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SOIL SURVEY

Lawrence County Alabama

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

HOW TO USE THE SOIL SURVEY REPORT

THIS SURVEY of Lawrence County will help you plan the kind of farming that will protect your soils and provide good yields. It describes the soils; shows their location on a map; and tells what they will do under different kinds of management.

Find your farm on the map

In using this survey, you start with the soil map, which consists of the sheets bound in the back of this report. These sheets, if laid together, make a large photographic map of the county as it looks from an airplane. You can see woods, fields, roads, rivers, and many other landmarks on this map.

To find your farm on the large map, use the index to map sheets. This is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located.

When you have found the map sheet for your farm, you will notice that boundaries of the soils have been outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map.

Suppose you have found on your farm an area marked with the symbol Ac. You learn the name of the soil this symbol represents by looking at the map legend. The symbol Ac identifies Abernathy silt loam, level phase.

Learn about the soils on your farm

Abernathy silt loam, level phase, and all the other soils mapped are described in the section Descriptions of the Soils. Soil scientists, as they walked over the fields and through the woodlands, described and mapped the soils; dug holes and examined surface soils and subsoils; measured slopes with a hand level; noted differences in growth of crops, weeds, brush, or trees; and, in fact, recorded all the things that they believed might affect suitability of the soils for farming.

With help from farmers and many other people, scientists placed each soil in a capability unit, which is a group of similar soils. Capability units can also be called management groups of soils. Capability units are grouped into capability classes and subclasses.

Abernathy silt loam, level phase, is in capability unit I-1. Turn to the section Use and Management of Soils and read what is said about soils in this capability unit. You will want to study the table, which tells you how much you can expect to harvest from Abernathy silt loam, level phase, under two levels of management. In columns A are yields obtained under prevailing management, and in columns B are yields to be expected under improved management.

Make a farm plan

For the soils on your farm, compare your yields and farm practices with those given in this report. Look at your fields for signs of runoff and erosion. Then decide whether or not you need to change your methods. The choice, of course, must be yours. This survey will aid you in planning new methods, but it is not a plan of management for your farm or any other farm in the county.

If you find that you need help in farm planning, consult the local representative of the Soil Conservation Service or the county agricultural agent. Members of the staff of your State agricultural experiment station and others familiar with farming in your county will also be glad to help you.

Farmers in Lawrence County participated in the organization of the Northwest Soil Conservation District. The district, through its board of supervisors, arranges for farmers to receive technical help from the Soil Conservation Service in planning good use and conservation of the soils on their farms. The survey furnishes some of the facts needed for this technical help. The soil survey map and report also are useful to land appraisers, credit agencies, road engineers, and to others who are concerned with the use and management of land.

The fieldwork for this survey was completed in 1949. Unless noted otherwise, all statements refer to conditions at the time of the survey.

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Contents

Page

General description of the county ... 1
Early history and population ... 1
Transportation and school facilities ... 1
Climate ... 1
Vegetation ... 2
Water supply ... 3
Drainage ... 3
Soil associations ... 3
Tennessee Valley physiographic division ... 3
Nolichucky-Etowah association ... 3
Decatur-Cumberland-Abernathy association ... 3
Tyler-Colbert-Etowah association ... 4
Little Mountain physiographic division ... 4
Tilsit-Linker-Muskingum association ... 4
Moulton Valley physiographic division ... 4
Colbert-Hollywood-Robertsville association ... 4
Decatur-Cumberland-Colbert-Robertsville association ... 5
Sand Mountain physiographic division ... 5
Muskingum-Pottsville association ... 5
Use and management of soils ... 5
Capability groups of soils ... 5
Description of capability units ... 6
Capability unit:
I-1 ... 6
IIe-1 ... 7
IIe-2 ... 7
IIe-3 ... 7
IIe-7 ... 8
IIw-1 ... 8
IIw-2 ... 8
IIIe-2 ... 9
IIIe-3 ... 9
IIIe-8 ... 9
IIIe-12 ... 10
IIIw-1 ... 10
IIIw-2 ... 10
IIIw-4 ... 11
IIIs-2 ... 11
IVe-2 ... 11
IVe-12 ... 12
IVw-2 ... 12
VIe-2 ... 12
VIIe-1 ... 13
VIIe-2 ... 13
Estimated yields ... 13
Soils of Lawrence County ... 16
Soil survey methods and definitions ... 16
Physiographic relations of the soil series ... 17
Soils of the uplands ... 17
Soils on stream terraces ... 18
Soils on old colluvium ... 18
Soils on young colluvium ... 19
Soils on bottom lands ... 19
Descriptions of the soils ... 19
Abernathy series ... 21
Abernathy silt loam:
Level phase ... 21
Undulating phase ... 21
Abernathy fine sandy loam:
Level phase ... 21
Undulating phase ... 21
Allen series ... 22
Allen fine sandy loam:
Eroded undulating phase ... 22
Rolling phase ... 22
Eroded rolling phase ... 22
Eroded hilly phase ... 23
Allen clay loam, severely eroded rolling phase ... 23
Atkins series ... 23
Atkins silt loam ... 23

