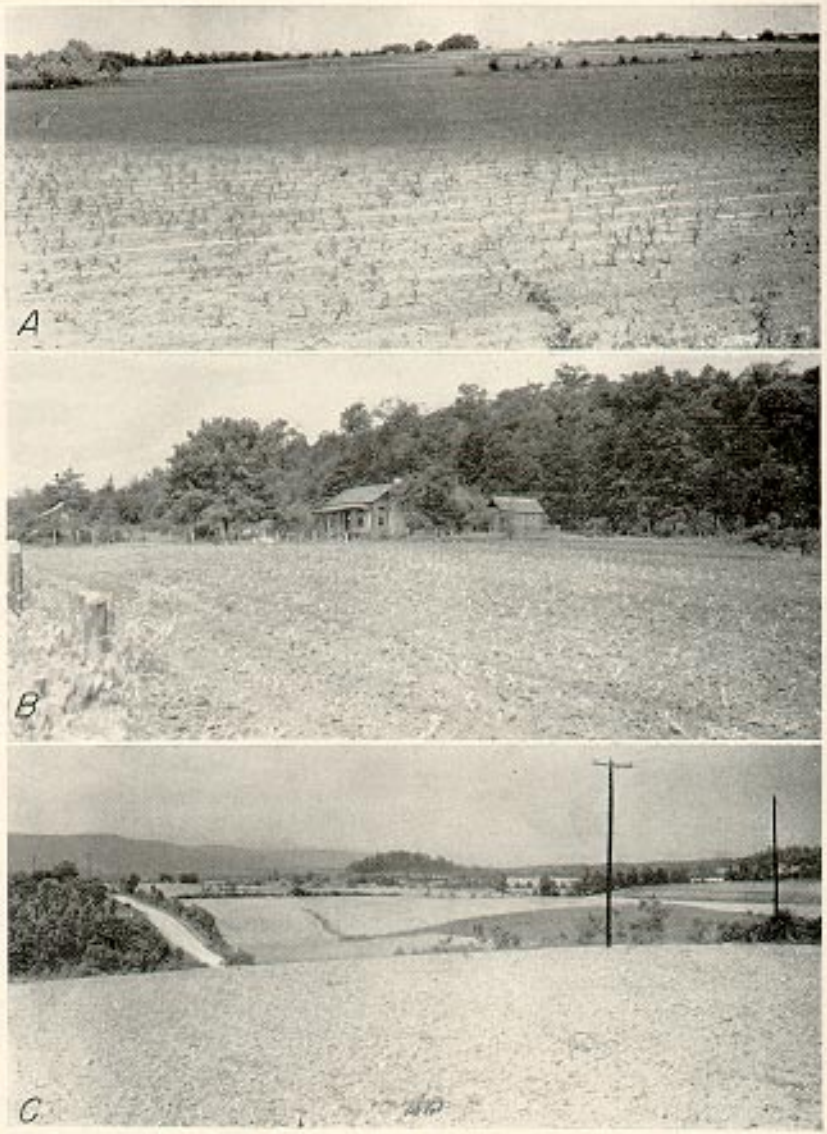
Group 19 is made up of slightly acid to alkaline poorly drained soils. The Hollywood soils have somewhat better drainage than the others, are not subject to flooding, and are suitable for crops. All the soils are fertile and have a very low lime requirement; a great part of the area does not require lime for either crops or pasture.

Owing to prevailingly wet conditions, the productivity is low for all except the better drained Hollywood areas. The generally wet condition and the heavy clayey nature of the plow layer causes Hollywood soils to be sticky when wet and hard and cloddy when dry and

Soil Survey of Jackson County, Ala. PLATE 9



A, Broad-based terraces on Hartsells fine sandy loam soils.
B, Cropland and forested land suitable for crops or pasture on rolling phases of Enders silt loam (Enders-Hartsells-Muskingum association).



A, Lighter colored Colbert soils on the Etowah-Jefferson-Monongahela-Talbott soil association in foreground are shallower to bedrock and less productive than darker colored Hollywood soils in center.
B, Tenant home on Hollywood soils; wooded area of Limestone rockland (hilly) in background.
C, Landscape in the Fullerton-Clarksville-Greendale association; Fullerton silt loam, eroded rolling phase, in view.

makes their workability only fair. The problem of conserving Hollywood soils against erosion losses and leaching of plant nutrients is of practically no consequence. Areas on first bottoms may be subjected to scouring by stream overflow, and where row crops are grown on the more sloping parts of Hollywood silty clay, undulating phase, there may be some erosion during heavy downpours.

The Hollywood soils, especially the undulating phase, are productive of corn, soybeans, lespedeza, and certain other hay crops. They are suited to moderately short rotations, but yields are easily affected by either a shortage or excess of moisture. Cultivation is also difficult, as Hollywood soil clods easily except when worked within a narrow optimum range of moisture conditions. Fertilizer requirements are less than for most soils, although responses to proper fertilization can be expected. Lime is not commonly required even for the more exacting legume crops.

Most areas of the Melvin, Dunning, and Prader soils are poorly suited to crops requiring tillage. They support fair to very good pasture, although some areas are so wet that the pasture is of poor quality. For most soils of group 19 the productivity of crops and the quality of pasture can be improved by artificial drainage. The feasibility of drainage, however, depends on the finding of suitable outlets and the cost of installation.

The fertility, workability, and conservability of the soils in management group 19 are given in table 25.

TABLE 25.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 19*

Soil	Fertility	Workability	Conservability
Dunning silty clay	High	Poor	Excellent.
Hollywood silty clay:			
Level phase	do	Fair	Very good.
Undulating phase	do	do	Do.
Melvin silt loam	do	Poor	Excellent.
Melvin silty clay	do	Very poor	Do.
Melvin silty clay loam	do	Poor	Do.
Prader very fine sandy loam	do	do	Do.

GROUP 20

Miscellaneous land types and steep and stony soils form group 20. This group consists of steep, stony, or shallow soils considered unsuitable for tilled crops or pasture. They are probably best used for forest, and a great part of the area is now occupied by forest consisting chiefly of oak, hickory, pine, and cedar.

The soils suited only to forest have not been subdivided into groups according to differences in forest-management requirements. Areas not under forest should be reforested. Some of these areas will reforest themselves if properly protected from fire and grazing; others will have to be planted.

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Old-field and Virginia pines are the trees most common on areas that were once cleared. They are also the most suitable trees for planting, especially on the less fertile soils and on the more exposed or otherwise less favorable growing sites. In the most exposed or infertile sites, Virginia pine is best suited, but it grows slowly and has a less commercial value than old-field pine. For the better locations, where moisture relations are most favorable for plant growth and the soil material is fairly fertile, yellow-poplar, walnut, locust, and other deciduous trees may be more desirable.

Management practices used in forest production include: (1) Maintenance of a full stand of desirable species; (2) systematic cutting and weeding out of undesirable trees; (3) harvesting of the mature trees so desirable species take their place; and (4) the control as far as possible of damage from fire, browsing, trampling, and other causes. Additional information on the establishment and maintenance of farm forests may be found in the handbook published by the Alabama Polytechnic Institute (*3*).

Sericea lespedeza is well suited for use in the establishment of a vegetative cover on many rough gullied areas, but it is generally difficult to get this crop established. Although the soils are not physically suited to cropping and pasture, farmers may be forced to use them for crops because they do not have any better land. Where tilled crops must be grown, adequate quantities of lime and fertilizer must be applied and the organic-matter content must be maintained at a high level. Rotations should consist as much as possible of close-growing hay, pasture, and small-grain crops. The soils must be maintained in a condition that will permit retention of as much moisture as possible. The goal must be reduction of runoff and development of a luxuriant vegetative cover that will hold the soil in place. All field operations should be with the contour, and on the longer slopes strip cropping may be beneficial. None of these soils can be terraced.

Productive pasture requires proper seeding, liming, and fertilizing, particularly with phosphorus. In general, legumes should make up a considerable part of the pasture sod. The difficulty of applying fertilizer and other amendments and clipping of weedy growth is the greatest problem in maintaining good pasture on these steep soils.

The fertility, workability, and conservability of the soils in management group 20 are given in table 26.

TABLE 26.—*Fertility, workability, and conservability of soils of Jackson County, Ala., in management group 20*

Soil	Fertility	Workability	Conservability
Aimuchee silty clay loam, eroded steep phase.	Low	Very poor	Very poor.
Fullerton cherty silt loam:			
Eroded steep phase	do	do	Do.
Steep phase	do	do	Do.
Hilly stony land (Muskingum soil material).	Very low	do	Do.
Jefferson-Allen loams:			
Severely eroded steep phases	do	do	Do.
Steep phases	Medium	Poor	Do.
Limestone rockland:			
Hilly	Very low	Very poor	Do.
Rough	do	do	Do.
Muskingum stony fine sandy loam:			
Hilly phase	do	Poor	Poor.
Steep phase	do	Very poor	Very poor.
Rolling stony land (Muskingum soil material).	do	do	Fair.
Rough gullied land (Dewey, Cumberland, and Colbert soil materials).	do	do	Very poor.
Rough gullied land (Muskingum soil material).	do	do	Do.
Rough stony land (Muskingum soil material).	do	do	Do.
Stony alluvium (Muskingum and Colbert soil materials).	Medium	do	Poor.

EXPECTABLE YIELDS

Yields that may be expected from various crops on Jackson County soils are given in table 27. Management practices differ from farm to farm but it is usually possible to find one or two major types of management that are followed on a soil or group of soils. In table 27 yields are estimated for most crops on each soil under two levels of management. In columns B are yields to be expected under the most common level of soil management; in columns C, those to be expected under good management.

TABLE 27.—*Expected average acre yields of principal crops under two levels of management on the soils of Jackson County, Ala.*

[In columns B—yields under common levels of management. In columns C—yields under the best practices considered feasible for the majority of farmers in the county. Absence of yield data indicates the soil is poorly suited to the crop specified and is not commonly planted to it.]

Soil	Cotton (lint)		Corn		Oats		Lespedeza		Soybeans		Cowpeas		Alfalfa		Sweet-potatoes		Potatoes		Pasture	
	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C
	Lb.	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Abernathy silt loam:																				
Level phase	[2] 400	500	50	63	[2] 25	30	1.5	1.7	2.0	2.5	0.8	1.0	2.8	4.0	128	150	170	200	125	150
Undulating phase	400	500	45	55	38	50	1.5	1.7	2.0	2.5	.8	1.0	3.0	4.0	128	150	170	200	115	140
Abernathy fine sandy loam	300	400	28	38	20	25	.8	1.1	1.8	2.3	.8	1.0	2.0	3.0	120	135	150	170	100	125
Allen fine sandy loam:																				
Undulating phase	320	460	30	45	25	40	.9	1.2	1.5	2.0	.8	1.0	1.6	2.6	113	150	150	200	75	100
Eroded undulating phase	300	400	23	35	23	38	.8	1.1	1.3	1.8	.7	.9	1.4	2.4	105	135	130	170	65	90
Rolling phase	280	360	20	35	23	35	.8	1.1	1.3	1.8	.7	.9	1.4	2.2	105	135	120	160	65	90
Eroded rolling phase	240	320	20	30	20	30	.8	1.1	1.1	1.6	.6	.8	1.2	2.0	90	120	100	140	60	80
Eroded hilly phase	140	280	15	28	13	28	.5	.8	------	------	.4	.6	.8	1.4	60	98	60	100	35	50
Allen loam:																				
Severely eroded rolling phase	160	280	18	25	15	25	.6	.9	.6	1.3	.5	.7	.8	1.6	75	105	80	120	30	65
Severely eroded hilly phase [4]	------	------	------	------	10	18	.4	.7	------	------	.3	.5	.6	1.2	45	75	50	80	25	40
Armuchee silty clay loam, eroded steep phase	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	30	50
Armuchee-Tellico silty clay loams:	160	240	13	15	13	23	.6	.9	.6	.8	.4	.5	1.0	2.0	53	75	50	110	60	75
Eroded hilly phases [4]	------	------	------	------	10	20	.3	.5	------	------	.2	.3	1.6	2.0	45	75	50	100	25	40
Severely eroded hilly phases [4]	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Barbourville-Cotaco fine sandy loams	------	------	30	40	------	------	------	------	1.5	2.0	.6	[3] 1.0	------	------	150	188	180	200	60	100
Bruno fine sandy loam	280	360	40	50	20	25	1.2	1.4	1.5	2.1	.6	.8	------	2.8	120	150	140	200	90	120
Bruno loamy fine sand	------	------	35	40	20	30	.8	1.1	1.0	1.8	.4	.7	------	2.0	90	120	100	140	40	80
Capshaw silt loam:																				
Undulating phase	300	400	20	35	25	35	1.2	1.5	1.5	2.5	.7	1.0	1.7	2.3	90	120	140	200	70	120
Level phase	280	360	20	35	25	35	1.2	1.6	1.5	2.5	.7	1.0	1.7	2.3	90	120	120	160	70	120
Clarksville cherty silt loam:																				
Rolling phase	220	300	13	25	15	23	.6	1.1	.9	1.4	.6	.8	1.2	2.4	60	90	70	110	40	65
Eroded rolling phase	180	240	13	23	13	20	.5	1.0	.8	1.3	.5	.8	1.2	2.0	53	75	50	100	35	60
Undulating phase	240	340	15	30	19	25	.9	1.1	1.1	1.6	.7	.9	1.6	2.6	83	113	90	120	50	75
Eroded undulating phase	220	300	15	26	15	23	.8	1.1	1.0	1.6	.6	.8	1.4	2.6	75	98	80	120	40	70
Hilly phase	140	200	10	20	10	20	.5	.8	.8	1.3	.4	.6	.8	2.0	------	------	------	------	30	60
Eroded hilly phase	------	------	------	------	------	------	.5	.8	.8	1.3	------	------	------	------	------	------	------	------	25	55
Colbert silty clay loam:																				
Undulating phase	200	320	15	25	20	30	.9	1.1	1.1	1.7	.6	.9	------	------	------	------	------	------	65	80
Rolling phase	200	260	13	20	15	25	.6	1.0	1.0	1.6	.6	.8	------	------	------	------	------	------	55	70

Colbert silty clay:																				
Eroded undulating phase	160	240	13	20	15	25	.6	1.0	1.0	1.6	.6	.8	------	------	------	------	------	------	50	75
Severely eroded undulating phase	120	200	------	------	13	25	.5	1.0	------	------	------	------	------	------	------	------	------	------	25	55
Eroded rolling phase	140	240	10	18	10	25	.5	.9	.9	1.5	.5	.9	------	------	------	------	------	------	40	70
Severely eroded rolling phase	120	180	------	------	10	23	.5	.8	------	------	------	------	------	------	------	------	------	------	30	60
Colbert-Talbott stony silty clay loams, severely eroded rolling phases	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	20	40
Crossville loam	320	400	25	38	25	38	1.2	1.5	1.3	2.4	.5	.8	------	------	113	150	100	130	75	100
Cumberland loam, undulating phase	360	500	38	50	38	50	1.5	1.7	1.8	2.5	.9	1.0	2.6	3.6	113	150	150	200	100	125
Cumberland silt loam:																				
Undulating phase	360	520	38	50	38	50	1.5	1.7	1.8	2.5	.9	1.0	2.6	4.0	113	150	150	200	75	125
Rolling phase	320	440	30	45	30	45	1.0	1.3	1.6	2.3	.8	.9	2.2	3.6	105	128	140	180	60	100
Cumberland silty clay loam:																				
Eroded undulating phase	280	400	30	45	30	43	1.1	1.4	1.7	2.4	.8	1.0	2.2	3.2	113	135	140	180	75	100
Eroded rolling phase	260	360	25	35	25	40	.9	1.1	1.4	2.0	.6	.9	2.0	3.0	90	120	130	160	60	90
Severely eroded rolling phase [4]	200	260	15	30	10	25	.4	.9	.6	1.3	.3	.5	1.2	2.2	------	------	------	------	35	70
Eroded hilly phase [4]	160	240	13	20	13	18	.5	.8	1.0	1.6	.4	.5	1.6	2.0	------	------	------	------	50	70
Severely eroded hilly phase [4]	------	------	------	------	8	15	------	------	------	------	------	------	------	------	------	------	------	------	30	65
Dewey silt loam:																				
Undulating phase	360	500	33	50	35	50	1.5	1.7	1.8	2.5	.9	1.0	2.0	4.0	113	150	150	200	100	125
Rolling phase	300	400	30	45	25	45	1.0	1.3	1.6	2.3	.8	.9	2.2	3.6	105	128	130	160	75	100
Hilly phase	200	300	20	30	20	30	.8	1.2	1.1	1.8	.5	.8	2.0	3.4	------	------	------	------	60	90
Dewey silty clay loam:																				
Eroded undulating phase	300	400	30	45	33	45	1.1	1.5	1.7	2.4	.8	1.0	2.2	3.2	105	135	140	180	75	100
Eroded rolling phase	240	360	25	35	25	40	.9	1.4	1.4	2.0	.6	.8	2.0	3.0	98	128	120	140	60	100
Severely eroded rolling phase	160	280	15	30	15	33	.5	1.1	.6	1.3	.4	.7	1.2	2.2	------	------	------	------	50	80
Eroded hilly phase	160	280	15	25	15	25	.7	1.1	1.0	1.6	.5	.7	1.8	3.2	------	------	------	------	50	80
Severely eroded hilly phase	------	------	------	------	10	20	.5	.9	------	------	------	------	1.5	2.0	------	------	------	------	40	70
Dewey cherty silt loam:																				
Eroded undulating phase	260	360	20	35	20	35	1.0	1.2	1.6	2.4	.7	.9	1.8	2.8	83	113	100	140	50	80
Eroded rolling phase	240	320	18	30	18	28	.9	1.1	1.1	1.8	.7	.9	1.6	2.2	75	105	80	100	35	60
Dewey cherty silty clay loam, severely eroded rolling phase	200	280	13	23	13	20	.5	1.1	.6	1.2	.4	.7	1.6	2.8	------	------	------	------	35	70
Dunning silty clay [5]	------	------	15	40	------	------	.7	1.0	1.1	2.3	------	------	------	------	------	------	------	------	70	130
Egam silt loam	[2] 300	400	35	45	[3] 30	45	1.2	1.5	1.8	2.4	.8	.9	2.4	3.0	90	113	120	140	100	120
Egam silty clay loam	[2] 280	380	30	45	[3] 30	45	1.2	1.5	1.6	2.3	.8	.9	2.4	3.0	90	113	120	140	75	125
Enders silt loam:																				
Undulating phase	280	400	23	35	25	30	.8	1.2	1.1	2.0	.5	.8	1.6	2.0	90	120	130	180	50	90
Eroded undulating phase	240	360	15	30	20	30	.7	.8	1.0	1.8	.4	.7	------	------	75	105	120	150	45	80
Rolling phase	220	320	15	25	15	25	.6	.8	1.0	1.6	.4	.6	------	------	68	90	100	130	40	75
Eroded rolling phase	220	280	15	25	15	25	.6	.8	1.0	1.6	.4	.6	------	------	68	90	100	130	40	75
Rolling shallow phase	180	240	8	20	10	20	------	------	------	------	------	------	------	------	------	------	------	------	40	75
Eroded rolling shallow phase	160	200	8	15	8	15	------	------	------	------	------	------	------	------	------	------	------	------	35	70
Etowah loam:																				
Level phase	300	480	35	55	35	60	1.5	1.7	1.8	2.5	.9	1.0	3.0	3.6	120	165	180	220	110	140
Undulating phase	320	500	35	50	35	50	1.5	1.7	1.8	2.5	.9	1.0	2.6	3.6	120	165	180	220	110	140
Etowah silt loam:																				
Undulating phase	320	500	35	50	38	55	1.5	1.7	1.8	2.5	.9	1.0	2.6	4.0	120	165	170	220	110	140
Level phase	260	480	33	55	35	60	1.5	1.7	1.8	2.5	.9	1.0	2.6	4.0	113	150	170	200	100	140
Rolling phase	240	360	30	45	30	45	1.0	1.3	1.6	2.3	.8	.9	2.2	3.6	105	128	140	180	60	100

See footnotes at end of table.

TABLE 27.—*Expected average acre yields of principal crops under two levels of management on the soils of Jackson County, Ala.*—Continued

[In columns B—yields under common levels of management. In columns C—yields under the best practices considered feasible for the majority of farmers in the county. Absence of yield data indicates the soil is poorly suited to the crop specified and is not commonly planted to it.]

Soil	Cotton (lint)		Corn		Oats		Lespedeza		Soybeans		Cowpeas		Alfalfa		Sweetpotatoes		Potatoes		Pasture	
	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C
	Lb.	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Etowah silty clay loam:																				
Eroded undulating phase	240	360	30	45	30	45	1.1	1.4	1.7	2.4	.8	1.0	2.2	3.2	113	135	140	180	75	100
Eroded rolling phase	220	340	25	35	25	38	.8	1.1	1.4	2.0	.6	.9	2.0	3.0	90	120	130	160	60	90
Severely eroded rolling phase	200	260	15	30	15	25	.5	.8	.6	1.3	.3	.5	1.2	2.2	----	----	----	----	40	80
Fullerton silt loam:																				
Undulating phase	300	440	28	40	25	40	1.1	1.4	1.3	2.3	.8	1.0	2.4	3.4	113	135	140	180	70	100
Eroded undulating phase	280	400	23	38	23	38	1.1	1.4	1.3	2.3	.7	.9	2.0	3.2	105	128	120	170	70	95
Eroded rolling phase	240	360	18	33	20	33	.9	1.3	1.1	2.1	.6	.9	----	----	90	120	90	150	50	85
Fullerton cherty silt loam:																				
Rolling phase	260	360	15	28	18	25	.9	1.1	1.0	2.0	.7	.9	1.6	2.4	75	105	90	120	45	70
Eroded rolling phase	240	320	15	25	15	25	.8	1.1	.9	2.0	.7	.9	1.6	2.2	75	105	80	100	35	60
Undulating phase	300	380	18	30	20	25	1.1	1.0	.9	1.8	.7	1.0	2.0	3.2	90	120	120	160	60	80
Eroded undulating phase	260	360	15	28	18	25	1.0	1.2	1.1	2.1	.7	.9	1.6	2.8	83	113	100	140	50	75
Hilly phase [4]	160	260	13	25	13	23	.7	1.0	.9	1.8	.5	.7	1.2	2.2	----	----	----	----	30	65
Eroded hilly phase [4]	140	240	13	23	13	23	.7	1.0	.9	1.8	.5	.7	1.0	2.0	----	----	----	----	30	60
Steep phase	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	30	45
Eroded steep phase	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	25	45
Fullerton cherty silty clay loam:																				
Severely eroded rolling phase [4]	160	----	10	----	10	20	.5	1.0	.6	1.8	----	----	----	----	----	----	----	----	25	55
Severely eroded hilly phase [4]	----	----	----	----	10	20	.4	.8	.5	1.6	----	----	.8	1.8	----	----	----	----	25	55
Greendale cherty silt loam:																				
Undulating phase	300	440	25	35	25	35	.9	1.2	1.3	2.1	.7	.9	2.0	2.2	90	120	140	180	80	100
Eroded undulating phase	280	400	20	33	23	33	.8	1.1	1.3	2.1	.6	.9	1.6	2.1	68	113	120	170	75	95
Level phase	300	400	25	35	25	35	.9	1.2	1.3	2.1	.7	.9	2.0	2.4	90	120	140	180	80	100
Eroded rolling phase	240	320	15	25	15	25	.7	1.1	1.1	2.0	.7	.9	1.4	2.0	60	105	70	100	60	75
Guthrie silt loam [5]	----	----	10	25	----	----	.5	.8	1.0	1.8	----	.5	----	----	----	----	----	----	60	100
Hanceville fine sandy loam:																				
Undulating phase	400	500	30	45	20	30	.9	1.1	1.2	2.0	.4	.8	2.0	3.0	120	150	140	180	40	80
Eroded undulating phase	320	460	25	40	18	28	.9	1.1	1.2	2.0	.4	.7	1.6	2.6	105	143	120	160	35	75
Rolling phase	280	380	20	30	15	25	.8	.9	1.0	2.0	.4	.6	----	2.4	90	120	110	140	35	70
Eroded rolling phase	240	340	18	28	13	23	.6	.8	1.1	1.9	.4	.6	----	2.0	75	105	100	130	35	65
Hartsells fine sandy loam:																				
Undulating phase	400	520	38	50	20	30	.9	1.1	1.1	2.0	.5	.8	----	3.0	120	150	160	200	40	80
Eroded undulating phase	340	480	30	45	15	28	.8	1.1	1.1	2.0	.4	.8	----	2.8	105	135	120	180	35	80
Rolling phase	300	440	25	40	15	25	.7	.9	1.1	2.0	.4	.7	----	2.4	90	120	110	160	35	70
Eroded rolling phase	260	400	20	35	15	23	.6	.8	1.0	1.9	.4	.6	----	2.0	75	113	100	140	30	70
Undulating shallow phase	280	400	25	38	20	25	.8	1.1	.9	1.8	.5	.8	1.6	2.0	98	135	130	180	35	75
Eroded undulating shallow phase	260	340	23	35	18	23	.7	1.0	.8	1.7	.5	.7	----	1.6	75	113	110	150	35	75
Rolling shallow phase	220	300	20	30	15	20	.7	.9	.8	1.7	.4	.7	----	1.6	60	98	70	120	25	70
Eroded rolling shallow phase	180	260	18	25	13	18	.6	.8	.7	1.6	.4	.6	----	1.2	53	75	50	100	35	60
Hermitage silty clay loam:																				
Eroded undulating phase	340	440	40	50	38	45	1.4	1.7	1.8	2.4	.7	.9	2.6	3.6	120	135	160	180	110	130
Eroded rolling phase	260	360	30	40	25	38	1.1	1.3	1.5	2.2	.6	.8	2.0	2.4	90	113	100	120	75	110
Hermitage cherty silty clay loam:																				
Eroded hilly phase [4]	140	240	13	23	13	23	.7	1.0	1.0	1.9	.5	.7	1.0	2.0	----	----	----	----	40	70
Severely eroded hilly phase [4]	----	----	----	----	10	20	.5	.8	----	----	----	----	.8	1.8	----	----	----	----	25	55
Hilly stony land (Muskingum soil material)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hollywood silty clay:																				
Level phase	[3] 220	320	35	40	[3] 30	35	.8	1.0	1.8	2.4	.8	.9	----	----	----	----	----	----	70	100
Undulating phase	[2] 280	360	38	45	[3] 35	40	1.1	1.2	1.8	2.4	.8	1.0	----	----	----	----	----	----	75	100
Holston loam:																				
Undulating phase	280	400	25	40	25	40	.8	1.1	1.1	2.3	.7	1.0	1.4	2.0	113	150	150	200	60	110
Level phase	240	320	23	35	20	38	.8	1.2	1.3	2.3	.7	1.0	----	----	105	135	140	180	60	120
Huntington silt loam	[2] 320	400	40	60	30	45	1.4	1.7	2.0	2.5	.9	1.0	2.4	3.2	120	135	140	160	125	150
Jefferson fine sandy loam:																				
Undulating phase	300	400	30	40	25	40	.8	1.1	1.2	2.3	.7	.9	1.4	2.0	113	150	150	200	70	100
Eroded undulating phase	280	380	20	30	20	38	.7	1.0	1.2	2.3	.6	.8	1.2	2.0	105	135	130	170	60	100
Rolling phase	240	340	18	25	18	35	.7	1.0	1.1	2.0	.6	.8	1.4	1.8	105	135	120	160	60	90
Eroded rolling phase	240	320	20	30	20	30	.6	.9	1.0	2.0	.5	.7	1.2	2.0	90	120	100	140	50	80
Jefferson-Allen loams:																				
Eroded rolling phases	240	320	18	25	18	25	.6	.9	1.0	2.0	.4	.6	1.0	1.6	75	120	100	----	50	80
Hilly phases	140	280	13	20	13	23	.6	.8	.8	1.8	----	----	1.0	1.6	----	----	----	----	55	75
Eroded hilly phases	120	240	13	20	13	20	.5	.8	.7	1.7	.4	.6	.8	1.4	60	90	60	100	30	55
Severely eroded hilly phases	----	----	----	----	10	15	.4	.7	----	----	.3	.5	.6	1.2	45	75	50	80	30	50
Steep phases	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	25	50
Severely eroded steep phases	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	25
Limestone rockland:																				
Hilly	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rough	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lindside silt loam	[2] 280	400	45	50	[3] 25	30	1.2	1.5	2.0	2.5	.8	1.0	----	----	----	----	----	----	135	170
Lindside silty clay loam	----	----	40	45	[3] 25	30	1.1	1.4	2.0	2.5	.8	1.0	----	----	----	75	----	----	120	160
Lindside silty clay	----	----	35	43	20	28	1.1	1.2	1.8	2.3	.7	.9	----	----	----	----	----	----	100	120
Melvin silt loam [5]	----	----	15	40	----	----	.9	1.2	1.8	2.3	.3	.6	----	----	----	----	----	----	80	140
Melvin silty clay loam [5]	----	----	16	35	----	----	.9	1.2	1.7	2.2	.7	1.0	----	----	----	----	----	----	80	140
Melvin silty clay	----	----	15	35	----	----	1.1	1.4	1.5	2.0	.8	1.0	----	----	----	----	----	----	80	140
Monongahela loam:																				
Level phase	200	280	15	25	18	30	.8	1.1	1.0	2.1	.6	.8	----	----	75	120	80	140	60	120
Undulating phase	240	360	15	25	20	35	.8	1.1	1.0	2.1	.6	.8	----	----	90	128	100	150	60	120
Muskingum fine sandy loam:																				
Hilly phase [4]	200	240	15	23	----	----	.5	.8	.6	1.4	----	----	----	----	----	----	----	----	40	50
Eroded hilly phase [4]	200	240	15	23	----	----	.5	.8	.5	1.3	----	----	----	----	----	----	----	----	35	50

See footnotes at end of table.

TABLE 27.—*Expected average acre yields of principal crops under two levels of management on the soils of Jackson County, Ala.*—Continued

[In columns B—yields under common levels of management. In columns C—yields under the best practices considered feasible for the majority of farmers in the county. Absence of yield data indicates the soil is poorly suited to the crop specified and is not commonly planted to it.]

Soil	Cotton (*lint*)		Corn		Oats		Lespedeza		Soybeans		Cowpeas		Alfalfa		Sweetpotatoes		Potatoes		Pasture	
	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C
	Lb.	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days*	*Cow-acre-[1] days*
Muskingum stony fine sandy loam:																				
Steep phase																			15	30
Hilly phase																			20	40
Ooltewah silt loam	320	440	38	45	[3] 20	30	1.2	1.5	2.0	2.5	.8	1.0	([3])						125	150
Philo-Atkins silt loams [5]			15	25	[3] 15	30	1.2	1.5	1.4	2.2	.8	1.0							80	120
Pope fine sandy loam			25	38	20	40	.9	1.2	1.5	2.2	.8	1.0							80	120
Pottsville loam:																				
Hilly phase	160		10	20					.6	1.4									35	60
Eroded hilly phase			10	20					.5	1.3									35	60
Prader very fine sandy loam [5]			15	35	([3])		.8	1.2	1.5	2.3	.3	.6							60	110
Robertsville silt loam [5]			15	25	([3])		.6	1.1	1.0	1.8	.4	.7							60	100
Rolling stony land:																				
Colbert soil material																			40	60
Muskingum soil material																			25	40
Rough gullied land:																				
Dewey, Cumberland, and Colbert soil materials																			10	50
Muskingum soil material																			10	20
Rough stony land (Muskingum soil material)																				
Sequatchie fine sandy loam:																				
Undulating phase	320	440	30	43	30	45	1.1	1.4	1.2	2.5	.7	1.0	2.2	3.4	113	165	160	200	80	110
Level phase	300	500	30	50	[3] 25	50	1.1	1.5	1.2	2.5	.7	1.0	2.2	3.4	113	165	160	210	80	120
Stony alluvium (Muskingum and Colbert soil materials)			15	20															40	75
Sturkie fine sandy loam			33	43			.9	1.4	1.7	2.3	.7	.9							100	130
Swaim silty clay loam:																				
Rolling phase	220	340	25	40	23	38	.9	1.2	1.2	2.1	.6	.7			60	90	70	100	70	100
Eroded rolling phase	160	240	18	23	15	30	.6	.9	1.1	2.0	.4	.6			45	75	60	100	50	70
Severely eroded rolling phase	80	200	10	18	10	18	.3	.5	.5	1.2	.2	.4							30	50
Undulating phase	280	400	30	45	30	43	1.2	1.5	1.4	2.3	.7	.9		2.0	90	105	100	120	90	125
Eroded undulating phase	240	360	25	40	23	38	.9	1.2	1.3	2.2	.6	.7			60	90	70	100	70	100
Taft silt loam [5]	160	240	15	30	15	25	.6	.9	1.6	2.3	.4	.6			45	75	60	120	70	110
Talbott silt loam, undulating phase	200	360	25	43	30	43	1.1	1.4	1.4	2.3	.7	.9		2.4	75	105	100	140	60	120
Talbott silty clay loam:																				
Eroded undulating phase	160	320	20	40	25	35	.9	1.1	1.3	2.2	.7	.8		2.4	45	75	60	160	50	100
Eroded rolling phase	120	240	15	30	18	30	.8	1.0	1.1	2.0	.6	.8		1.6	38	60	50	80	45	90
Severely eroded rolling phase	80	200	10	18	10	18	.3	.5	.5	1.1	.2	.4							30	50
Tellico clay loam:																				
Eroded rolling phase	280	360	18	30	25	35	.9	1.2	1.1	2.0	.6	.8		2.4	75	98	80	120	60	85
Severely eroded rolling phase	200	280	13	25			.6	1.1	.6	1.2									50	75
Tupelo silt loam:																				
Level phase			8	25	13	25	.8	1.0	.9	2.0	.5	.8							60	100
Undulating phase [5]	200	320	15	30	[3] 20	30	.9	1.1	.9	2.0	.6	.9							60	100
Tyler very fine sandy loam [5]			8	20	([3])		.6	1.1	1.0	1.8	.4	1.0							55	95
Waynesboro fine sandy loam:																				
Undulating phase	360	460	35	45	38	50	1.2	1.5	1.6	2.4	.9	1.1	2.6	3.6	128	165	160	200	80	110
Eroded undulating phase	340	420	30	40	33	45	1.1	1.4	1.6	2.4	.8	1.0	2.2	3.2	113	150	140	180	70	100
Rolling phase	320	400	28	38	30	43	1.1	1.4	1.5	2.3	.8	1.0	2.2	3.2	113	135	140	180	70	100
Eroded rolling phase	280	360	23	33	25	38	.8	1.2	1.5	2.3	.7	.9	1.6	2.6	98	120	120	180	60	90
Eroded hilly phase	160	240	13	20	10	25	.4	.9	1.0	1.6	.4	.6	1.2	2.0					40	70
Waynesboro loam, severely eroded rolling phase	160	280	15	25			.8	1.1	.5	1.2									30	60
Wolftever silt loam:																				
Level phase	260	360	30	40	35	45	1.0	1.5	1.5	2.3	.8	1.0	2.0	3.0	75	105	80	120	100	120
Undulating phase	300	400	25	35	33	43	.9	1.4	1.4	2.2	.8	1.0	2.0	2.4	60	90	80	120	90	115

[1] Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year that animals can be grazed without injury to the pasture; for example, a soil type able to support 1 animal unit per acre for 360 days of the year rates 360; a soil supporting 1 animal unit on 2 acres for 180 days rates 90; and a soil supporting 1 animal unit on 4 acres for 100 days rates 25.