Page

Soils of Lawrence County—Continued
Barbourville series ... 24
Barbourville fine sandy loam ... 24
Baxter series ... 24
Baxter cherty silt loam:
Eroded rolling phase ... 24
Hilly phase ... 25
Bruno series ... 25
Bruno loamy fine sand ... 25
Colbert series ... 25
Colbert silt loam:
Undulating phase ... 25
Level phase ... 25
Rolling phase ... 26
Colbert silty clay loam:
Eroded undulating phase ... 26
Eroded rolling phase ... 26
Eroded hilly phase ... 26
Colbert cherty silt loam:
Eroded undulating phase ... 27
Rolling phase ... 27
Colbert loam:
Undulating phase ... 28
Eroded undulating phase ... 28
Rolling phase ... 28
Eroded rolling phase ... 28
Hilly phase ... 29
Cotaco series ... 29
Cotaco silt loam ... 29
Cumberland series ... 29
Cumberland loam:
Undulating phase ... 30
Eroded undulating phase ... 30
Eroded rolling phase ... 30
Decatur and Cumberland soils ... 31
Decatur and Cumberland silt loams, undulating phases ... 31
Decatur and Cumberland silty clay loams:
Eroded undulating phases ... 31
Eroded rolling phases ... 32
Decatur and Cumberland silty clays:
Severely eroded undulating phases ... 32
Severely eroded rolling phases ... 33
Gullied phases ... 33
Dewey series ... 33
Dewey cherty silty clay loam:
Eroded undulating phase ... 33
Eroded rolling phase ... 34
Dowellton series ... 34
Dowellton silty clay loam ... 34
Dunning series ... 34
Dunning silty clay ... 34
Enders series ... 35
Enders loam:
Rolling phase ... 35
Eroded rolling phase ... 35
Eroded undulating phase ... 35
Etowah series ... 36
Etowah silt loam, undulating phase ... 36
Etowah silty clay loam:
Eroded undulating phase ... 36
Eroded rolling phase ... 36
Etowah loam:
Undulating phase ... 37
Eroded undulating phase ... 37
Gullied land ... 37
Gullied land, sandstone material ... 37
Hamblen series ... 38
Hamblen fine sandy loam ... 38

468630—59——1

Page

Soils of Lawrence County—Continued
Hartsells series 38
Hartsells fine sandy loam:
Eroded undulating phase 38
Rolling phase 39
Eroded rolling phase 39
Hollywood series 39
Hollywood silty clay 39
Huntington series 39
Huntington silt loam 39
Jefferson series 40
Jefferson fine sandy loam:
Eroded undulating phase 40
Rolling phase 40
Eroded rolling phase 41
Eroded hilly phase 41
Johnsburg series 41
Johnsburg loam 41
Lawrence and Colbert soils 42
Lawrence and Colbert silt loams:
Undulating phases 42
Rolling phases 42
Lawrence and Colbert silty clay loams:
Eroded undulating phases 42
Eroded rolling phases 43
Lickdale series 43
Lickdale silt loam 43
Lindside series 43
Lindside silty clay loam 43
Linker series 44
Linker fine sandy loam:
Eroded undulating phase 44
Rolling phase 44
Eroded rolling phase 45
Eroded hilly phase 45
Linker clay loam, severely eroded rolling phase 45
Melvin series 46
Melvin silt loam 46
Monongahela and Holston soils 46
Monongahela and Holston fine sandy loams:
Undulating phases 46
Eroded undulating phases 47
Level phases 47
Muskingum series 47
Muskingum fine sandy loam, hilly phase 47
Muskingum stony fine sandy loam:
Hilly phase 47
Steep phase 48
Nolichucky series 48
Nolichucky fine sandy loam:
Eroded undulating phase 48
Eroded rolling phase 49
Ooltewah series 49
Ooltewah silt loam 49
Ooltewah fine sandy loam 49
Philo series 50
Philo fine sandy loam 50
Pottsville series 50
Pottsville shaly silt loam:
Hilly phase 50
Steep phase 51
Prader series 51
Prader silt loam 51
Robertsville series 52
Robertsville silt loam 52
Rockland 53
Rockland:
Limestone, rolling 53
Limestone, steep 53
Ruston series 53
Ruston sandy loam:
Undulating phase 53

Page

Soils of Lawrence County—Continued
Ruston sandy loam—Continued
Rolling phase 54
Eroded rolling phase 54
Sequatchie series 54
Sequatchie fine sandy loam:
Undulating phase 54
Eroded undulating phase 55
Staser series 55
Staser fine sandy loam 55
Stony rolling land 56
Stony rolling land, Talbot and Colbert soil materials 56
Stony steep land 56
Stony steep land, Muskingum soil material 56
Talbott series 56
Talbott silt loam, undulating phase 56
Talbott silty clay loam:
Eroded undulating phase 57
Eroded rolling phase 57
Talbott silty clay:
Severely eroded undulating phase 57
Severely eroded rolling phase 58
Talbott loam:
Eroded undulating phase 58
Eroded rolling phase 58
Tilsit series 59
Tilsit silt loam:
Undulating phase 59
Eroded undulating phase 59
Rolling phase 60
Eroded rolling phase 60
Tupelo series 60
Tupelo silt loam 60
Tupelo loam 61
Tyler series 61
Tyler fine sandy loam 61
Tyler and Monongahela soils 62
Tyler and Monongahela fine sandy loams:
Level phases 62
Undulating phases 62
Eroded undulating phases 62
Waynesboro series 63
Waynesboro fine sandy loam, eroded undulating phase 63
Waynesboro clay loam, severely eroded rolling phase 63
Genesis, morphology, and classification of soils 64
Factors of soil formation 64
Parent materials 64
Climate 64
Plant and animal life 65
Relief 65
Time 65
Classification of soils by higher categories 65
Zonal soils 68
Red-Yellow Podzolic soils 68
Reddish-Brown Lateritic soils 73
Intrazonal soils 74
Rendzina soils 74
Humic Gley soils 74
Low-Humic Gley soils 74
Planosols 75
Azonal soils 76
Lithosols 76
Alluvial soils 77
Agriculture in Lawrence County 78
Size of farm and tenure 78
Land use 78
Farm crops and practices 78
Permanent pasture 80
Livestock and livestock products 80
Glossary 80
Literature cited 83

SOIL SURVEY OF LAWRENCE COUNTY, ALABAMA[1]

Soils surveyed by HOYT SHERARD, Alabama Department of Agriculture and Industries, in charge, and B. E. YOUNG and H. J. WESSON, Alabama Agricultural Experiment Station

Correlation by MAX J. EDWARDS, United States Department of Agriculture

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

LAWRENCE COUNTY is in the northwestern part of Alabama. Moulton, the county seat, is north of Birmingham and southwest of Decatur. Distances by air from Moulton to principal cities in the State are shown in figure 1. The land area of the county is