[2] Crop not commonly planted because soil is better suited to other crops and has a high organic content that causes rank growth and late maturity.

[3] Not commonly planted because of danger from freezing, flooding, and lodging.

[4] Yields obtained on selected areas with milder slopes.

[5] Yields obtained on artificially drained or naturally better drained areas.

The yield data in columns B are based largely on observation, interviews, and experience of local farmers and agricultural workers. Crop yield data by soil types over a long period of years are used wherever available. The summation of experience will give fairly reliable yield expectations under the commonly practiced management. For the soils for which such information was not available, the expectable yields given are assumed to be about the same as those for soils with similar characteristics for which there was information.

Information regarding common management for most crops is given for the separate soils in the section on Soil Types and Phases, but common management for permanent pasture is discussed in less detail. Some general definition of common management for permanent pasture is therefore required before the carrying capacities listed in columns B can be interpreted. The management considered normal, and that defined as necessary to achieve the carrying capacities given in columns B of table 27, is explained in the following.

Except for the steep very stony soils, the soils used either for pasture or for crops requiring tillage are reseeded to lespedeza, redtop, orchard grass, Kentucky bluegrass, Dallis grass, common white clover, and like forage plants. The pastures do not receive amendments after reseeding but usually benefit to small extent from the small quantities of lime and phosphorus applied to the crops preceding. The reseeding, however, insures a growth more desirable than that commonly existing on unimproved permanent pastures. Many of the plants used in reseeding are generally tolerant of low nutrient levels, and although production would be much increased by good pasture management, the carrying capacities are commonly above that of unimproved pastures.

Some permanent pastures receive essentially no care. They are grazed without regard for their carrying capacity and receive no lime, fertilizer, or manure except droppings. Excess herbage is not clipped, and droppings are not scattered. Under such treatment, carrying capacities are naturally lower than under the management defined for table 27, and are not considered representative.

Good management, used to obtain the yields in columns C, refers to the proper choice and rotation of crops; use of amendments, commercial fertilizer, and manure and the best tillage methods; return of organic matter to the soil; and where necessary, use of engineering methods of water control. Requirements for good management are discussed in the section Use and Management of Important Soil Groups.

INTERPRETIVE SOIL GROUPINGS AND MAPS

To make soil maps more useful, soils can be grouped so as to emphasize properties that are important in dealing with particular problems. The classification of soils by management groups in the section on Use and Management of Important Soil Groups is an example of an interpretive grouping. Additional soil groupings can be made for other purposes; for example, soils can be grouped according to their need for lime, drainage possibilities, or degree of stoniness. An interpretive grouping of the soils of Jackson County according to suitability for use follows under the heading Suitability Classes.

SUITABILITY CLASSES

The soils of the county can be grouped as First-, Second-, Third-, Fourth-, and Fifth-class soils according to their relative suitability for agricultural use. Such a grouping is not a key to the actual agricultural value of the soils, because location of individual soil areas, association of one soil with others, and benefits or injuries caused by past management are not considered in making the groupings.

First-, Second-, and Third-class soils are considered suitable for crops that require tillage. First-class soils are the most suitable and Third-class the least suitable within this range. Fourth-class soils are not well suited to crops requiring tillage but are suitable for pasture. Fifth-class soils are poorly suited to crops or pasture, but most of them are suitable for forest production.

Soils of any one group are not necessarily alike in their characteristics. First-class soils are more nearly alike than are those that are in any of the other four classes. All First-class soils are fertile, permeable, smooth, and deep to bedrock. The range of characteristics within this class is fairly limited, whereas it is greater among Second-class soils and still greater among Third-class soils. For example, one Third-class soil may not be well suited to cultivation because of poor drainage, another because of strong slope, and another because of stoniness.

The soils of Jackson County are grouped in the following suitability classes:

FIRST CLASS:
- Abernathy silt loam:
  - Level phase
  - Undulating phase
- Cumberland loam, undulating phase
- Cumberland silt loam, undulating phase
- Dewey silt loam, undulating phase
- Etowah loam:
  - Level phase
  - Undulating phase
- Etowah silt loam:
  - Level phase
  - Undulating phase
- Hanceville fine sandy loam, undulating phase
- Hartsells fine sandy loam, undulating phase
- Huntington silt loam

SECOND CLASS:
- Abernathy fine sandy loam
- Allen fine sandy loam:
  - Eroded undulating phase
  - Undulating phase
- Barbourville-Cotaco fine sandy loams
- Bruno fine sandy loam
- Capshaw silt loam:
  - Level phase
  - Undulating phase
- Crossville loam
- Cumberland silt loam, rolling phase

SECOND CLASS—Continued
- Cumberland silty clay loam:
  - Eroded rolling phase
  - Eroded undulating phase
- Dewey cherty silt loam, eroded undulating phase
- Dewey silt loam, rolling phase
- Dewey silty clay loam:
  - Eroded rolling phase
  - Eroded undulating phase
- Egam silt loam
- Egam silty clay loam
- Enders silt loam:
  - Rolling phase
  - Undulating phase
- Etowah silt loam, rolling phase
- Etowah silty clay loam, eroded undulating phase
- Fullerton cherty silt loam, undulating phase
- Fullerton silt loam, undulating phase
- Greendale cherty silt loam:
  - Eroded undulating phase
  - Level phase
  - Undulating phase
- Hanceville fine sandy loam:
  - Eroded undulating phase
  - Rolling phase
- Hartsells fine sandy loam:
  - Eroded undulating phase
  - Rolling phase

SECOND CLASS—Continued
- Hermitage silty clay loam, eroded undulating phase
- Hollywood silty clay, undulating phase
- Holston loam:
  - Level phase
  - Undulating phase
- Jefferson fine sandy loam:
  - Eroded undulating phase
  - Undulating phase
- Lindside silt loam
- Lindside silty clay
- Lindside silty clay loam
- Ooltewah silt loam
- Pope fine sandy loam
- Sequatchie fine sandy loam:
  - Level phase
  - Undulating phase
- Sturkie fine sandy loam
- Talbott silt loam, undulating phase
- Talbott silty clay loam, eroded undulating phase
- Waynesboro fine sandy loam:
  - Eroded rolling phase
  - Eroded undulating phase
  - Rolling phase
  - Undulating phase
- Wolftever silt loam:
  - Level phase
  - Undulating phase

THIRD CLASS:
- Allen fine sandy loam:
  - Eroded rolling phase
  - Rolling phase
- Allen loam, severely eroded rolling phase
- Bruno loamy fine sand
- Clarksville cherty silt loam:
  - Eroded rolling phase
  - Eroded undulating phase
  - Rolling phase
  - Undulating phase
- Cumberland silty clay loam, severely eroded rolling phase
- Dewey cherty silt loam, eroded rolling phase
- Dewey cherty silty clay loam, severely eroded rolling phase
- Dewey silty clay loam, severely eroded rolling phase
- Enders silt loam:
  - Eroded rolling phase
  - Eroded rolling shallow phase
  - Eroded undulating phase
  - Rolling shallow phase
- Etowah silty clay loam:
  - Eroded rolling phase
  - Severely eroded rolling phase
- Fullerton cherty silt loam:
  - Eroded undulating phase
  - Rolling phase
- Fullerton silt loam:
  - Eroded rolling phase
  - Eroded undulating phase

THIRD CLASS—Continued
- Greendale cherty silt loam, eroded rolling phase
- Hanceville fine sandy loam, eroded rolling phase
- Hartsells fine sandy loam:
  - Eroded rolling phase
  - Eroded rolling shallow phase
  - Eroded undulating shallow phase
  - Rolling shallow phase
  - Undulating shallow phase
- Hermitage silty clay loam, eroded rolling phase
- Hollywood silty clay, level phase
- Jefferson-Allen loams, eroded rolling phases
- Jefferson fine sandy loam:
  - Eroded rolling phase
  - Rolling phase
- Monongahela loam:
  - Level phase
  - Undulating phase
- Philo-Atkins silt loams
- Swaim silty clay loam:
  - Eroded rolling phase
  - Eroded undulating phase
  - Rolling phase
  - Severely eroded rolling phase
  - Undulating phase
- Taft silt loam
- Talbott silty clay loam:
  - Eroded rolling phase
  - Severely eroded rolling phase
- Tellico clay loam:
  - Eroded rolling phase
  - Severely eroded rolling phase
- Tupelo silt loam:
  - Level phase
  - Undulating phase
- Waynesboro loam, severely eroded rolling phase

FOURTH CLASS:
- Allen fine sandy loam, eroded hilly phase
- Allen loam, severely eroded hilly phase
- Armuchee-Tellico silty clay loams:
  - Eroded hilly phases
  - Severely eroded hilly phases
- Clarksville cherty silt loam:
  - Eroded hilly phase
  - Hilly phase
- Colbert silty clay:
  - Eroded rolling phase
  - Eroded undulating phase
  - Severely eroded rolling phase
  - Severely eroded undulating phase
- Colbert silty clay loam:
  - Rolling phase
  - Undulating phase
- Colbert-Talbott stony silty clay loams, severely eroded rolling phases
- Cumberland silty clay loam:
  - Eroded hilly phase
  - Severely eroded hilly phase

FOURTH CLASS—Continued
- Dewey silt loam, hilly phase
- Dewey silty clay loam:
  - Eroded hilly phase
  - Severely eroded hilly phase
- Dunning silty clay
- Fullerton cherty silt loam:
  - Eroded hilly phase
  - Eroded rolling phase
  - Hilly phase
- Fullerton cherty silty clay loam:
  - Severely eroded hilly phase
  - Severely eroded rolling phase
- Guthrie silt loam
- Hermitage cherty silty clay loam:
  - Eroded hilly phase
  - Severely eroded hilly phase
- Jefferson-Allen loams:
  - Eroded hilly phases
  - Hilly phases
  - Severely eroded hilly phases
- Melvin silt loam
- Melvin silty clay
- Melvin silty clay loam
- Muskingum fine sandy loam:
  - Eroded hilly phase
  - Hilly phase
- Pottsville loam:
  - Eroded hilly phase
  - Hilly phase
- Prader very fine sandy loam
- Robertsville silt loam

FOURTH CLASS—Continued
- Rolling stony land (Colbert soil material)
- Stony alluvium (Muskingum and Colbert soil materials)
- Tyler very fine sandy loam
- Waynesboro fine sandy loam, eroded hilly phase

FIFTH CLASS:
- Armuchee silty clay loam, eroded steep phase
- Fullerton cherty silt loam:
  - Eroded steep phase
  - Steep phase
- Hilly stony land (Muskingum soil material)
- Jefferson-Allen loams:
  - Severely eroded steep phases
  - Steep phases
- Limestone rockland:
  - Hilly
  - Rough
- Muskingum stony fine sandy loam:
  - Hilly phase
  - Steep phase
- Rolling stony land (Muskingum soil material)
- Rough gullied land:
  - Dewey, Cumberland, and Colbert soil materials
  - Muskingum soil material
- Rough stony land (Muskingum soil material)

SOIL ASSOCIATIONS

Soils tend to occur in characteristic geographic association. The Fullerton soils, for example, are generally associated with the Clarksville and Greendale. The Huntington soils are usually associated with Lindside and Egam soils of the first bottoms. Such geographic groups of soils are called soil associations. A soil association may contain few or many soils, and these soils may be nearly similar or they may differ greatly. In each soil association area, however, the same combination of soils occurs repeatedly throughout the area. Two soils may be closely associated and yet be wholly different in their suitability for agricultural use.

The association in which a soil occurs may have great influence on its use. If a soil suitable for corn, for example, is associated with other soils equally suitable for corn, much less of it may need be used for corn than if it were associated with soils unsuited to that crop.

Seven soil associations are recognized in Jackson County. Each association is separately discussed in the following, and the location it occupies is shown on the small map inset on the soil map.

HARTSELLS-CROSSVILLE-MUSKINGUM ASSOCIATION

The Hartsells-Crossville-Muskingum association occupies many of the broader relatively smooth ridge lands of the sandstone plateaus. The relief in general is undulating to rolling, with narrow strips of steeper land extending into the areas along the drains. Hartsells and

Crossville soils occupy all of the smoother parts, and the soil material is 20 to 50 or 60 inches thick. The Muskingum soil material on the steeper slopes is shallow to bedrock, and sandstone outcrops in places. Narrow strips of the Barbourville-Cotaco and Philo-Atkins complexes are along the larger drainways, but the proportion of the association area they occupy is small, not exceeding 10 percent. The Muskingum soils occupy a little larger percentage than the complexes, and the Hartsells and Crossville soils together represent 70 to 80 percent. The most extensive areas of this association are on Sand Mountain and are generally deeper to bedrock.

The Sand Mountain area of this association is one of the most densely settled farm areas in the county. From 60 to 75 percent of the farms are owner-operated. Practically all land suitable for crops is cultivated. Cotton, corn, and sorghum are the most extensive crops, and soybeans and peanuts are common. Soil management as now practiced is at a relatively high level. The common cropping system includes frequent row crops with consistent heavy fertilization, regular use of legume green-manure crops, and appropriate tillage practices. Cotton yields average among the highest in the State. Much of the association area on Cumberland Plateau, however, is still under cut-over forest, and management of the cropland is at a lower level than in the Sand Mountain area.

This association in general is well suited to crop production. A great part of the acreage consists of First-, Second-, and Third-class soils, which are low in fertility but easily worked and respond well to good management. The Hartsells soils are considered among the best soils of Alabama for cotton and general farm crops such as corn, soybeans, lespedeza, and small grains. Many truck and berry crops also do well. These soils are not so well suited to pasture plants as are some others in the county, but with proper management good pastures can be maintained.

ENDERS-HARTSELLS-MUSKINGUM ASSOCIATION

The Enders-Hartsells-Muskingum association occupies ridge lands of the sandstone plateaus. The surface, though relatively smooth, is somewhat more rolling and hilly than that of the Hartsells-Crossville-Muskingum association, and the strips of steep Muskingum and Pottsville soils are somewhat more extensive. The Enders and Hartsells soils occupy the smoother parts of the association, and the Muskingum and Pottsville soils occupy the hilly and steep areas. Narrow strips of Barbourville-Cotaco and Philo-Atkins complexes are along the drainways. The more shaly material that underlies the Enders and Pottsville soils causes them to be more slowly permeable to moisture and heavier or more plastic than the soils of the Hartsells-Crossville-Muskingum association.

This association is less extensive than the adjoining Hartsells-Crossville-Muskingum association and is confined to the northeastern part of the county, which is not so densely settled as the adjacent association on Sand Mountain. The soil management on this association is not at so high a level. Some of the ridge tops are not easily accessible from the present established roads, and a considerable part is still in cut-over forest. Some land could be improved and cropped (pl. 9, *B*).

The most fully settled areas, in the vicinities of Higdon and north of Flat Rock, have cotton, corn, and hay as the principal crops. Some land is planted also to potatoes. Truck farms and a few small orchards occupy some of the association. Little livestock other than enough for home use is raised.

Much of the Enders and Hartsells soils in this association area is suitable for crops requiring tillage. These soils are relatively low in fertility, somewhat shallower to bedrock than the Hartsells soils of the Hartsells-Crossville-Muskingum association, and somewhat more subject to erosion. They respond well to proper management, however, and are considered suitable for such general farm crops as corn, cotton, soybeans, red clover, and for truck and berry crops such as potatoes and strawberries.