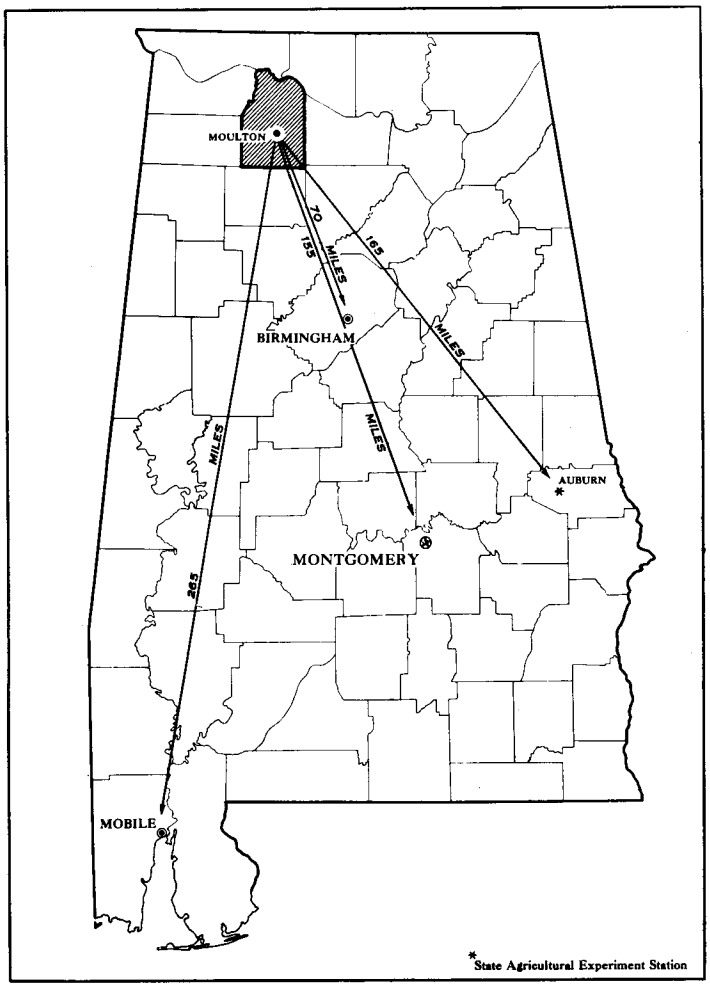

Figure 1.—Location of Lawrence County in Alabama.

439,040 acres, or 686 square miles. In addition, there are about 23 square miles of water.

[1] Fieldwork for this study was done when the division of Soil Survey was a part of the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

General Description of the County

This section is provided mainly for those not familiar with Lawrence County. It tells about the early history and population, transportation and schools, climate, vegetation, water supply, and drainage. Details about agriculture of the county will be found in the section Agriculture in Lawrence County.

Early History and Population

Lawrence County was created in 1818 from lands acquired from the Chickasaw and Cherokee Indians in 1816. The first settlement was on the Tennessee River, about 7 miles north of Hillsboro. The first courts were held there, but the seat of government was moved to Moulton in 1820. Lawrence County was named in honor of Captain James Lawrence, a naval hero in the War of 1812. The early settlers came from Virginia, Tennessee, and the Carolinas. They were mainly of English descent, but some were of Scotch and Irish descent.

Nearly all parts in the county except the Sand Mountain area are thickly settled. This area is mostly within the William B. Bankhead National Forest. In 1950 the population of the county was 27,128. Moulton, the county seat, had a population of 1,384; Town Creek and Courtland had 763 and 507, respectively.

Transportation and School Facilities

Railroad service in the county is provided by a main line of the Southern Railway to Chattanooga and Memphis, Tennessee. Hillsboro, Town Creek, Wheeler, and Courtland are shipping points along this line. The Louisville and Nashville Railroad goes through Decatur, a major shipping point about 10 miles east of Lawrence County, and connects with other large cities. Facilities for handling waterborne shipments are available at Decatur, Florence, and Sheffield in adjoining counties.

Federal and State all-weather highways are in all parts of the county except the Sand Mountain area. This rough section is mostly in a national forest and has an east-west, all-weather road running through it.

The county school system provides elementary schools and junior and senior high schools. Rural pupils are transported by county school buses.

Climate

The climate of Lawrence County is humid and temperate. Winters are characteristically cool but include frequent short periods that are cold or moderately warm. Temperature and precipitation data

compiled from United States Weather Bureau records are given in table 1. Complete climatological records are not available for Lawrence County; consequently, those for Morgan County are used in this report.

Precipitation is distributed fairly evenly throughout the year, but the hazard from runoff and flooding is greater late in winter and early in spring. In winter the soils are moist and generally too wet for tillage. The ground seldom freezes deeper than 1½ or 2 inches, and then only for 2 or 3 days at a time. Light snows are common, but they seldom stay on the ground for more than 3 or 4 days.

Winters are mild enough for fall-sown oats, barley, wheat, and rye, and for winter cover crops, as Austrian peas, vetch, and crimson clover. Small grains and winter cover crops can be grazed during most of the winter, although these plants do not grow well during December, January, and February. The ground may be too wet to be trampled by livestock for several days at a time. The regular grazing season can be extended through the greater part of the winter by proper management of winter pastures. The more hardy vegetables—as cabbage, collards, and turnips—ordinarily can be grown throughout the winter.

TABLE 1.—*Temperature and precipitation at Decatur Station, Morgan County, Alabama*

[Elevation, 573 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute Minimum	Average	Driest year (1904)	Wettest year (1932)	Average snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	45.5	78	0	5.04	4.50	9.68	0.6
January	42.4	79	−5	4.63	1.90	8.46	1.0
February	44.0	84	−12	4.43	1.25	6.91	.7
Winter	44.0	84	−12	14.10	7.65	25.05	2.3
March	53.1	93	4	5.62	7.60	3.89	.2
April	61.8	92	26	4.48	2.78	4.25	[3]
May	70.0	100	34	3.83	3.04	1.97	0
Spring	61.6	100	4	13.93	13.42	10.11	.2
June	77.9	108	47	3.79	1.51	6.53	0
July	80.3	107	52	4.35	5.39	4.05	0
August	79.3	107	52	3.91	2.91	8.09	0
Summer	79.2	108	47	12.05	9.81	18.67	0
September	74.1	104	36	2.37	1.60	2.37	0
October	62.2	100	27	3.07	.30	8.83	[3]
November	50.9	86	3	3.20	1.92	3.72	.1
Fall	62.4	104	3	8.64	3.82	14.92	.1
Year	61.8	108	−12	48.72	34.70	68.75	2.6

[1] Average temperature based on a 74-year record, through 1955; highest and lowest temperature based on a 59-year record, through 1952.