ETOWAH-JEFFERSON-MONONGAHELA-TALBOTT ASSOCIATION

The Etowah-Jefferson-Monongahela-Talbott association occurs in the limestone valley section and consists of low to moderately high stream terraces and relatively smooth uplands. The stream terraces are of mixed alluvium, much of which is derived from limestone. The soils of the upland, chiefly the Talbott, Colbert, and Dewey, are developed over argillaceous and high-grade limestone and are predominantly reddish. All of them are high in clay but vary from plastic to friable in consistence. Soils on bottom lands and colluvial slopes are intermixed in some areas. The bottom lands are inextensive and confined to narrow strips. The bedrock underlying practically all of this association is limestone and its depth in most places is more than 6 feet and in some places more than 20 feet. The depth of the Talbott and Colbert soils (pl. 10, *A*), and the associated stony land types to bedrock, however, is generally less than 6 feet.

Drainage is good in places and slow in others; in very few places is it too slow for feasible tillage. Most of the upland soils and some soils on the stream terraces are well drained, although the internal drainage of the Talbott, Colbert, Hollywood, and Swaim soils is impaired by the heavy compact clayey subsoil. Drainage conditions of the soils on the stream terraces range from very good to poor. Most of the better drained soils of the association are reddish or yellowish to a depth of 3 feet and are permeable, fertile, and easily worked. The slower drained soils have gray or mottled subsoil which is usually firm and plastic.

A large part of this association is cleared and used either for crops or pasture. Many of the more prosperous communities of the limestone valley section are included. The size of farms ranges from 500 acres or more for the large farms or plantations to 40 acres or less for the small farms. About 35 percent of the farms are owner-operated; tenants (pl. 10, *B*) constitute a greater proportion of farm operators on this and the Huntington-Lindside-Egam soil association than on the Hartsells-Crossville-Muskingum and Enders - Hartsells - Muskingum soil associations. The main crops are cotton, corn, and hay, but oats and wheat are common on some farms. Winter legumes for cover crops, grazing, and seed production are becoming increasingly important as their value and use become better known.

The association in general is suited to general farming, including livestock production. Practically all the soils are suited at least to

pasture, and a great many are suited to a wide variety of crops, although the nature of the soil pattern varies from place to place. Legume and grass hay, pasture crops, small grains, soybeans, corn, and cotton are among the well-suited crops. Where adequate fertilization is practiced on the better drained soils, alfalfa can be expected to produce well. Management is not now at a sufficiently high level to maintain the general productivity. Erosion is active on many of the more sloping areas, and crop yields are not high. Better choice of crops and rotations, increased use of fertilizers and lime, and better supplementary means of controlling runoff on the more sloping parts are some of the good management measures.

HUNTINGTON-LINDSIDE-EGAM ASSOCIATION

The Huntington-Lindside-Egam association in general occupies the nearly level better-drained first bottoms. The soils are very fertile, easily worked, and present no serious conservation problems. Accordingly, this association is better suited to intensive use for row crops than any of the others. The aggregate area is limited, however, and the separate tracts are small. They are widely distributed on the first bottoms of the larger streams of the limestone valley section. Some of the largest areas are adjacent to the Tennessee River and along the Paint Rock River.

Practically all of this association is cleared, and a great part of it is used for row crops. Corn and hay predominate, but cotton is a common crop on some of the better drained higher lying areas. In general, however, the acreage in corn is by far greater than that in all other crops. Little or no fertilizer is used for corn or hay on those parts subject to periodic flooding. Cotton, which is generally grown on those areas not commonly subject to flooding, is fertilized regularly. Some fall-sown grains are grown on areas infrequently flooded, and these are commonly fertilized with 100 to 200 pounds of nitrate of soda an acre. Most of the acreage is especially well suited to improved pastures, but because these soils normally give high yields of corn without fertilizer, only the more poorly drained or less accessible areas are used for pasture. In many localities, farmers who have a considerable acreage of this association specialize in livestock. They usually raise beef cattle and hogs and use the soils for grain feed crops.

FULLERTON-CLARKSVILLE-GREENDALE ASSOCIATION

The Fullerton-Clarksville-Greendale association, composed chiefly of Fullerton (pl. 10, *C*) and Clarksville soils, occupies cherty ridges. The Greendale soils are confined to narrow strips along the drainways and foot slopes. In general the association is rolling to hilly, although the lay of the land ranges from undulating on the broader ridges to hilly or steep on the stronger slopes. Most parts are very deep to bedrock and consist chiefly of cherty residuum from dolomitic limestone. In general, the fertility level is low. The association occupies 5 percent or less of the county. All of it lies as irregular or broken belts in the main part of the Tennessee River valley, and belts paralleling the general direction of the valley.

A large part of this association has been cleared, and most of the undulating and rolling parts are used for crops. Especially in the

hilly parts, areas have been cleared and cropped but are now either under a volunteer shortleaf-pine forest or are used as unimproved pasture. Some of the strongest slopes are still in native forest.

Farms range from small to medium in size, although some are part of large holdings that include soils of other associations. Some of the small farms are of the subsistence type, but most of them are of a general type. Cotton, corn, and hay, chiefly lespedeza, are the principal crops. Management is not at a high level, and yields are lower than on the Hartsells-Crossville-Muskingum, Etowah-Jefferson-Monongahela-Talbott, and Huntington-Lindside-Egam associations.

Much of this association is suited to pasture, but probably half of the area so used is also suited to crops. All the soils require heavy fertilization, liming, and organic manures if their productivity is to be maintained at a high level. In general, the soils respond well to proper management. Areas suited to crops, when well managed, have a wide adaptation. Corn, cotton, small grain, and most hay and pasture plants produce well, although the soils are not so well suited to hay and pasture as are many of the soils of the Etowah-Jefferson-Monongahela-Talbott and Huntington-Lindside-Egam associations. Alfalfa, red and white clovers, and bluegrass require exceptionally good soil preparation and are somewhat more difficult to maintain on this association. Many truck and berry crops and tree fruits, as peaches, are well suited.

MELVIN-ROBERTSVILLE-DUNNING ASSOCIATION

The Melvin-Robertsville-Dunning association consists predominantly of nearly level very poorly drained soils on bottom lands and stream terraces. The alluvial parent material washed predominantly from soils developed over limestone and to a less extent from soils developed over sandstone and shale. Small areas of somewhat better drained soils are included, but most of these have somewhat impaired internal drainage. This association occurs on the lower parts of the limestone valley section, generally adjacent to larger tributary streams. The larger areas are irregular bodies along the larger tributaries; there are only a few small areas on the bottom lands along the Tennessee River.

About 40 percent of this association is in forest; 30 percent is used for pasture, and the rest for crops. Part of the land cropped includes small areas of the somewhat better drained soils, as the Sequatchie, Capshaw, Hollywood, and Tupelo. The native forest was predominantly deciduous hardwood. No farms are wholly within this association, as there is not sufficient tillable acreage in it to support a farm. The areas occur adjacent to other soil associations having considerable acreage of tillable soils.

The predominent soils of this association are not well suited to cultivation except where adequate artificial drainage has been established. Only a small area has been improved by open ditches and tile drains. The feasibility of artificial drainage depends on the soil, the initial cost of installation, the likelihood of obtaining suitable outlets, the percentage of increase in productivity resulting from the improvement, and the need for additional acreage of tillable land.

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Corn, soybeans for hay, and grain sorghum are the chief crops grown on areas sufficiently well drained to warrant their use as cropland. Lespedeza and redtop are also among the better suited crops for these areas suitable for cultivation. Much of this association is well suited to improved pasture where adequate fertilization and proper seeding are practiced. Some of the most poorly drained areas, however, do not support useful pasture vegetation and therefore are of little value except for forest.

ROUGH STONY LAND ASSOCIATION

The Rough stony land association consists chiefly of the steep stony mountain slopes that lie between the higher sandstone plateaus and the lower lying limestone valleys. In general, the depth of the soil material is very slight. Rock outcrops and loose stone abound. The upper parts of the slopes consist chiefly of sandstone rock and material weathered from it, and the lower parts, limestone rock and material from it. A few small irregular benches along the upper edge of the limestone materials are occupied by soils of sufficient depth and smoothness to be suitable for pasture or crops.

Much of this association is in forest. The upper slopes have deciduous hardwoods, mainly oak, hickory, yellow-poplar, persimmon, and buckeye, with some pine intermixed. The lower slopes, or parts underlain by limestone, are grown up in many places with solid stands of red cedar and in other places by deciduous hardwoods. The small benches of arable land on the mountain slopes are cleared and used for a subsistence type of farming where access has been gained to them. Practically all the area has been cut over from time to time. The subsistence farms on the small included benches are occupied mainly by families of coal miners, operators and employees of small sawmills, and by families who prefer isolation.

FORESTS

The early settlers throughout this part of the Tennessee River valley found it heavily forested except for occasional small open or partly open areas in the limestone valleys. Such areas probably had been cleared and kept open by the Indians for their village sites, recreational grounds, and for growing corn and other tilled crops. Early reports mentioning the heavy stands of timber give little definite information as to the dominant varieties of trees, the topographic positions occupied by the different varieties, or the purity of the stands. Much of the timber in excess of that needed in the construction of the first houses, barns, and other shelters or for fuel was burned to clear the land for crops. No markets were available where even choice logs or other timber products could be disposed of at a profit.

Early writers reported deciduous hardwoods as being dominant in practically all areas except the lower rough limestone slopes and the isolated knolls of limestone outcrops, which were covered by nearly solid stands of red cedar. From information based on later observations it is probable that fairly solid stands of pine occurred on some of the well-drained positions in the limestone valleys and that some pine was common among the deciduous hardwoods on the sandstone plateaus. On the rough stony slopes were giant chestnut trees and many

tall yellow-poplars and oaks. Travel in the valleys was difficult because of the dense underbrush of young saplings, vines, and briers, whereas it was relatively easy to travel by cart, wagon, horseback, or on foot through forests on the plateaus. On the plateaus deer, turkeys, other game, and wild animals could be seen at fairly great distances because of the absence of underbrush.

No areas of virgin forest remain in the county, although access to some parts of the rough stony lands and some isolated or nearly isolated sandstone plateaus is difficult. Nearly all the stony lands, large areas of the sandstone plateaus, and poorly drained locations in the limestone valleys have never been completely cleared of forest vegetation. All the county has been cut over at some time.

The principal trees of commercial value are black, post, white, Southern red, laurel, Spanish, chestnut, and willow oaks, scaly-bark and pignut hickories, beech, redgum, blackgum, persimmon, yellow-poplar, and red cedar. Of less extent but nevertheless of commercial value are black walnut, basswood, maple, cherry, ash, and black locust. In other places old-field or loblolly, shortleaf, and scrub or Virginia pines are the chief conifers. Before being killed by the blight in the early thirties, chestnut was widely distributed over the county and was among the largest, most common, and most valuable trees. Many slopes and some plateau ridges are still studded by gigantic dead chestnut trees, some of which are 60 to 80 feet tall to the first limbs. Other common but less useful trees are red and white elms, sourwood, dogwood, blackjack oak, willow, sycamore, redbud, honeylocust, hackberry, plum, and buckeye. Holly and sassafras are common in places.

Grape, rattan, and ivy are common vines that together with blackberry, greenbriers, saw briers, and other prickly vines and shrubs entangle the less dense forest areas as well as some of the abandoned open areas. Honeysuckle, mountain-laurel, rhododendron, roses, yellow jasmine, and wild crab apple are common. Voluntary vegetation on abandoned fields commonly consists of a mixture of sassafras, blackberry or other brier growth, persimmon, and broomsedge; in other places shortleaf, loblolly, or scrub pines establish a dense stand (pl. 7, *B*).

Approximately 445,000 acres in the county was in forest in 1940. Of this area, about 270,000 acres was in upland hardwood; 16,000, bottom land hardwood; 16,000 yellow pine; 112,000, yellow pine and hardwood; and 32,000, cedar and hardwood. Of the total forest acreage, a little less than 220,000 acres is considered to be of sawtimber size (*11*). According to the Forest Relations Division, Tennessee Valley Authority, about 38 percent of the forest is farm woodland, 57 percent nonfarm woodland, and 5 percent public-forest woodland. Of the nonfarm woodland, about 212,000 acres is held in tracts of 500 acres or more by 137 owners. As of 1945 there were 84 sawmills and 6 other wood-working plants, and the estimated total lumber cut for the county in 1945 was about 12½ million board feet of softwood and 6 million board feet of hardwood.

Probably 85 percent or more of the forest land consists of stony land types that in general are very poorly suited to other use. Possibly 10 percent consists of uncleared land on the sandstone plateaus that is suitable for crops, and much of the remaining small part is woodland on poorly drained areas on bottom lands and stream terraces in the limestone valleys. Only a small acreage is woodland pasture.

Prior to January 1942, about 4,350 acres, mostly severely eroded areas and land otherwise not suitable for cultivation or pasture, had been planted with forest seedlings. Of these seedlings about 65 percent were loblolly, slash, and shortleaf pines, and about 35 percent were black locust, ash, and sweetgum or redgum. A few black walnut and yellow-poplar trees and, as an experiment, a few longleaf pine and chestnut trees have also been set out. Much of the acreage was planted to forest by Civilian Conservation Corps personnel in cooperation with the Tennessee Valley Authority. The rest was planted by the individual landowners, most of the trees being obtained through the Tennessee Valley Authority.

The necessary preparation of the soil for planting trees varies according to the condition of the site. Fertile permeable areas require little preparation other than planting the trees and possibly protecting them from competitive weedy growth. Open bald areas, however, may require breaking, some fertilization, and mulching. Sites on sidehills may require contour furrows in which to set the trees, and suitable preparation of gullies may require the construction of low brush check dams. It may be difficult to establish trees on some of these more severely eroded cleared areas, and plants such as kudzu or honeysuckle may be more useful in establishing a vegetative covering that will arrest erosion. Possibly 1 percent of the forest land consists of abandoned areas formerly cropped that have returned by voluntary reseeding to forest vegetation consisting principally of pine, persimmon, sweetgum, and cedar.

The Division of Forestry of the State of Alabama maintains a ranger, a fire warden, and three patrolmen in Jackson County to protect the forests, especially from fires. Although two sites for fire towers have been selected, none has been erected.

Growing trees suitable for lumber or other timber products and processing them into finished materials in the sawmills, planing mills, and specialty mills should be considered an important source of income for landowners and both skilled and unskilled labor in the county. About half the total land area in the county consists of stony lands ranging from gently rolling to rough steep slopes or badly broken areas poorly suited to agricultural uses but fair to good for forest. The eastern and northern slopes are commonly more favorable to forest vegetation than the southern and western slopes, probably because of more favorable moisture relations. In addition to the stony lands, thousands of acres of poorly drained land in the limestone valleys, small sandstone plateaus isolated and not readily accessible for crop production, and many acres of severely eroded or hilly land are best suited for forest production under present economic and social conditions. Many of the forest areas could well be included in game and wildlife preserves.

MORPHOLOGY AND GENESIS OF SOILS

FACTORS OF SOIL FORMATION

Soil is the product of the forces of weathering and soil development acting on the parent soil 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 on and in 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.

Climate and vegetation are the active factors of soil genesis. They exert their influence on the parent material and change it from a heterogeneous mass of inert material to a body that has definite genetic morphology. The effects of climate and vegetation on the parent material are guided, or limited, to varying degrees by the modifying influence of relief as it affects conditions such as drainage, quantity of water that percolates through the soil, rate of natural erosion, and vegetation growing on the soil. The nature of the parent material itself also guides the course of action that results from the forces of climate and vegetation. Finally, time is involved in the changes that take place, and age becomes a factor of soil genesis, as it reflects the degree of development of the soil into a body that is in equilibrium with its environment. The degree of such development depends not only on time, but also on the rate of action of the forces of climate and vegetation as that rate is influenced by the factors of relief and parent material.

The factors of soil genesis are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one unless conditions are specified for the other four. They are so complex in their interrelations that many of the processes that take place in the development of soils are unknown.

This section presents the outstanding morphological characteristics of the soils of Jackson County and relates them to the factors of soil formation. Physical and chemical data are limited for these soils, and the discussion of soil genesis and morphology is correspondingly incomplete. The first part of the section deals with the environment under which the soils exist; the second, with specific soil series and the part environment has played in determining the morphology of soils of those series.

ENVIRONMENT AND GENERAL CHARACTERISTICS OF SOILS

The parent materials of the soils of Jackson County may be considered in two broad classes: (1) Materials residual from the weathering of rocks in place and (2) materials transported by water or gravity and laid down as unconsolidated deposits of clay, silt, sand, and larger rock fragments. Materials of the first class are related directly to the underlying rocks from which they were derived; materials of the second class, to the soils or rocks from which they were washed or fell.

The residual parent materials are the residuum left by the weathering of consolidated sedimentary rocks—limestone, sandstone, and shale. The character of these materials is strongly reflected in many of the characteristics of the soils developed from them. Geologically, the rocks are very old. They were laid down as unconsolidated sediments that were gradually converted into consolidated rocks. Nearly all the rock in the county, other than that of the Tennessee Valley, is level bedded. The rocks of the Tennessee Valley are in the Sequatchie anticline and are therefore a part of a strong fold. The upper formations have been eroded away, leaving the rocks as narrow parallel

outcrops along the eastern side of the valley and exposing the lowermost formations as parallel strips along the main axis of the valley.

The soils developed from residual material are generally associated with particular rock formations or parts of particular rock formations. Soils of the Hartsells, Hanceville, Crossville, and Muskingum series are commonly associated with sandier parts of the Pottsville formation of the Pennsylvanian rock system, whereas those of the Enders and Pottsville series are commonly associated with the more shaly parts. The stony land types of limestone material are closely related to the Bangor limestone (restricted) of the Mississippian system. The Fullerton series is associated in the Paint Rock River valley with the Tuscumbia limestone (Warsaw limestone) and Fort Payne (Lauderdale) chert of the lower part of the Mississippian system.

The Talbott and Colbert soils and some stony land types are associated with the Tuscumbia limestone, and the Tellico and Armuchee soils are associated with the Red Mountain formation of the Silurian system. Talbott, Colbert, and Dewey soils are associated with the Chickamauga limestone of the Ordovician system, and the Fullerton and Clarksville series are associated with the Longview limestone formation of the Lower Ordovician or Upper Cambrian system. Dewey soils may be associated with higher grade parts of the Longview limestone. The various rock formations are arranged in accordance with the geologic column by Adams and others (*1*).

Among the soils consisting of transported material, the nature of the parent rock is reflected in some of their characteristics. Soils of the Barbourville, Cotaco, Pope, Philo, and Atkins series consist almost wholly of material derived from acid sandstone and shale. Waynesboro, Sequatchie, Holston, Monongahela, Tyler, Allen, Jefferson, Bruno, Sturkie, and Prader soils consist chiefly of material derived from acid sandstone and shale but are influenced by limestone material. Cumberland, Etowah, Capshaw, Wolftever, Tupelo, Taft, Robertsville, Hermitage, Greendale, Swaim, Hollywood, Abernathy, Ooltewah, Guthrie, Huntington, Egam, Lindside, Melvin, and Dunning soils consist chiefly of limestone material or material very strongly influenced by limestone.

Although a relatively consistent relationship exists between the kinds of parent materials and some of the characteristics of soils, other soil characteristics, especially those of regional significance from the standpoint of soil genesis, cannot be correlated with the kinds of parent material and must be attributed to other factors.

The climate of Jackson County is mild, temperate, and continental. It is characterized by long warm summers, short mild winters, and relatively high rainfall. The moderately high temperatures favor rapid chemical reactions under the moist conditions that exist in the soil most of the time. The high rainfall favors intense leaching of soluble material, as bases, completely from the soil and translocation of less soluble materials and collodial matter downward in the soil. The soil is frozen for only short periods and to only shallow depths in winter, and this permits further weathering and translocation of materials.

Climatic conditions vary somewhat within the county. The climate of the Sand and Cumberland Plateaus is cooler than that of the limestone valleys. The growing season is almost 20 days shorter, and the soil is frozen for longer periods on the plateaus than in the valleys. Some of the differences between the soils of the plateaus and those of the limestone valleys are no doubt due to these climate differences, but they are also associated with marked differences in parent material. The separate influences of the two factors have not been determined. The differences arising from climatic differences are subordinate to those arising from differences in parent material. The climate of the limestone valleys is relatively uniform from place to place, as is also that of the plateaus. Within each of those areas, differences of climate can account only in part for some of the outstanding common characteristics of many of the soils.

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 live on and in the soil are determined by environmental factors, including climate, parent material, relief, age of the soil, and the associated organisms. The influence of climate is most apparent, though not always most important, as a determinant of the kinds of higher plants that grow on the well-drained well-developed soils. In this way climate exerts a powerful indirect influence on the morphology of soils. Climate and vegetation acting together are the active factors of soil genesis.

The natural vegetation on the well-drained well-developed soils was predominantly deciduous hardwoods, chiefly oak, chestnut, and hickory, with some pine intermixed. There were probably differences in the density of stands, the relative proportions of species, and the associated ground cover. Some of the greater differences in these respects were between the forest of the plateaus and that of the limestone valleys, not only because of differences in climate but also because of differences in the kind of soil that developed. Few marked differences in morphology among the well-drained well-developed soils are directly the result of differences in the vegetative cover, however.

The trees that commonly grow in this area are moderately deep to deep feeders on plant nutrients. They are deciduous, and there is considerable range among species in content of the various plant nutrients in the leaves. In general, the quantity of bases and phosphorus returned to the soil in the leaves of deciduous trees is high compared to that returned by coniferous trees. In this way, essential plant nutrients are returned to the upper part of the soil from the lower part, and the depleting action of percolating waters is thereby retarded.

Organic material is added to the soil in the form of dead leaves, twigs, roots, and entire plants. Most of it is added to the top part of the soil, where it is acted upon by micro-organisms, earthworms, and other forms of life and by direct chemical reaction. The rate of decomposition of such materials is relatively rapid as a result of the favorable temperature and moisture conditions, favorable character of the organic material itself, and presumably favorable micropopulation of the soil. Organic material, however, does not accumulate on well-drained sites to the extent that it does in cooler regions under similar drainage conditions. Little is known of the micro-organisms,

earthworms, and other population of the soil, but their importance is probably no less than that of the higher plants.

The well-drained well-developed soils have been formed under relatively similar conditions of climate and vegetation. On these soils climate and vegetation have had the maximum of influence with the minimum of modification by relief and age. As a result, the soils developed from various kinds of parent material have many characteristics that are common to all. They are called zonal soils. Zonal soils are members of one of the classes in the highest category in soil classification and are defined as soils having well-developed soil characteristics that show the influence of active factors of soil genesis, as climate and living organisms (*13*).

In the virgin condition, all the well-drained well-developed soils have a layer of organic debris in varying stages of decomposition on the surface. All have dark-colored A_1 horizons. The A_2 horizons are lighter in color than either the A_1 or the B. The B horizon is generally uniformly yellow, brown, or red and is heavier textured than the A_1 or A_2. The C horizon is variable in color and texture among the different soils, but it is usually light red or yellow mottled with gray or brown.

Analyses of samples of a number of comparable soils from Jefferson County, Tenn., may be expected to apply to these soils (*8*). With depth the silica content decreased and the alumina and iron contents increased. The content of organic matter was moderate in the A_1 horizon, less in the A_2, and very low in the B and C horizons. The soils were low in bases and phosphorus within the solums. In general the loss on ignition was low, indicating a low content of tightly held water. They were medium, strongly, or very strongly acid throughout the solum. In general, the quantity of silt decreased and the quantities of clay and of colloid increased with depth from the A_1 horizon through the C horizon. The colloid content of the B horizon was much higher than that of the A_2 horizon.

In places where the parent material has been in place only a short time, as in the case of very recently deposited transported material, the soils have very poorly defined or no genetic horizons. These soils are young and have few or none of the characteristics of zonal soils and therefore are called azonal soils (*7*). Azonal soils are members of a second class of the highest category of soil classification and are defined as a group of soils that, owing to their youth or adverse conditions in their parent material or relief, lack well-developed soil characteristics (*13*).

The azonal soils of this county are characterized by (1) A_1 horizons that are moderately dark to very dark and apparently moderate to fairly high in content of organic matter; (2) the absence of a zone of illuviation, or a B horizon; and (3) parent material that is usually lighter in color than the A_1 horizon and that may be similar to, lighter than, or heavier than the A_1 horizon in texture. Soils of this kind may be referred to as AC soils because of the absence of a B horizon. Also, on some steep areas where the quantity of water that percolates through the soil is relatively small, and where the large quantity of water that runs off the soil and the rapid rate of that runoff contribute to relatively rapid geologic erosion, the soils are young. The materials are constantly renewed or mixed and the changes brought about by vegetation and climate may be so slight that the soils are essentially AC, or azonal, soils.

On some nearly level areas in the county where both internal and external drainage are restricted or where geologic erosion is very slow, soils formed of materials that have been in place a long time have certain well-developed profile characteristics that zonal soils do not have. Such soils are associated geographically with the zonal soils and are called intrazonal soils (*7*). They are defined as soils that have characteristics that are more or less well developed and reflect the dominating influence of some local factor of relief or parent material over the normal effects of climate and vegetation (*13*). The characteristics of such soils in this county are generally the result of level relief influenced greatly by the character of the parent material and the kinds of vegetation that grow in such environments.

Soils of each of the three broad classes—zonal, azonal, and intrazonal—may be derived from similar kinds of parent materials. Within any one of those classes in this county, major differences among soils appear to be closely related to differences in the kinds of parent materials from which the soils were derived. The thickness of soils developed from materials residual over the rock from which they were derived is partly dependent on the resistance of the rock to weathering, the volume of the residue after weathering, and the rate of geologic erosion. The chemical and physical nature of the parent materials modifies the rate and direction of the chemical changes that result from climate and vegetation. The kind of parent material also exerts a pronounced influence on the kinds of vegetation that grow on the soil.

GREAT SOIL GROUPS

In the following pages the soil series of the county are classified in great soil groups and soil orders. The morphology and genesis of the soils of each series are discussed, and some of their relationships to and differences from soils of other series of the same great soil group are shown.

The classification of soil series in higher categories is based upon limited data, principally those characteristics that are observable in the field. The correct classification of some of the soil series is not known; that of others is reasonably well known. An attempt has been made to place each series in the correct great soil group, but further study may prove the classification to be incorrect in some instances.

Jackson County is in the region of Red-Yellow Podzolic soils. Both the red and yellow members of this group are in the county. The intrazonal order is represented by soils of the Humic Gley and Planosol great soil groups; the azonal order, by soils of the Lithosol and Alluvial great soil groups. The classification of the soil series of the county in higher categories and some of the factors that have contributed to their morphologic distinctions are given in table 28.

TABLE 28.—*Classification of the soil series of Jackson County, Ala., by higher categories and some of the factors that have contributed to differences* [1] *in soil morphology*

ZONAL SOILS

Great soil group and series	Relief	Parent material
Red-Yellow Podzolic soils:		
Red members:		Eluvium from weathering of—
Dewey	Undulating to hilly	High-grade dolomitic limestone.
Fullerton	do	Cherty dolomitic limestone.
Talbott	Undulating to rolling	Argillaceous limestone.
Tellico	do	Shale, sandstone, and limestone mixed.
Hanceville	do	Sandstone and conglomerate.
		Colluvium consisting of material derived from—
Hermitage	Gently sloping to strongly sloping.	Limestone.
Swaim	Gently sloping to moderately sloping.	Argillaceous limestone.
Allen	Undulating to hilly	Sandstone and some limestone and shale.
		Alluvium consisting of material derived from—
Cumberland	do	Limestone and some sandstone and shale.
Etowah	Nearly level to rolling.	Do.
Waynesboro	Undulating to hilly	Sandstone, shale, and limestone.
Sequatchie	Nearly level to undulating.	Sandstone and some shale and limestone.
Yellow members:		Eluvium from weathering of—
Clarksville	Undulating to hilly	Cherty dolomitic limestone.
Colbert (lithosolic).	Undulating to rolling	Agillaceous limestone.
Hartsells	Nearly level to rolling.	Sandstone.
Enders	Undulating to rolling.	Shale and sandstone.
Crossville	Undulating	Sandstone and some shale.
		Colluvium consisting of material derived from—
Greendale	Gently sloping	Cherty limestone.
Jefferson	Undulating to hilly	Sandstone and some shale and limestone.
		Alluvium consisting of material derived from—
Holston	Nearly level to undulating.	Sandstone and some shale and limestone.
Capshaw	Nearly level to gently undulating.	Limestone and some sandstone and shale.

See footnotes at end of table.

TABLE 28.—*Classification of the soil series of Jackson County, Ala., by higher categories and some of the factors that have contributed to differences* [1] *in soil morphology*—Continued

INTRAZONAL SOILS

Great soil group and series	Relief	Parent material
Humic Gley soils:		
Hollywood	Nearly level to gently sloping.	Colluvium consisting of material derived from argillaceous limestone.
Planosols:		Alluvium consisting of material derived from—
Wolftever	Nearly level to gently rolling.	Limestone and some sandstone and shale.
Tupelo	Nearly level to gently undulating.	Argillaceous limestone and some sandstone and shale.
Taft	Nearly level	Limestone and some sandstone and shale.
Robertsville	do	Do.
Monongahela	Nearly level to undulating.	Sandstone and some shale and limestone.
Tyler	Nearly level	Do.

AZONAL SOILS

Lithosols: [2]		Eluvium from weathering of—
Armuchee	Hilly and steep	Shale, sandstone, and limestone mixed.
Muskingum	do	Sandstone and some conglomerate and shale.
Pottsville	do	Shale and some sandstone.
Alluvial soils:		Colluvium consisting of material derived from—
Abernathy	Nearly level and very gently sloping.	Limestone.
Ooltewah	Nearly level	Do.
Barbourville	Nearly level to gently sloping.	Sandstone and shale.
Cotaco	do	Do.
		Alluvium consisting of material derived from—
Huntington	Nearly level to gently undulating.	Limestone mainly.
Egam	do	Do.
Lindside	Nearly level	Do.
Bruno	do	Sandstone and some limestone and shale.
Sturkie	do	Do.
Pope	do	Sandstone and some shale.
Philo	do	Do.

See footnotes at end of table.

TABLE 28.—*Classification of the soil series of Jackson County, Ala., by higher categories and some of the factors that have contributed to differences*[1] *in soil morphology*—Continued

AZONAL SOILS—continued

Great soil group and series	Relief	Parent material
Alluvial soils—Con.		
With gley layer:		
Melvin	——do	Limestone mainly.
Atkins	——do	Sandstone and some shale.
Dunning	Nearly level and slightly depressional.	Limestone mainly.
Prader	——do	Sandstone and some limestone and shale.
Guthrie	Nearly level	Colluvium consisting of material derived from limestone.

[1] Inasmuch as the factors of climate and vegetation are relatively uniform in their effect on soil throughout the county, they do not account for the broad differences in the soils.

[2] The following nine miscellaneous land types also are classified as Lithosols: Hilly stony land (Muskingum soil material), Limestone rockland (hilly), Limestone rockland (rough), Rolling stony land (Colbert soil material), Rolling stony land (Muskingum soil material), Rough gullied land (Dewey, Cumberland, and Colbert soil materials), Rough gullied land (Muskingum soil material), Rough stony land (Muskingum soil material), and Stony alluvium (Muskingum and Colbert soil materials).

RED-YELLOW PODZOLIC SOILS

RED MEMBERS

Red members of the Red-Yellow Podzolic great soil group are zonal soils that have thin organic and organic-mineral layers over a yellowish-brown leached layer, which in turn rests on an illuvial red horizon. They have developed under a deciduous or mixed forest in a warm-temperature moist climate (*13*). The soil-forming processes involved in their development are laterization and podzolization.

The Dewey, Fullerton, Talbott, Tellico, Hanceville, Hermitage, Swaim, Allen, Cumberland, Etowah, Waynesboro, and Sequatchie soils are in this group. All these soils have apparently developed under relatively similar conditions of climate and vegetation. They are well drained, and although they differ somewhat in degree of maturity, all are sufficiently old to have at least a moderately well-developed typical Red-Yellow Podzolic soil profile. They range from level to steep, but differences among their soil profiles are probably not primarily due to differences in slope. Many of the differences among soil profiles can be correlated with the marked differences among parent materials.

Soils of the Dewey series are developed from the residuum of high-grade limestone, or limestone that is less siliceous or cherty than that from which Fullerton and Clarksville soils develop. They are well drained, relatively thick over bedrock, and have an undulating to hilly

surface. They are distinguished by brown surface soil and reddish relatively thick permeable silty clay subsoil.

Following is a profile description of a Dewey silt loam soil:

A_2. 0 to 5 inches, dark grayish-brown to very dark-brown somewhat granular friable silt loam; a relatively large quantity of well-incorporated organic matter; material readily crushed to a mellow mass of fine rounded soft crumbs; in virgin areas a half inch or so of forest litter on the surface and a greater quantity of organic matter in the surface 2-inch A_1 layer; pH, 6.0 to 5.5.[1]

A_3. 5 to 12 inches, dark reddish-brown somewhat granular firm but friable silt loam to silty clay loam; fairly plastic and somewhat sticky when wet; redder, firmer, coarser, and greater number of angular fragments with increasing depth; pH, 5.8 to 5.2.

B_2. 12 to 30 inches, yellowish-red or brownish-red firm but moderately friable silty clay; medium nut structure; fairly plastic when wet; numerous fine nearly black concretions and a few small chert fragments in places; pH, 5.5 to 4.5.

B_3. 30 to 48 inches, yellowish-red or brownish-red moderately stiff plastic silty clay; moderately well developed medium-sized nut structure; fragments easily crushed to fine soft particles under favorable moisture conditions; numerous fine nearly black concretions and a few small chert fragments in places; pH, 5.5 to 4.5.

C_2. 48 inches +, variegated or mottled yellowish-red, yellow, and gray firm to very firm silty clay; easily broken to angular medium-sized structure fragments; a small quantity of fine to medium chert fragments; depth to bedrock in most places 42 to 80 inches; pH, 5.5 to 4.5.

The Fullerton soils are developed from material residual from dolomitic limestone high in insoluble material, particularly silica, which occurs chiefly in the form of chert. These soils commonly occupy higher positions having greater depth to bedrock, greater chert content, stronger slopes, and lower fertility than the Dewey soils. In general, the percentage of insoluble material in the limestone parent rock increases progressively from the Talbott soils through the Dewey and Fullerton to the Clarksville soils. Associated with this increase is an increase in the chert content, thickness over bedrock, and permeability, and a decrease in the content of plant nutrients, cohesive properties, and susceptibility to erosion.