[2] Average precipitation based on a 77-year record, through 1955; wettest and driest years based on a 77-year record, in the period 1879–1955; snowfall based on a 58-year record, through 1952.

[3] Trace.

According to reports from the Weather Bureau at Decatur, the average frost-free season extends from March 28 to November 3. The length of the growing season is 220 days. The latest recorded killing frost is April 26, and the earliest is October 11. Late spring frosts commonly damage strawberries and peaches. Damage to crops by early fall frosts is much less significant, since most crops commonly grown are not subject to frost damage at this time of year.

Crops can be planted from 5 to 10 days earlier in the Tennessee Valley than in the other parts of the county.

Soil moisture is favorable for crops throughout much of the growing season. There is generally enough moisture in spring, but occasional dry periods slow the germination of seeded crops and reduce yields of early crops. During the growing season, there are from one to five dry periods in which crops need additional moisture. These dry periods last from several days to several weeks, but they seldom are severe enough to cause crop failures. Excessively dry weather is most common in August, September, and October. It favors the harvesting of crops, but it is somewhat unfavorable for pasture and for the seeding of grains, grasses, and other cover crops.

According to a 53-year record of the United States Weather Bureau at Chattanooga, the average amount of sunshine per year was about 56 percent of the possible maximum. Sunshine is least in December, January, and February, when it ranges from 40 to 46 percent, and is most from May 1 through October 31, when it ranges from 61 to 66 percent.

In winter rains are usually general and prolonged, but in summer much of the precipitation is in thunder showers and falls rapidly. The total number of thunder storms per year is about 58. More than half of them occur in June, July, and August. Hailstorms and tornadoes are few. The prevailing wind direction at Decatur, Ala., over a 25-year period, was from the south from May through September and from the north from November through March. Average wind velocity is low; the average humidity is moderately high.

Vegetation

Before settlement by white men, practically all of Lawrence County was covered by forests. The county is in the area classified as the chestnut, chestnut-oak, and yellow-poplar forest type (*4*). Species of trees that commonly occur in the area are hickory, maple, beech, elm, hackberry, holly, sycamore, gum, persimmon, willow, and locust. Loblolly *(Pinus taeda)*, shortleaf *(P. echinata)*, and scrub *(P. virginiana)* pines are also common. Redcedar *(Juniperus virginiana)* is common on the glady areas of stony rolling land, Talbott and Colbert soil materials. All chestnut trees were killed by blight before 1930.

About 43 percent of the county is in forests. Most of this area is in cutover hardwoods, but some is predominantly in cedar. Some of the abandoned fields have reseeded naturally to stands of pure pine, or pine has been planted on them. The present forest is classified as about 42 percent yellow pine-hardwoods, 26 percent upland hardwoods, 22 percent bottom-land

hardwoods, 5 percent yellow pine, and 5 percent cedar-hardwoods (*6*).[2] The Tennessee Valley Authority cooperated in planting trees on 1,599 acres.

Water Supply

Water for home and livestock needs is obtained from wells, springs, lakes, streams, and cisterns. In some localities there is a shortage of water in seasons of drought. In the Moulton and Tennessee Valleys, adequate water is available at depths of 30 to 75 feet. There are also springs. On the ridgelands of Little Mountain and Sand Mountain, water is hard to obtain easily and wells must be drilled to great depths. In these sections the wells of average depth go dry during long droughts. For this reason many farms supplement their water supply by using cisterns. Wells are a more permanent source of water in the deeper valleys of the mountainous parts of the county.

Wheeler Reservoir on the Tennessee River is easily accessible for fishing, boating, and swimming. Several small resorts and boat-renting docks are on this lake.

Drainage

The drainage of the Sand Mountain and the Little Mountain physiographic divisions is in the mature stage. Development of the Tennessee Valley and Moulton Valley physiographic divisions is somewhat younger, and extensive depressions exist in which adequate surface drainage has not yet developed. About five-sixths of the county is drained northward to the Tennessee River. Most of the Sand Mountain division is drained southward to the Black Warrior River. Parts of the county capped by Coastal Plain material are drained westward to Bear Creek, a tributary of the Tennessee River.

Soil Associations

As we study or map the soils of a county or other large tract, it is fairly easy to see differences as one travels from place to place. There are many obvious differences in the shape, length, and gradient of slopes; in the course, depth, and speed of streams; in the width of bordering valleys; in the kinds of plants; and in the agriculture. Less noticeable are the differences in the pattern of soils.

By drawing lines around the different patterns of soils on a small map, one may obtain a map of the general soil areas, or as they are sometimes called, soil associations. Such a map is useful to those who want only a general idea of the soils, who want to compare different parts of a county, or who want to locate large areas suitable for some particular kind of agriculture or other broad use. The colored map in the back of this report shows the seven soil associations in Lawrence County.

The soil associations occur in four well-defined physiographic divisions—Tennessee Valley, Little Mountain, Moulton Valley, and Sand Mountain. The descriptions of physiographic divisions and the soil associations in each follow.

Tennessee Valley Physiographic Division

The northern end of the county is in the Tennessee Valley physiographic division, which is a low undulating or rolling plain. The soil parent material is mostly reddish residuum weathered from St. Louis limestone of the Mississippian system (*1*) and old general alluvium deposited by the Tennessee River. The residuum lies on a gently undulating plain; the old alluvial deposits are gently sloping and have many nearly level depressions. The three soil associations in this physiographic division are the Nolichucky-Etowah, the Decatur-Cumberland-Abernathy, and the Tyler-Colbert-Etowah.

Nolichucky-Etowah association

This soil association occupies two parts of the Tennessee Valley physiographic division in the northern part of the county. The well-drained Nolichucky and Etowah soils predominate, but significant areas of Monongahela, Tyler, and Robertsville soils and a few areas of Decatur and Cumberland soils are also in this association.

Most areas are undulating, but smaller rolling or sloping areas are intermixed. Approximately 65 percent of the association consists of the well-drained Nolichucky, Etowah, Cumberland, and similar soils, and about 20 percent consists of poorly drained soils on bottom lands and in sinks. There are some broad nearly level areas consisting mainly of Robertsville and Tyler soils.

Approximately 25 percent of the association is in forest, mainly on poorly and somewhat poorly drained soils. Practically all of the association is in farms, and much of the cleared land is in cultivation. In general, this association is well suited to general farming. The poorly drained areas now in forest should be retained in this use. The soils in this association are in capability classes II, III, and IV.

The natural fertility of this association is a little lower than that of the Decatur-Cumberland-Abernathy association. The well-drained soils are somewhat more sandy and more friable than the predominant soils in the Decatur-Cumberland-Abernathy association, and they are better suited to truck crops and other plants that respond well to more open friable soils.

Decatur-Cumberland-Abernathy association

This soil association occupies most of the Tennessee Valley physiographic division. It occurs predominantly on a gently undulating plain consisting mainly of well-drained red soils. This association consists chiefly of the Decatur and Cumberland series. Along the drainageways are strips of the well-drained Abernathy and somewhat poorly drained to moderately well drained Ooltewah soils. The nearly level poorly drained areas are mainly Robertsville and Melvin soils. The limited acreage of sloping land occurs as small areas that are associated with extensive, smooth areas of Decatur and Cumberland soils.

Practically all of the association is in farms; 10 per-

[2] Italic numbers in parentheses refer to Literature Cited, p. 83.

cent or less is in forest. A small acreage that was once cleared and cultivated has reverted to pine forest. The cleared acreage is used for crops and pasture. Cotton is the predominant crop.

This association is the most productive part of the county because the soils are mainly smooth, well drained, and productive. Soils of capability classes I, II, and III predominate. The predominant soils are well suited to cotton, corn, small grains, and pasture. If properly managed, the soils can be kept productive.

Tyler-Colbert-Etowah association

This soil association occupies two areas along the southern edge of the Tennessee Valley physiographic division. The terrain is nearly level to undulating. More than half the acreage consists of poorly drained soils, predominantly Robertsville, and the somewhat poorly drained soils, predominantly Tyler and Tupelo. A smaller but significant percentage consists mainly of well drained Etowah and moderately well drained Colbert and Monongahela soils that occupy the higher parts of the association.

There is also some acreage of Allen and Jefferson soils adjacent to the steep slopes of the Little Mountain physiographic division. Most of the soils of this association have yellow to gray subsoils that are generally more plastic and more slowly permeable than those in soils of the Nolichucky-Etowah and Decatur-Cumberland-Abernathy associations. The content of plant nutrients is notably less than for the soils of the latter association.

About 40 percent of this association is in forest, and most of these soils are poorly drained and somewhat poorly drained. Most of the well drained and moderately well drained soils, and some of the somewhat poorly drained soils, have been cleared and are in cultivation.

Soils in this association are less productive and less well suited to crops than those of the Decatur-Cumberland-Abernathy association. They are also more difficult to work and to keep productive. The content of plant nutrients is less. Moisture-tolerant crops, as corn, soybeans, grain sorghum, and some of the legumes and grasses, are best suited to these soils. Some of the association, however, is well suited to cotton and alfalfa. The inadequately drained soils can be made suitable for a wider variety of crops by improving drainage.

Little Mountain Physiographic Division

This division is a dissected plateau that generally slopes toward the south. The northern edge of the plateau is a moderately sharp escarpment that rises from 125 to 275 feet above the level of the Tennessee Valley. The terrain consists of moderately broad, undulating and rolling ridges and strong to moderately steep slopes along the valleys of larger creeks and drainageways. The exposed geologic formation is predominantly the Hartselle of the Mississippian system.

Only one soil association is in the Little Mountain physiographic division—the Tilsit-Linker-Muskingum.

Tilsit-Linker-Muskingum association

This soil association occupies all of the Little Mountain physiographic division. It consists of undulating to rolling Tilsit and Linker soils with strips of hilly and steep Muskingum soils along the more deeply entrenched streams. Narrow strips of Cotaco and Barbourville soils are at the heads and along the upper reaches of the drainageways. Tilsit soils greatly predominate.

All soils of this association have a loam to fine sandy loam texture, except where erosion has exposed the more clayey subsoil. They are more permeable to depths of 20 to 24 inches than most of the soils of the Decatur-Cumberland-Abernathy and the Tyler-Colbert-Etowah associations. The Tilsit soils have a pan at depths of 24 to 28 inches that somewhat impedes penetration of roots and moisture. All of the soils are low in plant nutrients.

Approximately 80 percent of this association has been cleared and is in cultivation or is used for pasture. Forested areas are mainly on Muskingum soils.

Most of the cleared acreage consists of Tilsit, Linker, and Cotaco soils and is in capability classes II and III. Most of the Muskingum acreage is in classes VI and VII. The Tilsit, Linker, Cotaco, and similar soils are well suited to cotton, corn, small grains, and many of the legumes and grasses commonly grown. The Tilsit-Linker-Muskingum association is one of the more productive agricultural areas of the county, although its soils are not so fertile as the predominant soils of the Decatur-Cumberland-Abernathy association.

Moulton Valley Physiographic Division

This division is from 50 to 75 feet above the elevation of the Tennessee Valley and greatly resembles it in topography. The parent material of the soils was mainly residuum from weathered argillaceous limestone of the Bangor formation, but there are extensive areas of soils that developed from old general alluvium. There is a considerable acreage of well-drained reddish soils similar to those in the Tennessee Valley physiographic division and a large acreage of shallow clayey soils underlain by limestone.

The Colbert-Hollywood-Robertsville association and the Decatur-Cumberland-Colbert-Robertsville association are in the Moulton Valley physiographic division.

Colbert-Hollywood-Robertsville association

This soil association occupies the northwestern part of the Moulton Valley physiographic division. It consists mainly of nearly level to undulating soils. Most of the soils are poorly drained to moderately well drained and have slowly permeable clayey subsoils. Limestone bedrock in most places is at depths ranging from 1 to 4 feet. Well-drained Etowah and Cumberland soils that have permeable subsoils occur in small areas. The poorly drained Robertsville soils occur in several large areas.