The color of the eluviated, or A, horizon of the Fullerton soils is much lighter than that of the Dewey and Talbott soils, and the color of the illuviated, or B, layer is progressively more yellow than of the Dewey and Talbott soils. The lower susceptibility to erosion and the greater volume of residue from weathering of the rocks characteristic of the Fullerton soils apparently has resulted in a thicker mantle of unconsolidated material over bedrock. This mantle probably protects the bedrock from rapid weathering and may account in part for the higher position and resultant stronger slopes of the Fullerton soils.

Profile of a Fullerton cherty silt loam soil:

A_2. 0 to 7 inches, grayish-brown or very pale-brown friable cherty silt loam; most of the chert fragments 1 to 6 inches in diameter but many are smaller; in places chert composes 50 percent of the soil mass; under native forest there is about an inch of leaf litter on the surface (A) layer, which is about 2 inches thick and made up of dark-gray cherty silt loam containing a great abundance of fine roots; the main part of the 7-inch surface layer is strongly acid, but the A_1 part is somewhat less acid.

[1] Reaction data for this section of the report were obtained by field methods.

A_3. 7 to 11 inches, light yellowish-brown friable cherty silt loam, somewhat finer textured and firmer than the A_2 layer; when wet slightly plastic; the quantity of chert generally increases with depth through this and the layer below.

B_2. 11 to 27 inches, reddish-yellow firm but friable cherty clay with a moderate nut structure; easily broken under favorable moisture conditions to medium-sized fragments; plastic when wet and resistant to pressure when dry; strongly to very strongly acid.

B_3. 27 to 48 inches, yellowish-red or red firm cherty clay; breaks into medium-sized angular fragments under favorable weather conditions; plastic when wet.

C_2. 48 inches +, red splotched with yellow and gray cherty clay; at 10 to 20 feet or more cherty limestone bedrock.

The Talbott soils have a thinner solum, a shallower depth to bedrock, a heavier more plastic consistence, and finer texture in the B and C layers than the Dewey soils. These are characteristics related to the argillaceous limestone from which the parent material is derived. The lower position, smoother relief, and shallower depth to bedrock of the Talbott soils suggest that the limestone from which they are derived weathers more rapidly and leaves a smaller quantity of residue after weathering than does the limestone from which the Dewey soils are derived. In many places the Talbott soils consist of a complex of material formed in place and accumulations of local alluvium carried from adjacent areas of stony land types, Limestone rockland, hilly and rough, and other areas of Colbert and Talbott soils.

In general, the solum of the Talbott soils resembles that of the Dewey soils in color, consistence, and structure. The C layer is more mottled and at a shallower depth. The Talbott soils erode easily when cultivated. They may have eroded rapidly under their natural vegetation and this probably accounts in part for their shallower depth to bedrock. Like the other zonal soils of the county, the Talbott soils have developed under a deciduous forest vegetation and a warm, temperate moist climate. Talbott soils are medium to strongly acid.

The Tellico soils are derived from weakly acid to calcareous shale interbedded with layers of calcareous sandstone or highly siliceous limestone. In general, their characteristics are less uniform than those of some other Red-Yellow Podzolic soils. On the whole they are notably reddish throughout their solum and permeable. All the areas are in a hilly to steep landscape where the soils are largely Lithosols, chiefly Armuchee soils.

The Hanceville series represents the reddish soils developed in place from material derived from sandstone. The parent rock is similar to that giving rise to the yellowish Hartsells soils, but the sandstone has weathered to red instead of yellow residuum. The reason for the difference is unknown, although in some places it may be that the color was inherited from the parent rock. Inasmuch as the Hanceville soils are on the high sandstone plateaus, the climate was probably slightly cooler than that under which the other reddish soils of this county developed. The most striking difference between the Hanceville and the other reddish soils, however, is in the character of the parent material. There was probably a less dense cover of native vegetation, particularly of undergrowth on the Hanceville soils, but that difference may be attributed largely to differences in the soil plant-nutrient content, which is closely related to the plant-nutrient content in the parent material.

Following is a profile description of a Hanceville fine sandy loam soil that has been under cultivation for a number of years:

A_2. 0 to 8 inches, reddish-brown friable fine sandy loam; easily broken to soft crumbs; in virgin areas upper 2 inches is notably darker and contains an abundance of fine roots.

B_2. 8 to 32 inches, red to reddish-brown firm but friable fine sandy clay; somewhat sticky when wet; moderate nut structure; medium-sized fragments.

B_3. 32 to 60 inches, a little lighter reddish-brown fine sandy clay probably a little more sticky than the layer above.

C_2. 60 inches +, yellowish-brown fine sandy loam; weathered sandstone fragments in places at a depth of 32 inches and in others at 48 inches; less well-defined structure and tendency to break to more angular softer fragments; bedrock sandstone at a depth from 3 to 7 feet.

The medium to old Hermitage, Swaim, and Allen soils are developed on local alluvium or colluvium. The less cherty Hermitage soils have a solum similar to that of the Dewey soils, and the more cherty areas have a solum somewhat similar to that of the Fullerton soils, although in general the eluviated layer is a little darker than in the Fullerton soils.

The Swaim soils consist of clayey material derived from argillaceous limestone, which underlies the Talbott and Colbert soils. The solum characteristics in general are similar to those of the Talbott soils.

The Allen soils consist chiefly of colluvium derived from sandstone with a variable quantity of material of limestone origin intermixed. Most of the areas are at the base of rough mountainous slopes. The profile of the Allen soils resembles that of the Waynesboro, the most observable difference being that the gravelstones and cobblestones of the Allen soils are more angular.

Cumberland soils are well-developed reddish soils on high terraces and are developed from old alluvium that consists chiefly of material washed from soils underlain by high-grade limestone. The solum resembles that of the Dewey, except that parts have a darker brown surface, or A, layer and a deeper red subsoil, or B, layer. The Cumberland soils have more open and porous substrata and are slightly more friable throughout than the Dewey. The material has been in place a sufficient length of time to allow development of a reddish soil comparable in maturity to the Dewey soils.

Cumberland soils are fertile and have good moisture-holding capacity, which probably explains the relatively high organic-matter content in the upper layer. This characteristic appears to have resulted in part from a more luxuriant vegetative cover than was present on soils of lower fertility. The Cumberland soils were developed in a warm-temperate moist climate under a deciduous forest of oaks, hickory, yellow-poplar, sweetgum, dogwood, and other hardwoods, with possibly a few pine in places. The relief ranges from level to hilly, although it is mostly undulating to rolling.

Soils of the Etowah series are similar to those of the Cumberland series in general nature of parent material. The surface, or eluviated, layer is a little lighter brown, and the subsoil lighter red. They have permeable substrata. Most areas are on lower stream terraces than the Cumberland and accordingly are somewhat younger. In many characteristics, particularly color, the older more mature areas of Etowah soils resemble the Dewey soils, but generally they have a more friable subsoil.

The Waynesboro and Sequatchie soils are the reddish members of the Waynesboro-Sequatchie-Holston-Monongahela-Tyler catena. The parent material for all of these soils is a mixture of alluvium originating from sandstone, shale, and limestone. The Waynesboro are well-developed reddish soils that generally occupy the higher stream terraces consisting of this mixed alluvium. In general they are more friable and have a little coarser texture than the Cumberland and Etowah soils, which they resemble somewhat in the color of the profile. The eluviated layer, however, is usually a little lighter brown than that of the Etowah soils and ranges from fine sandy loam to loam. The texture of the subsoil is sandy clay loam to clay loam.

The Sequatchie soils are distinguished from the Waynesboro chiefly by their lighter red illuviated layer and more sandy nature. Some Sequatchie areas are on moderately high stream terraces, but others are on relatively low stream terraces. In general the profile of a great part of the acreage is somewhat less mature than is that of the Waynesboro.

Profile of a Sequatchie fine sandy loam soil:

0 to 9 inches, dark grayish-brown friable loose fine sandy clay loam with a weak crumb structure; strongly to medium acid.
9 to 14 inches, yellowish-brown to light reddish-brown friable very silty clay loam; faint somewhat yellowish mottling; medium moderately weak nut structure.
14 to 27 inches, yellowish-brown to reddish-yellow friable fine sandy clay; a moderate nut structure of medium-sized fragments; medium to strongly acid.
27 to 40 inches, reddish-yellow or yellowish-red moderately friable fine sandy clay; faintly mottled or splotched with yellow and brown in the lower part; somewhat less readily broken to medium-sized fragments that are more angular than those of the layer above; strongly acid.

YELLOW MEMBERS

The yellow members of the Red-Yellow Podzolic group are zonal soils that have thin organic and organic-mineral layers over a grayish-yellow leached layer resting on a yellow horizon (*13*). The yellowish soils in the county are undulating to steep. They developed under a forest vegetation that consisted mainly of deciduous trees, but there was a limited admixture of conifers in some places. There may have been a somewhat less luxuriant and different kind of ground cover on the yellowish than on the reddish soils. Climatic conditions on the soils of the two groups were apparently similar. The parent material was derived from argillaceous limestone or highly siliceous limestone, sandstone, shale, and to a small extent high-grade limestone.

The causes for the pronounced color differences between the yellowish and the reddish soils are not known. The yellowish soils of this county, however, are generally associated with parent materials either lower in bases or less well drained internally than parent materials of the reddish soils. The Clarksville, Colbert, Hartsells, Enders, Crossville, Greendale, Jefferson, Holston, and Capshaw soils belong to the yellowish group.

Clarksville soils are closely associated with the Fullerton soils, which are classified as reddish. They have developed from dolomitic limestone more siliceous than that from which the Fullerton soils were derived. Development was under a forest that was largely deciduous. The parent material of the Clarksville soils may

have affected them in many of the same ways that soils developed from material weathered from sandstone were affected by sandstone. The highly siliceous dolomitic limestone is weathered to great depth, and apparently in the process the residuum has lost most of its bases. The residuum is strongly acid and has a low base-exchange capacity, indicating that the siliceous part of the residuum dominates the parent material. The thickness of residuum covering the unweathered rock, however, accounts partly for the high positions of the Clarksville soils and the resultant steep slopes. In general Clarksville soils are not so susceptible to erosion as are most others developed from limestone residuum. Their lower erodibility may be partly responsible for the thickness of the weathered material over bedrock.

A description of a Clarksville cherty silt loam soil under deciduous forest is as follows:

A_1. 0 to 2 inches, gray to nearly dark-gray cherty silt loam with some roots and organic matter intermixed; little structure; medium to strongly acid.
A_2. 2 to 10 inches, light-gray to very pale-brown cherty silt loam; little structure.
A_3. 10 to 15 inches, yellow to pale-yellow cherty silt loam; little structure.
B_2. 15 to 30 inches, yellow to pale-yellow cherty silty clay loam easily broken to a weak nut structure and subsequently to a loose mass; hard when dry; very strongly acid.
B_3. 30 inches +, brownish-yellow cherty silty clay loam splotched with reddish brown and gray; in places nearly white when dry.

The entire profile is very strongly acid. The abundant chert fragments are sharply angular and range from less than 1 inch to 6 inches or more in diameter.

Soils of the Colbert series are developed over highly argillaceous limestone. In this respect they are comparable to the Talbott soils, but they differ chiefly in being yellowish rather than reddish, in having a shallower depth to bedrock, and in general a less mature profile, especially on the more sloping parts. The Colbert soils, like the Talbott, are somewhat a complex of soil material formed in place and local alluvium washed from higher lying areas of rolling stony land and limestone rockland types and other areas of Colbert and Talbott soils. The Colbert soils differ from the Clarksville chiefly in a much higher clay content, sharper gradation from the eluviated layer to the illuviated layer, and a shallower solum as well as a shallower depth to bedrock. Chert is not characteristic.

The Hartsells, Enders, and Crossville soils are developed from sandstone and/or acid shale of the sandstone plateaus under a deciduous hardwood forest. The Hartsells and Crossville are developed chiefly over sandstone, and the Enders chiefly over shale or shale and sandstone intermixed. The Hartsells have the greatest depth to bedrock, for in places the soil material is as much as 50 to 60 inches deep. The profile is mature but somewhat less so than that of the Enders soils.

A description of a Hartsells fine sandy loam soil under its native vegetation follows:

A_0. 0 to 2 inches, brownish-gray fine sandy loam; some organic matter; numerous small roots.
A_2. 2 to 9 inches, light grayish-yellow or brownish-gray fine sandy loam; weak crumb structure.
B_2. 9 to 30 inches, yellow to brownish-yellow friable fine sandy clay loam; weak nut structure; fragments range up to 1½ inches in diameter.

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C_1. 30 to 45 inches, pale-yellow fine sandy clay loam with faint gray and reddish-brown mottling; slightly firm to somewhat brittle; material easily crushed to a friable mass; lower clay content than in layer above.

C_2. 45 inches +, partly weathered sandstone fragments mixed with predominantly yellowish but variegated sandy material; bedrock at a depth of about 48 inches.

The Enders soils have a more mature zonal profile than the Hartsells and Crossville. A virgin profile of an Enders silt loam soil is as follows:

A_2. 0 to 3 inches, light-gray silt loam; weak crumb structure.

A_3. 3 to 9 inches, pale-yellow friable silt loam grading to a finer texture in the lower part; little more structure than the layer above, the mass breaking to weak subangular fragments.

B_2. 9 to 21 inches, firm but friable silty clay loam; pale yellow when dry; light yellowish brown when moist; fairly well defined nut structure; fragments to about 1 inch in diameter.

C_1. 21 to 26 inches, yellow or yellowish-brown firm silty clay; hard when dry and tough and plastic when wet; when broken forms angular fragments slightly darker on the surface than inside; in places, mottled yellowish brown, reddish yellow, and gray.

C_2. 26 to 33 inches, yellowish and yellowish-brown partly disintegrated shale grading into bedrock at 33 inches.

The Crossville soil is distinguished from the Hartsells by its browner color, the surface 4 or 5 inches being dark-brown or grayish-brown friable mellow loam and the subsoil yellowish-brown friable loam or silty clay loam. Bedrock is generally at a depth of about 20 inches. Profile development is notably less than that of either the Hartsells or Enders soils. Most Crossville areas have slower internal drainage, a condition that may account for the difference between Hartsells and Crossville soils.

The Greendale and Jefferson are developed on local alluvium or colluvium. The Greendale consists of material derived from cherty limestone; and the Jefferson, chiefly that from sandstone. The Greendale soils include some young colluvium, the soil profile thereon being azonal. The profile somewhat resembles that of Clarksville soils, although in general the surface layer is darker and in places the thickness of the eluviated layer is less and the chert content is not so high. The fertility is also more variable, depending on the source of the alluvium or colluvium. In general the Greendale soils are medium to strongly acid, whereas the Clarksville soils are very strongly acid.

The Jefferson soils have approximately the same parent material as the Allen, although their surface layer is lighter colored and their subsoil or illuviated layer is yellow rather than reddish. They are lower in plant nutrients, but the reaction of the two is approximately the same. Profile characteristics of the Jefferson soils are similar to those of the Holston series.

The Holston soils, members of the Waynesboro-Holston-Sequatchie-Monongahela-Tyler catena, are on general alluvium on stream terraces. This alluvium is a mixture of material predominantly from various kinds of limestone, sandstone, and shale. There is a small admixture of material from gneiss, schist, and granite, but the influence of these rocks must be very small.

A profile description of a Holston loam soil in a cultivated field follows:

0 to 14 inches, light brownish-gray to light yellowish-brown mellow loam; weak crumb structure; the lower 3 or 4 inches slightly lighter colored; medium to strongly acid.

14 to 30 inches, yellowish-brown friable very fine sandy clay loam with a moderately well-developed fine nut structure.

30 to 40 inches, yellowish-brown friable very fine sandy loam faintly mottled or splotched with pale-gray and brownish specks; easily broken to fine soft crumbs; strongly acid; in places underlain by irregular gravel beds but in general with no great quantity of gravel.

The Capshaw series may be considered a member of a catena made up of the Cumberland, Etowah, Capshaw, Taft, and Robertsville series. The internal drainage is somewhat slower than that of the Etowah soils and somewhat more rapid than that of the Taft. In general the solum of Capshaw soils is free of mottlings to a depth of 26 inches, but the material below 36 inches is well mottled. The solum resembles that of the Holston series but is somewhat more mottled. Also, the parent material is in general finer textured.

A profile of a Capshaw silt loam soil is as follows:

A_1. 0 to 8 inches, brownish-gray to grayish-yellow friable silt loam; in virgin areas the surface 2 or 3 inches is notably darker and contains numerous small roots and partly disintegrated organic matter.

A_2. 8 to 12 inches, friable brownish-gray to yellowish-brown silty clay loam; finer texture with depth.

B_2. 12 to 26 inches, yellowish-brown friable silty clay; breaks easily to moderate nut structure; medium-sized fragments.

B_3. 26 to 36 inches, yellowish-brown to pale-yellow firm but friable silty clay; becomes strongly mottled with brown, yellow, and gray; weaker structure but moderately plastic.

C_2. 36 to 48 inches, mottled yellow, gray, and brown firm silty clay that breaks into irregular angular pieces.

The entire profile is strongly acid. Dark concretions occur throughout most of the profile in many places but are most abundant at a depth of 30 inches.

HUMIC GLEY SOILS

Humic Gley (Wiesenboden) soils are a group of intrazonal soils that usually have brown or black friable surface horizons underlain by light-gray or yellowish calcareous material. They developed from relatively soft highly calcareous parent material under grass vegetation or mixed grasses and forest in humid and semiarid regions (*13*). The soil development process is gleyzation. In this county the only member of the Humic Gley great soil group is the Hollywood series.

The Hollywood are imperfectly drained soils developed from local alluvium and colluvium derived chiefly from the Colbert and Talbott soils. They occupy gently sloping nearly level or slightly depressional positions and are affected by seepage water. In places where water may stand on the surface for short periods, the uppermost layer may be mucky. The content of organic matter in general is relatively high.

A profile of a Hollywood silty clay soil in a cultivated field is as follows:

0 to 8 inches, dark grayish-brown granular waxlike silty clay; almost black when wet; under optimum moisture conditions fairly mellow and granular; when wet very sticky and plastic; medium to slightly acid.

8 to 18 inches, olive-gray to dark olive-gray clay; breaks to nutlike fragments ⅜ to ⅝ inch in diameter; sticky and plastic when wet; slightly acid.

18 to 28 inches, olive sticky plastic clay; breaks to nutlike fragments ⅜ to ⅝ inch in diameter; olive-gray mottlings; slightly acid to neutral.
28 to 37 inches, pale-olive clay; breaks to angular fragments; very hard when dry, very plastic when wet; neutral to mildly alkaline.

PLANOSOLS

Planosols are a group of intrazonal soils that have eluviated surface horizons, underlain by B horizons more strongly illuviated, cemented, or compacted than those of associated normal soils. They have developed on nearly level uplands under grass or forest vegetation in a humid or subhumid climate (*13*).

The soil series in this county designated as Planosols are the Wolftever, Tupelo, Taft, Robertsville, Monongahela, and Tyler. Few of them, however, are properly in this great soil group according to the definition. The Robertsville and Tyler soils are probably the most consistent in planosolic characteristics; most others have a tight clay subsoil. The Monongahela and Taft soils are variable; some areas have a decidedly compact clayey subsoil, whereas others are at least moderately friable to a depth of 2 or 3 feet. The Wolftever soils have a subsoil somewhat more compact than that of average zonal soils of this region but less compact than that of many of the Planosols in regions where this great soil group is prominent. The material of the Tupelo subsoil is consistently tight compact clay, but this is an inherited characteristic rather than an acquired one.

Climatic conditions under which these soils developed were similar to those under which the zonal soils developed, but conditions in the internal parts of the soils were such that the soils were more moist and less aerated. Some difference probably existed between the kinds of vegetation on the members of this great soil group and those on the Red-Yellow Podzolic group, although deciduous forest was on soils of both groups.

Morphologically, Planosols appear to be older than the Red-Yellow Podzolic soils. The Wolftever and Tupelo soils in general, however, do not have a strikingly developed profile. The relief, or lay of the land, is such that geologic erosion would be slow, thus causing the formation of the planosolic profiles. The material itself is not older in years than that of the associated zonal soils of similar relief. For some of these soils, the relatively dense nature of the parent material caused slow internal drainage, which, combined with slow external drainage, resulted in places in the development of a compact subsoil.

The Wolftever soils are on low stream terraces, chiefly along the Tennessee River. The parent material is mixed alluvium derived from limestone, sandstone, shale, and a small quantity of material from metamorphosed and granitic rock. Relief is nearly level to gently rolling. External drainage is fair to good, but internal drainage is impeded by the compact subsoil. The lower lying areas have been subjected to occasional inundation by floodwater. The interior soil layers are more moist than in Etowah soils and in general have less aeration below the eluviated layer. The compact B, or illuviated, layer distinguishes the Wolftever soils from the zonal soils on stream terraces. On the other hand, the subsoil is not so compact as that of the Planosols normally is, nor is the contrast in color between the eluviated and illuviated layers so striking. The soil below the eluviated layer is commonly dark-mottled concretionary material.

The Wolftever soils are associated with and in some respects are related morphologically to the soils of the Huntington-Egam-Lindside-Melvin catena. All of these soils have the same parent material, the Wolftever differing chiefly in being older and therefore having at least a moderately developed profile.

A Wolftever silt loam soil in a cultivated field has the following profile:

0 to 5 inches, brown or grayish-brown friable silt loam; in virgin areas, the surface 1½ inches notably darker and containing a great many small roots and partly disintegrated organic material.
5 to 18 inches, yellowish-brown compact silty clay; when broken forms medium-sized nutlike fragments; texture and color gradation, gradual; some mottling in the lower few inches of the subsoil.
18 to 30 inches, yellowish-brown firm silty clay mottled with yellow and gray; less compact than the layer above; no breakage into definite nutlike fragments; increased mottling with depth.
30 to 42 inches, mottled yellowish-brown and yellowish-gray silty clay; under pressure breaks to angular pieces.

The entire profile is medium to strongly acid. The texture of the surface layer ranges from very fine sandy loam to silt loam. A notable quantity of sand is throughout the subsoil layers in many places. Very fine mica flakes occur in many areas below a depth of 20 inches. Dark concretionary material is common to the subsoil, especially below a depth of 18 to 20 inches.

The Tupelo soils occur on relatively low stream terraces and have parent material for the most part from soils developed over argillaceous limestone. The slow internal drainage compares with that of the Taft and Monongahela soils, but this series is distinguished chiefly by its fine texture and the plastic consistence of the subsoil and substrata. The surface 6 inches is yellowish-gray friable silt loam with a relatively thin darker colored A layer. Below this depth the soil is plastic clay grading at 10 inches from grayish yellow faintly mottled with light yellowish brown to pale gray or bluish gray somewhat mottled with brownish yellow and brown.

The Taft series is the poorly drained member of the Cumberland-Etowah-Capshaw-Taft-Robertsville catena. The Taft soil occupies low to slightly depressed positions on stream terraces and has a very gently sloping to nearly level surface. The soil is somewhat more moist than the Wolftever. The degree of development of the compact subsoil varies; in places it is well developed, whereas in others it is little more compact than in the Etowah.

An area of Taft silt loam under cultivation has the following profile:

0 to 5 inches, pale-gray to yellowish-gray loose floury silt loam; under native forest the surface inch is a dark grayish-brown silt loam with an abundance of fine roots.
5 to 14 inches, pale grayish-yellow friable but firm silt loam grading with depth to silty clay loam; weak nut structure; faint gray and brown mottling, especially in the lower part.
14 to 28 inches, faintly mottled pale grayish-yellow, yellowish-brown, and light reddish-brown firm but friable silty clay loam to silty clay; variable from place to place in compactness and plasticity but in general more compact than the layer above and increasing in compactness and plasticity with depth.

28 to 42 inches, pale-gray firm silty clay mottled with yellowish brown and reddish brown; compact and plastic, although in some places to a lesser degree than in the layer above.

The entire profile is strongly to very strongly acid. Slight variations in drainage are strongly reflected in the color of the solum, the better drained part being more yellow and less mottled.

The Robertsville series is the poorest drained member of the Cumberland-Etowah-Capshaw-Taft-Robertsville catena. The Robertsville soil occupies the lowest parts or slight depressions on the stream terraces. Internal drainage is very slow, and as a result the solum is very wet or waterlogged for many months during the cooler part of the year and very dry during the driest hottest season. Such conditions have been unfavorable for the accumulation of organic matter, as the eluviated layer of the soil is very light gray or nearly white except for light accumulation in the upper inch or so of the solum. The profile is characterized by a very light-colored floury silt loam A horizon and a very compact clayey or mottled B horizon.

The profile of Robertsville silt loam in a cultivated area is as follows:

1. 0 to 6 inches, nearly white or very pale-gray floury silt loam; in virgin areas the upper half inch is dark-gray silt loam.
2. 6 to 10 inches, light yellowish-gray friable silt loam; a few dark-brown concretions; lower part of the layer generally faintly mottled and somewhat finer textured.
3. 10 to 30 inches, mottled pale yellowish-gray and brownish-yellow silty clay; where the profile is more strongly developed, very compact and plastic; in the few places where the profile is less strikingly developed, very firm but somewhat crumbly in consistence and structure; tendency everywhere to break under pressure into angular fragments.
4. 30 to 48 inches, pale-gray mottled with light reddish-brown plastic silty clay.

The Monongahela series is the poorly drained member of the Waynesboro-Sequatchie-Holston-Monongahela-Tyler catena. Monongahela soils occupy nearly level to undulating positions on stream terraces, having drainage intermediate between that of the Holston and Tyler soils. They resemble soils of the Taft series especially in color, structure, and consistence. The chief difference between soils of these two series is that the parent material of the Monongahela soils consists of a mixture of materials derived from sandstone, shale, and limestone, whereas the Taft soils are derived predominantly from limestone. Accordingly, sand is more common to the Monongahela soils, which have usually had an A horizon of very fine sandy loam and a B horizon, or pan, of very fine sandy clay or fine sandy clay.

The Tyler series is the most poorly drained member of the Waynesboro-Sequatchie-Holston-Monongahela-Tyler catena. The soils occupy the more depressed parts of stream terraces consisting of mixed alluvium. Both surface and internal drainage are very slow. In profile characteristics soils of the Tyler series are similar in many respects to the Robertsville soil, and like it, very wet or waterlogged during many months in the cooler part of the year and very hard and dry during the hottest and driest seasons. As with the Robertsville soil, the surface layer or eluviated part is gray, but it has a notably higher sand content. The subsoil is a compact tight predominantly gray clay subsoil or pan.

LITHOSOLS

Lithosols include miscellaneous intrazonal and azonal soils that vary greatly in character and degree of soil development, in nature and depth of soil and soil material, and in external features, as relief, stoniness, and drainage. For the most part, however, these soils are shallow and occur on rough, hilly, or mountainous areas. They are stony in many places and commonly have little soil development and no definite profile. Parent soil materials or underlying bedrock are exposed in many places, although in others there is a fairly well-developed soil. In some areas natural vegetation consists of grass; in others it is largely brush or thin open stands of timber (*13*). The Lithosols great soil group is represented in this county by the Armuchee, Muskingum, and Pottsville series.

The Armuchee soils are associated with the Tellico soils on the serrated hills of the Tennessee River valley. Their parent material was derived from slightly acid to neutral shale interbedded with thin layers of sandstone and limestone. They have little profile development and are shallow to bedrock. Much of the soil material contains shale fragments. In general the profile is browner than that of the Muskingum and Pottsville soils, the color being inherent from the parent residuum.

A profile of Armuchee silty clay loam, eroded steep phase, is as follows:

0 to 6 inches, yellowish-brown to weak-orange firm silty clay; faint mottling with shades of pale grayish yellow, light reddish brown, and dark brown; in some of the less eroded parts, more nearly silt loam; moderately friable when moderately moist, hard when dry, and plastic when wet.

6 to 18 inches, light yellowish-brown to yellowish-red firm silty clay streaked and splotched with yellowish brown and red; commonly a weak nut structure.

18 to 30 inches, mottled yellowish-brown and reddish-brown silty clay; friable when moderately moist and sticky and plastic when wet; weak nut structure of moderate-sized fragments.

30 to 36 inches, faintly to strongly mottled bright-yellow, reddish-yellow, and reddish-brown silty clay; many shale fragments.

The entire profile is strongly to very strongly acid. The soil varies from place to place according to the nature of the parent rock stratum. Those parts derived from the thinly bedded shale and sandstone material are more friable, more yellow, and contain channery fragments of indurated sandstone, siltstone, and shale, whereas the areas derived from soft clayey shale or partly indurated shale strata are more plastic, more gray, and relatively free of channery fragments.

The Muskingum soils are shallow azonal soils developed over acid sandstone and in places sandstone interbedded with thin layers of shale. Little evidence of a genetic morphology is apparent. In most places the steep relief favors geologic erosion, but the parent rock is resistant to weathering. Usually the soils are AC, and a thin layer of forest litter, (A_0), on the surface overlies an A, or eluviated, layer a few inches thick, which is underlain by yellowish to brownish-yellow fine sandy loam. Bedrock sandstone is at a depth of 12 to 20 inches. A profile approaching that of the Red-Yellow Podzolic soils is on those few sites favorable for developing a zonal profile.

A profile of a Muskingum fine sandy loam soil is as follows:

0 to 4 inches, grayish-brown or brownish-gray fine sandy loam; weak crumb structure; upper inch is more notably dark because of an abundance of fine roots and partly disintegrated organic matter.
4 to 12 inches, yellowish-gray or grayish-yellow friable material ranging in texture from fine sandy loam to fine sandy clay loam; weak nut structure.
12 to 16 inches, splotched or variegated yellowish-brown or grayish-yellow and reddish-brown fine sandy loam; in places a weak brittle structure, in other places absence of cohesion; sandstone bedrock.

The entire profile is medium to strongly acid.

Soils of the Pottsville series developed over acid shale material and like the Muskingum occur on strong slopes where profile development is lacking chiefly because of relatively rapid geologic erosion. Unlike the Muskingum, the Pottsville soils consist predominantly of silty material and contain an abundance of shale fragments. They are like the Muskingum, however, in occupying strong mountainous slopes below the sandstone plateau areas.

In addition to the three soil series already discussed, the miscellaneous land types of the county are classified as Lithosols. These land types are Hilly stony land (Muskingum soil material), Limestone rockland (hilly), Limestone rockland (rough), Rolling stony land (Colbert soil material), Rolling stony land (Muskingum soil material), Rough gullied land (Dewey, Cumberland, and Colbert soil materials), Rough gullied land (Muskingum soil material), Rough stony land (Muskingum soil material), and Stony alluvium (Muskingum and Colbert soil materials). Mainly because of unfavorable surface relief, stoniness, and geologic erosion, a true soil does not exist in most places on these stony lands. The rough gullied lands, which are areas mutilated by accelerated erosion, represent truncated soils.

ALLUVIAL SOILS

Alluvial soils are an azonal group of soils developed from transported and relatively recently deposited material, alluvium, and are characterized by a weak or no modification of the original material through soil-forming processes (*13*). In Jackson County these soils are on first bottoms along streams and in depressions in the uplands. They have nearly level to depressional relief and medium to very slow internal drainage. Their main common characteristic is lack of a soil profile in which the horizons are genetically related.

Alluvial soils derived from similar parent material may differ in drainage and in characteristics arising from differences in drainage. Alluvial soils derived from similar parent material but differing in drainage have been differentiated mainly on the basis of characteristics associated with a good, imperfect, or poor drainage and, collectively, constitute a soil catena. In order to bring out the relation among these soils in the county, they are discussed in relation to their positions in soil catenae. The Abernathy, Ooltewah, Barbourville, Cotaco, Huntington, Egam, Lindside, Bruno, Sturkie, Pope, and Philo are Alluvial soils. The Alluvial soils with a gley layer are the Melvin, Atkins, Guthrie, Dunning, and Prader.

The Abernathy, Ooltewah, and Guthrie series are made up of well, imperfectly, and poorly drained soils belonging to a catena, the members of which are derived from local alluvium washed mainly from

soils underlain by limestone. They are somewhat comparable to Huntington, Lindside, and Melvin soils, respectively, but are derived from local rather than general alluvium, are commonly not underlain by sand and gravel strata, and are generally slightly more acid. External drainage is slow on the Abernathy, Ooltewah, and Guthrie soils, and most of the drainage is internal through cracks and crevices in the underlying limestone bedrock. Internal drainage is rapid to medium rapid through Abernathy soils, somewhat impeded through the Ooltewah, and greatly impeded in the Guthrie.

Abernathy silt loam, level phase, is a young soil and is reddish-brown to brown mellow silt loam to a depth of 30 inches or more. It is medium to medium acid.

Ooltewah silt loam is generally grayish-brown mellow silt loam to a depth of 10 to 15 inches, below which it is brownish-gray silt loam mottled with darker gray, brown, and yellow. The soil is generally slightly acid or acid.

Guthrie silt loam is gray silt loam to a depth of about 7 inches, below which it is gray mottled with brown and yellow plastic silty clay. The texture and compactness of this layer varies notably, the finer textured more compact areas being more in the nature of a Planosol than an Alluvial soil.

There are considerable variations in the Abernathy, Ooltewah, and Guthrie soils from place to place as a result of differences in the nature of recent deposition. For example, there is enough fine sand in some of the Abernathy areas to justify the separation of Abernathy fine sandy loam. The heavier grayish-brown layers of the Guthrie soil may be partly the result of soil-forming processes, and the lower layers have some characteristics of the gley horizons of Half Bog soils. Therefore, the Guthrie, along with the Melvin, Atkins, Dunning, and Prader soils, are classified in table 28 as Alluvial soils with a gley layer.