Nearly all of this association is in farms. About 30 percent of it is in forest, mainly on drained Robertsville soils but, to some extent, on Dowelton and Hollywood soils. Most of the somewhat poorly drained and moderately well drained soils and nearly all of the well drained soils have been cleared. About half the cleared acreage is used for cotton, corn, soybeans,

legumes, and grasses. The areas less favorable for crops are used for pasture.

The large acreage of poorly drained soils is not suited to cultivation. Most of the better drained soils are less fertile, more difficult to till, and have a lower water-holding capacity than a considerable acreage of the soils of the Nolichucky-Etowah, the Decatur-Cumberland-Abernathy, and the Decatur-Cumberland-Colbert-Robertsville soil associations. The soils in the Colbert-Hollywood-Robertsville association are in capability classes II, III, and IV. Some of the more stony areas are in class VI.

Decatur-Cumberland-Colbert-Robertsville association

This soil association occupies most of the Moulton Valley physiographic division. It occurs on undulating to rolling terrain that contains numerous nearly level, poorly drained areas in depressions and along streams. The higher lying parts of the association consist mainly of red, well-drained Cumberland and Decatur soils. The lower lying parts consist of the poorly to somewhat poorly drained clayey Robertsville, Hollywood, Dunning, and Colbert soils. There are also areas of Tyler, Monongahela, and Dowellton soils.

About 30 percent of the association is in forest, which is mostly on nearly level to very gently sloping, poorly drained and somewhat poorly drained soils. Nearly all of the well-drained, red Cumberland and Decatur soils has been cleared and used for crops. Much of the acreage of the somewhat poorly drained soils has been cleared and is used for pasture.

Nearly all of this association is in farms. Their productivity varies according to the percentage of red, well-drained Cumberland and Decatur soils they contain. The better drained soils are productive and suited to a wide range of crops. The rest of the soils, except the poorly drained ones, are generally well suited to soybeans and grain sorghum and to legumes and grasses for hay and pasture. Much of the acreage of the poorly drained soils is best suited to pasture and forestry.

The use suitability and the productivity of the soils of this association vary greatly. The soils are about equally divided among capability classes II, III, and IV. However, some acreage of capability class VI soils occur in this association.

Sand Mountain Physiographic Division

This division is in the southern part of the county. It is nearly all in the William B. Bankhead National Forest and is covered by cutover oak and hickory forest. It is strongly dissected and consists of narrow ridgetops and valleys, extensive hills, and steep slopes. In places the ridgetops are more than 1,000 feet above sea level. The exposed geologic material is mainly acid shale of the Pottsville formation of the Pennsylvanian system. The ridgetops on the extreme western edge of the Sand Mountain physiographic division are capped by sandy Coastal Plain strata, the most extensive area of which is north of Kinlock Knob. In this area, the underlying Pottsville shale is at depths of more than 4 feet.

The Muskingum-Pottsville association occurs in the Sand Mountain physiographic division.

Muskingum-Pottsville association

This soil association occupies all the hilly and steep Sand Mountain physiographic division in the southern part of the county. It consists predominantly of strongly sloping sandy and shaly Muskingum and Pottsville soils. The narrow ridgetops are occupied by the moderately deep Hartsells and Enders soils, but these areas are too small for farming. The soils of this association are low in fertility, strongly acid, and, for the most part, low in moisture-holding capacity.

About 95 percent of the association is in cutover hardwood forest. A small percentage of the acreage is in farms, but very little is cultivated. The best use is forestry. A large part of the association is in capability class VII.

Use and Management of Soils

In this section the soils of Lawrence County are placed in capability classes and units. The use and management of each capability unit is discussed. Also, estimated average yields of principal crops are given for ordinary and for improved management.

Capability Groups of Soils

Capability grouping is a system of classification used to show the relative suitability of soils for crops, grazing, forestry, and wildlife. It is a practical grouping based on the needs and limitations of the soils, risks of damage to the soils, and also on their response to management. There are three levels above the mapping unit in the grouping—unit, subclass, and class.

The capability unit, sometimes called a management group, is the lowest level of grouping. A capability unit consists of soils that are similar in kind of management they need, in risk of damage, and in general suitability for use.

The next broader grouping, the subclass, is used to indicate the dominant kind of limitation. The letter symbol "e" means that the main limiting factor is risk of erosion if the plant cover is not maintained; "w" means that excess water retards plant growth or interferes with cultivation; and "s" shows that the soils are shallow, droughty, or unusually low in fertility.

The broadest grouping, the land class, is identified by Roman numerals. All the soils in one class have limitations and management problems of about the same degree, but they are of different kinds, as is shown by the subclass. All the land classes except class I may have one or more subclasses.

In classes I, II, and III are soils that are suitable for annual or periodic cultivation of annual or short-lived crops. Class I soils are those that have the widest range of use and the least risk of damage. They are level or nearly level, productive, well drained, and easy to work. They can be cultivated with almost no risk of erosion and will remain productive if managed with normal care.

Class II soils can be cultivated regularly, but they do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping; consequently, they need moderate care to prevent erosion;

others may be slightly droughty or slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly but have a narrower range of use. These soils need even more careful management than those in class II.

In class IV are soils that should be cultivated only occasionally or only under very careful management.

In classes V, VI, and VII are soils that normally should not be cultivated for annual or short-lived crops, but they can be used for pasture or range, as woodland, or for wildlife.

Class V soils (none in Lawrence County) are nearly level and gently sloping, but they are droughty, wet, low in fertility, or otherwise unsuitable for cultivation.

Class VI soils are not suitable for crops. They are steep, droughty, or otherwise limited, but they give fair yields of forage or forest products. Some soils in class VI can, without damage, be cultivated enough so that fruit trees or forest trees can be set out or pasture crops can be seeded.

Class VII soils provide only poor to fair yields of forage or forest products.

Class VIII (none in Lawrence County) are not suited for growing crops in commercial quantity. Some of the soils have value as watersheds, wildlife habitats, or recreation areas.

Capability classes and units in Lawrence County are given in the following list. In several of the subclasses, the capability units are not numbered consecutively because the system of symbols used is one that applies to the soils in several counties.

Class I.—Soils that have few limitations in use.
- I-1: Nearly level, well-drained alluvial soils on bottom lands or in depressions.

Class II.—Soils moderately limited for use as cropland.
- Subclass IIe: Gently sloping soils that will erode if cover is not maintained.
  - IIe-1: Well-drained alluvial soils on gentle slopes; subject to short periods of overflow.
  - IIe-2: Well-drained, light-colored sandy loams and fine sandy loams with permeable subsoils, on gentle slopes.
  - IIe-3: Well drained to moderately well drained soils on gentle slopes that developed from weathered, acid, interbedded shale and sandstone.
  - IIe-7: Well-drained reddish soils with permeable subsoils, on gentle slopes.
- Subclass IIw: Somewhat wet soils.
  - IIw-1: Somewhat poorly drained to moderately well drained, deep, permeable alluvial soils on first bottoms.
  - IIw-2: Moderately well drained friable soils with subsoils permeable to depths of 24 to 30 inches, on nearly level to gently sloping stream terraces.

Class III.—Soils severely limited for cropland but suitable for a regular cropping system.
- Subclass IIIe: Sloping soils that have a high risk of erosion when tilled.
  - IIIe-2: Well-drained friable, permeable, moderately deep to deep soils on sloping ridgetops, foot slopes, and high stream terraces.
  - IIIe-3: Moderately well drained to well drained, light-colored soils with friable surface soils and firm, compact subsoils.
  - IIIe-8: Well-drained friable reddish soils with firm subsoils, on rolling uplands and stream terraces.
  - IIIe-12: Slowly permeable, moderately shallow loams to silty clay loams with plastic clay subsoils, on gentle slopes.
- Subclass IIIw: Wet soils that can be cultivated if drained.
  - IIIw-1: Poorly drained, permeable, deep soils on nearly level slopes, subject to overflow.
  - IIIw-2: Somewhat poorly drained deep soils with plastic clay or pan subsoils, on nearly level to very gentle slopes.
  - IIIw-4: Very slowly permeable clayey soils on nearly level to gentle slopes, underlain by limestone at depths of 12 to 30 inches.
- Subclass IIIs: Soils with low capacity to hold moisture.
  - IIIs-2: Very rapidly permeable soil on very gently sloping natural levees, subject to overflow.

Class IV.—Soils fairly well suited to limited or occasional cultivation under careful management.
- Subclass IVe: Soils that have extreme risk of erosion if cultivated.
  - IVe-2: Well-drained, deep to moderately deep, firm, plastic red soils, on rolling slopes.
  - IVe-12: Shallow soils with very slowly permeable plastic clay subsoils.
- Subclass IVw: Wet soils that are difficult to farm.
  - IVw-2: Poorly drained soils with a pan or clay subsoil at depths of less than 30 inches, on nearly level slopes.

Class VI.—Soils not suitable for annual or short-lived crops and not more than moderately limited for use as pasture or woodland.
- Subclass VIe: Hilly soils too steep for cultivation.
  - VIe-2: Infertile acid soils with slopes ranging from 12 to 25 percent.

Class VII.—Soils severely limited if used for grazing land or woodland.
- Subclass VIIe: Shallow, steep or gullied soils.
  - VIIe-1: Shallow acid soils with rock outcrops on the surface.
  - VIIe-2: Shallow soils with many limestone rock outcrops, unsuitable for tillage.

Description of capability units

In this section each capability unit is described and the soils in it are listed. In addition, suggestions are given on how to use and manage the soils in each unit.

CAPABILITY UNIT I-1

Nearly level, well-drained alluvial soils on bottom lands or in depressions:

Abernathy silt loam, level phase.
Abernathy fine sandy loam, level phase.
Huntington silt loam.
Staser fine sandy loam.

These soils are in the Moulton and Tennessee Valleys, where they occupy 9,965 acres. The Abernathy soils

are flooded for short periods, but the Huntington and Staser soils are regularly flooded. All the soils are deep and permeable, and they show good tilth. They are moderately to highly fertile but require moderate quantities of fertilizers and organic matter for highest yields. The capacity to hold available moisture is moderate to high, and the reaction is acid to neutral. Cultivation is not difficult, because the plow layer is friable. Overflow is the main hazard along streams, but drainage is not required. Some areas can be helped by installation of diversion ditches. Erosion is not a problem.

Nearly all of this association is cultivated. The soils can be used intensively, and they are especially good for corn, soybeans, most hay and pasture plants, and legumes. In dry years good yields of cotton can be obtained if management is good, but yields are low in wet years. Small grains generally lodge, and rust is more common than on the higher lying soils. If fertility and organic matter are maintained, row crops can be grown several years in succession. A good sequence is row crops followed by a winter cover of vetch or by a small grain that is turned under the following spring.

The favorable supplies of moisture in dry weather make these soils suitable for improved pasture. Forage plants respond well to fertilizers and, in many places, to lime. Weeds are more of a problem than on uplands, and they should be controlled by periodic mowing.

The subsoil has favorable supplies of moisture and allows roots to grow deeply. Consequently, these soils are good for loblolly and shortleaf pines and for the commercially valuable hardwoods.

CAPABILITY UNIT IIe-1

Well-drained alluvial soils on gentle slopes, subject to short periods of overflow:

Abernathy silt loam, undulating phase.
Abernathy fine sandy loam, undulating phase.
Barbourville fine sandy loam.

These soils occupy 6,370 acres on Little Mountain and in the Tennessee Valley. They are fertile and medium to slightly acid, and they contain a moderate amount of organic matter. In addition, they are permeable, are easily worked, and have a medium to high capacity to hold available moisture.

The soils can be used intensively for many kinds of crops. Cotton and small grains can be grown with less risk than on soils of capability units I-1 and IIw-1. If runoff is controlled and winter legumes are grown and used as green manure, these soils can be used continually for row crops or for row crops grown in short rotations. Contour cultivation is generally adequate to control erosion, but in places terraces may be needed. The soils of this unit respond to fertilizer, and they need more lime than soils in capability unit I-1.

Good fertility and favorable supplies of moisture make these soils especially suitable for improved pasture. All of the more desirable legumes and grasses grow well. Alfalfa responds to additions of boron.