Huntington, Lindside, and Melvin soils constitute a catena of soils derived from general alluvium that consists mainly of weathered limestone material. The soils are neutral to medium acid. The Huntington soil is well drained, the Lindside imperfectly, and the Melvin poorly. The Huntington soil is brown or dark grayish brown to depths of 20 or 30 inches. The Lindside soils are predominantly dark grayish brown to depths of 12 to 18 inches, below which they are mottled gray, yellow, and brown. The Melvin soils have a gray surface layer underlain by gray material mottled with yellow and brown below a depth of 5 to 8 inches. Textures of the lower layers of the Lindside soils are generally intermediate between those of the lower layers of the Huntington and Melvin soils. These differences are thought to be mainly accidents of deposition that with differences of the height of the water table have contributed to differences in drainage. The heavier lower layers of the Melvin soils may be partly the result of soil-forming processes, and these layers have some of the characteristics of the gley horizons of Half Bog soils. The Melvin soils may be considered Alluvial soils with a gley layer.

The soils of the Egam series are very closely related to the Huntington, with which they are often closely associated and intermingled. The Egam soil generally occupies positions a little lower than the Huntington but in some places may be on the same level or even

slightly higher. The two soils are derived from similar material, but the Egam soil is characterized by a layer, at a depth of 12 inches, that is finer textured and more compact than the corresponding layer in the Huntington soil. The Egam soil may be older morphologically than the Huntington or it may have formed because of particular periods in which coarse and fine materials were deposited. It is not known which of these factors cause differences between the two series. In many places the compact layer in Egam soil is dark and suggests an old surface layer that has been buried under more recent alluvium.

The upper 12 inches in Egam soil is generally grayish-brown to dark grayish-brown mellow silt loam grading with depth to silty clay loam. Underlying is a layer of dark grayish-brown to nearly black moderately compact silty clay 12 to 20 inches thick. This underlying material is generally less fine in texture and less compact than the material above and is mottled with gray, yellow, and brown. The mottling increases with depth. The soil is medium to slightly acid throughout. Because Egam soil is subject to flooding and often receives new deposits of alluvial material, it appears that the heavy layer is not entirely the result of illuviation from layers above.

Soils of the Dunning, Guthrie, Melvin, Prader, and Atkins series have been classified as Alluvial soils with a gley layer.

Soils of the Dunning series consists of fine-textured alluvium washed mainly from soils underlain by limestone. Like the Melvin soils it is a young very poorly drained soil on first bottoms, slightly acid to slightly alkaline in reaction, and with a gleylike subsoil. It differs from the Melvin soils in that it is notably darker colored to a depth of 8 to 20 inches.

In several respects soil of the Dunning series qualifies as a member of the Half Bog great soil group, which is an intrazonal group of soils with mucky or peaty surface soil underlain by gray mineral soil that developed largely under forest, mostly in humid and subhumid climate (*13*). The organic content of Dunning soil, however, is not so large as that characteristic of Half Bog soils, although it is notably above that of the other azonal soils, and of the intraoznal soils of the county, except perhaps the Hollywood soils.

A typical profile of Dunning silty clay is as follows:

0 to 3 inches, fairly friable silty clay breaking into fine angular granules that are hard and olive gray when dry and dark grayish brown when moist; slightly acid.
3 to 10 inches, stiff clay breaking into small nutlike fragments; light grayish brown when dry; grayish brown when moist; very plastic when wet; faint mottlings in various shades of gray and brown; slightly acid.
10 to 28 inches, light brownish-gray heavy stiff clay mottled with various shades of gray, brown, and yellow; breaks into coarse angular fragments; very plastic and sticky when wet; slightly acid.
28 to 40 inches +, mottled light brownish-gray, dark grayish-brown, and yellow heavy stiff clay showing little evidence of structure; massive when moist; when thoroughly dry breaks into small angular lumps; slightly acid.

Soils of the Bruno, Sturkie, and Prader series make up the catena of soils having parent material of mixed alluvium derived chiefly from sandstone, shale, and limestone. These soils are commonly associated and occur along the larger streams of the limestone valleys. The Bruno soils are the best drained members of this catena. They

are notably more sandy and pervious than the Sturkie and Prader soils, and much of their aggregate area is on swells or natural levees of the first bottoms.

Bruno fine sandy loam typically has the following profile:

0 to 8 inches, pale-brown to brown loose friable fine sandy loam.
8 to 20 inches, brown to yellowish-brown fine sandy loam; contains a little more clay than the layer above; weak nut structure in places.
20 to 36 inches, yellowish-brown friable fine sandy loam, a little lighter colored than the layer above and coarser in texture with depth; the texture at a depth of 40 inches is commonly loamy fine sand but in some places sandy loam.

The entire profile is slightly acid. A more sandy type, Bruno loamy fine sand, occupies the natural levees along the Tennessee River. Very little structure is manifest, and the soil is slightly acid.

Soils of the Sturkie series have slower internal drainage than the Bruno and in this respect resemble the Lindside. The friable fine sandy loam material to a depth of approximately 15 inches is pale brown to pale yellow when dry and light yellowish brown to yellowish brown when moist. In virgin areas the surface 3 inches is notably darker. Below 15 inches is light-gray mottled with yellow and brown friable fine sandy clay loam. In places this layer is sandy clay, and practically all of it is moderately plastic when wet. The texture generally becomes finer with depth, and the consistence more plastic. The entire profile is generally slightly acid.

The Prader series is the poorest drained member of the Bruno-Sturkie-Prader catena, the profile resembling that of the Melvin series. It is associated with the Bruno and Sturkie soils and in general occupies the lowest positions on the bottoms, which in most places are gentle depressions with very slow surface drainage. Prader soil is more subject to flooding than the other soils in the catena. Compared with soils of the Bruno and Sturkie series it has a finer texture, a grayer color, and a heavier or more plastic consistence. The material below a depth of 20 or 24 inches is bluish gray mottled with brown and yellow. The entire profile is slightly acid.

The Pope, Philo, Atkins, Barbourville, and Cotaco are Alluvial soils consisting predominantly of material derived from acid sandstone and in places acid sandstone and acid shale. These soils are more sandy and decidedly more acid than the other Alluvial soils, which are all in the limestone valleys and are subject to the influence of lime-bearing water and alluvium from limestone. These soils are in the sandstone plateaus and are not subject to the influence of limestone.

Soils of the Pope, Philo, and Atkins series make up a catena occupying first bottoms consisting of general alluvium and are therefore subject to overflow. The Barbourville and Cotaco soils comprise an incomplete catena occupying positions on local alluvium. They lie along the upper reaches of drainways and therefore are more sloping and less subject to overflow than are the Pope, Philo, and Atkins soils.

The Pope series is the best-drained member of the catena. It is relatively free of mottling to a depth of 24 inches; the material to this depth being light or pale brown. In general, this part of the profile is little lighter colored than corresponding parts of Huntington silt loam and Bruno fine sandy loam, but the texture corresponds with that of the Bruno. The material below a depth of 24 inches is generally

faintly mottled with gray, the gray increasing with depth. The entire profile is strongly to very strongly acid.

The Philo series has slower internal drainage than does the Pope and in this respect corresponds with the Lindside and Sturkie series. Philo soil is consistently lighter brown throughout the upper 15 or 18 inches than is the Lindside in the corresponding part. In this respect Philo soil shows less contrast with the Sturkie profile. The entire Philo profile is strongly to very strongly acid.

The Atkins series is the most slowly drained member of the Pope-Philo-Atkins catena. In this respect Atkins soil is like those of the Melvin and Prader series, and it is classified as an Alluvial soil with a gley layer. Its profile is predominantly gray and in the lower part relatively tight and plastic. The texture of the entire profile generally is finer than that of the other members of the catena. Like the Melvin and Prader soils it occupies the lowest parts of the bottom lands on which it occurs and is the most subject to overflow of the members of its catena. The separate areas of both the Philo and Atkins soils in the county are small and interassociated, and therefore they were mapped as a complex rather than separately.

A typical Atkins silt loam profile is as follows:

0 to 2 inches, dark-gray to very dark-gray silt loam containing a notable quantity of organic matter.
2 to 6 inches, light-gray moderately friable but sticky silty clay loam; brown, yellow, and bluish-gray fine mottlings.
6 to 24 inches +, gray, or bluish-gray mottled with brown and yellow, plastic silty clay.

The entire profile is very strongly acid. The texture of Atkins soil varies relatively widely; in places the surface layer is fine sandy loam and the subsoil has a notably higher content of sand than indicated in the profile description.

The Barbourville series is the better drained member of the Barbourville-Cotaco catena. The profile of Barbourville soil resembles that of the Pope, being predominantly light brown and free of mottlings to a depth of 20 or 30 inches. Below this the soil is mottled gray, yellow, and brown friable clay loam. The Cotaco series corresponds to the Philo series, the material below a depth of 10 or 12 inches being mottled. The soils of both of these series are strongly to very strongly acid throughout their entire depth. Barbourville and Cotaco soils occur in such small interassociated areas that they were mapped as a complex rather than separately.

LABORATORY DETERMINATIONS

Mechanical analyses of several soils are given in table 29. The Crossville, Hanceville, Hartsells, and Enders soils listed in this table are from the sandstone plateaus; the Clarksville, Dewey, and Wolftever are from the limestone valleys. The soils on sandstone plateaus are those developed from (1) sandstone with conglomerate influence, (2) sandstone, (3) acid shale interbedded with sandstone, and (4) sandstone with some shale influence. The soils in limestone valleys represent those derived from (1) relatively pure limestone, (2) cherty limestone, and (3) alluvial deposits mainly from limestone.

TABLE 29.—*Mechanical analyses of several soils in Jackson County, Ala.*

Soil and sample No.	Depth	Material and diameter of particles (in millimeters)						
		Very coarse sand (2.0–1.0)	Coarse sand (1.0–0.5)	Medium sand (0.50–0.25)	Fine sand (0.25–0.10)	Very fine sand (0.10–0.05)	Silt (0.005–0.002)	Clay (0.002–0)
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Crossville loam:								
418401	0–7	0.3	4.2	17.6	14.8	2.1	40.9	20.1
418402	7–15	.1	3.9	14.7	11.1	1.6	37.7	30.9
418403	15–22	.7	4.2	16.9	13.3	1.8	35.2	27.9
408404	22–30	.9	5.1	21.2	19.0	2.7	28.5	22.6
Clarksville cherty silt loam, rolling phase:								
418405	0–2	16.4	9.1	4.6	6.7	3.6	45.0	14.6
418406	2–10	5.4	7.3	4.4	6.2	3.5	54.8	18.4
418407	10–24	6.5	7.2	4.5	6.7	4.6	52.7	17.8
418408	24–40	7.9	8.1	5.2	7.8	6.4	45.8	18.8
Hartsells fine sandy loam, undulating phase:								
418409	0–2	1.4	11.7	14.8	24.5	5.4	35.1	7.1
418410	2–6	1.4	11.9	15.7	22.9	4.2	35.4	8.5
418411	6–16	1.1	11.3	14.7	23.4	4.1	35.8	9.6
418412	16–24	1.1	11.2	14.2	22.2	4.2	35.5	11.6
418413	24–38	1.5	12.3	16.8	27.8	5.2	27.2	9.2
Hanceville fine sandy loam, undulating phase:								
418426	0–3	.5	8.2	20.4	25.3	7.4	20.3	17.9
418427	3–8	.4	9.0	19.7	22.5	6.2	19.5	22.7
418428	8–12	.8	7.3	15.2	17.9	4.4	24.6	29.8
418429	12–18	.5	7.8	17.3	20.1	5.3	11.7	37.3
418430	18–24	.8	8.0	16.2	17.7	4.1	16.6	36.6
418431	24–32	1.0	9.2	17.3	17.9	4.1	16.4	34.1
418432	32–40	1.1	8.9	16.5	18.4	4.6	16.4	34.1
418433	40–50	1.6	9.3	16.6	18.7	4.9	16.8	32.1
418434	50–62	1.7	11.6	18.9	19.6	5.0	17.4	25.8
418435	62–75	2.7	10.6	16.8	16.1	4.6	13.7	35.5
Enders silt loam, undulating phase:								
418437	0–½	.6	.6	1.1	6.3	30.1	53.8	7.5
418438	½–3	.2	.5	.9	5.3	28.8	54.9	9.4
418439	3–9	.3	.4	.8	4.8	24.8	53.8	15.1
418440	9–13	.5	.4	.9	4.3	24.3	52.2	17.4
418441	13–16	.5	.4	.7	4.1	22.1	51.3	20.9
418442	16–21	0	.2	.4	2.8	15.6	50.9	30.1
418443	21–26	0	.1	.1	.8	6.4	53.3	39.3
418444	26–33	0	.1	.2	.5	11.0	53.9	34.3
418445	33–41	0	0	.1	.8	15.1	51.0	33.0
418446	41–46	0	.1	.4	12.4	51.2	27.5	8.4
Dewey silt loam, undulating phase:								
4184121	0–3	2.0	7.5	5.0	10.7	7.0	50.5	17.3
4184122	3–6	1.2	5.6	3.4	6.9	6.0	56.5	20.4
4184123	6–16	.9	3.9	2.3	4.9	4.5	55.5	28.0
4184124	16–26	1.2	4.3	2.2	4.6	4.3	52.0	31.4
4184125	26–36	1.8	3.9	1.9	3.4	4.3	45.1	39.6
4184126	36–46	1.5	3.5	1.9	4.1	4.5	41.1	43.4
4184127	46–54	1.1	3.4	1.9	4.2	4.6	39.0	45.8
Wolftever silt loam, level phase:								
4184207	0–6	.4	1.1	4.9	16.4	6.3	46.5	24.4
4184208	6–10	.3	1.3	4.7	13.9	5.5	44.3	30.0
4184209	10–18	.4	1.3	5.0	14.1	5.2	39.5	34.5
4184210	18–26	.9	1.5	6.3	17.8	6.1	37.3	30.1
4184211	26–34	.9	2.0	8.1	23.5	7.6	33.5	24.4
4184212	34–42	1.1	2.6	9.8	26.4	8.1	28.4	23.6

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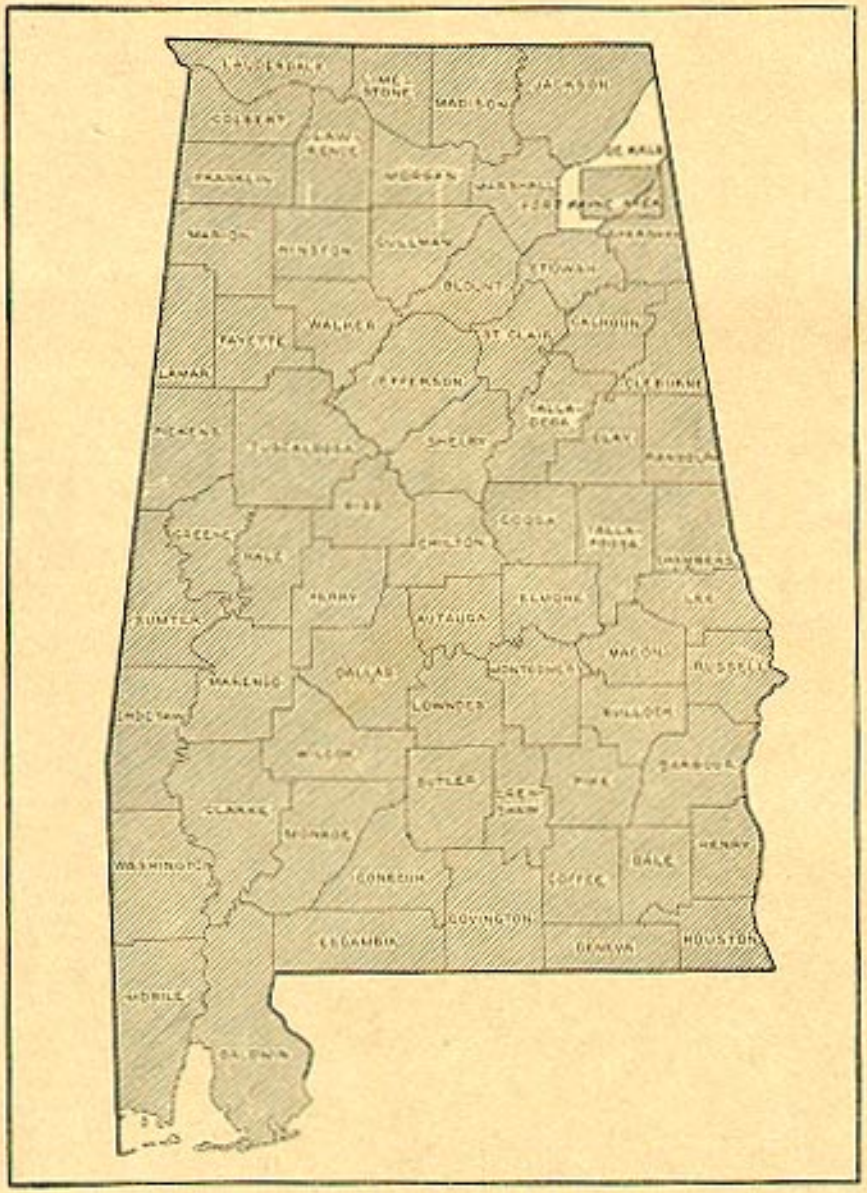

Areas surveyed in Alabama shown by shading.

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