The deep root zone and favorable moisture make these soils good for pine and hardwood trees.

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CAPABILITY UNIT IIe-2

Well-drained, light-colored sandy loams and fine sandy loams with permeable subsoils, on gentle slopes:

Allen fine sandy loam, eroded undulating phase.
Hartsells fine sandy loam, eroded undulating phase.
Jefferson fine sandy loam, eroded undulating phase.
Linker fine sandy loam, eroded undulating phase.
Nolichucky fine sandy loam, eroded undulating phase.
Ruston sandy loam, undulating phase.
Sequatchie fine sandy loam, eroded undulating phase.
Sequatchie fine sandy loam, undulating phase.
Waynesboro fine sandy loam, eroded undulating phase.

The Sequatchie soils are on low stream terraces, but all others occupy high stream terraces and uplands. The total area in this capability unit is 12,028 acres. These soils are low in organic matter and fertility and are medium to strongly acid. They have a moderately deep to deep root zone and a high capacity to hold available moisture. The soils are easily worked, and tilth is hard to maintain only where the subsoil is exposed.

All these soils can be used fairly intensively. However, the soils are susceptible to erosion and should not be used for row crops more than 1 year in 2 or 3 years. All cultivation should be along the contour, and if row crops are grown frequently, the land should be terraced. The soils are suited to cotton, small grains, alfalfa, and many truck crops. Additions of organic matter and large quantities of fertilizer are regularly needed for highest yields of crops. Lime is needed for legumes. Boron improves alfalfa.

These soils are also good for pasture, if they are properly seeded and given fertilizer and lime. Dallisgrass, tall fescue, orchardgrass, whiteclover, and alfalfa grow well. Moisture is favorable for pasture, but it is not quite so abundant as in soils of capability units I-1, IIe-1, and IIw-1.

Soils of capability unit IIe-2 will grow loblolly and shortleaf pines and hardwoods. The terrain is favorable for tree planting and other forestry operations.

CAPABILITY UNIT IIe-3

Well drained to moderately well drained soils on gentle slopes that developed from weathered, acid, interbedded shale and sandstone:

Enders loam, eroded undulating phase.
Tilsit silt loam, undulating phase.
Tilsit silt loam, eroded undulating phase.

These soils occupy 23,754 acres on broad upland ridges, mainly on Little Mountain. Small areas are on Sand Mountain. The soils are not difficult to work, but they should not be tilled when too wet in places where the plow layer contains subsoil material. They are all low in plant nutrients and organic matter and are moderately to strongly acid. The surface soil and subsoil are moderately permeable. However, the firm, compact subsoil of the Enders and the pan of the Tilsit interfere with the penetration of roots and water. The capacity to hold available moisture is moderate.

Practically all of these soils on Little Mountain are

used for crops or pasture. They are not so productive and cannot be used so intensively as the soils in capability units I-1, IIe-1, and IIw-1. They respond to management and need large quantities of plant nutrients and organic matter for high productivity. The soils are well suited to corn, cotton, soybeans, and small grains. Row crops should be grown only 1 year in 2. All cultivation should be along the contour, and the stronger slopes ought to be terraced. The moderate slopes and the somewhat retarded infiltration and percolation of water make the control of runoff necessary.

These soils are good for hay and pasture. Fescue, orchardgrass, whiteclover, and common and sericea lespedeza are well suited. Moisture is somewhat limited, and the root zone is a little too shallow for alfalfa. Lime and a complete fertilizer are needed for high-yielding pastures, Alfalfa responds to boron.

The soils in this capability unit are good for loblolly and other species of pine. The terrain is favorable for tree planting and other forestry operations.

CAPABILITY UNIT IIe-7

Well-drained reddish soils with permeable subsoils, on gentle slopes:

Cumberland loam, undulating phase.
Cumberland loam, eroded undulating phase.
Decatur and Cumberland silt loams, undulating phases.
Decatur and Cumberland silty clay loams, eroded undulating phases.
Dewey cherty silty clay loam, eroded undulating phase.
Etowah loam, undulating phase.
Etowah loam, eroded undulating phase.
Etowah silt loam, undulating phase.
Etowah silty clay loam, eroded undulating phase.

This unit occupies 54,547 acres, mainly in the Tennessee and Moulton Valleys. The soils are deep to bedrock, which in most places is limestone. They are medium to strongly acid. Their capacity to hold available moisture is moderately high. These are some of the more fertile soils in the county, but they need complete fertilizers for sustained high yields of crops. They are somewhat more fertile than the soils in capability unit IIe-2, and the surface layer contains a little more organic matter. Good tilth is easily maintained, but tillage should not be attempted when the soils are wet.

These soils are mostly in cultivation. They are well suited to cotton, corn, soybeans, wheat, oats, alfalfa, and lespedeza. They respond to good management and can be used safely in 2- to 3-year crop rotations. Tilth, fertility, and the available moisture-holding capacity can be improved by adding organic matter through crop residues, barnyard manure, and green-manure crops. Crimson clover, vetch, Caley-peas, and button clover are good winter legumes and cover crops for maintaining organic matter and adding nitrogen. Cultivation should be along the contour; most of the land should be terraced. Cultivation on the stronger slopes should be avoided or held to a minimum to prevent erosion.

These soils are also well suited to hay and pasture if fertility is maintained at a high level. The more desirable grasses and legumes for pastures are dallisgrass, tall fescue, orchardgrass, and whiteclover. Lime is required for best growth of grasses and legumes; alfalfa requires boron.

The commercially valuable loblolly pine, yellow-poplar, and oaks grow well on these soils. However, little acreage is available for trees because the soils are highly valued for crops and pasture.

CAPABILITY UNIT IIw-1

Somewhat poorly drained to moderately well drained, deep, permeable alluvial soils on first bottoms:

Cotaco silt loam.
Hamblen fine sandy loam.
Lindside silty clay loam.
Ooltewah fine sandy loam.
Ooltewah silt loam.
Philo fine sandy loam.

These moderately fertile soils occupy 26,599 acres. The Hamblen, Lindside, and Philo soils are subject to stream overflow. For short periods, the Cotaco and Ooltewah soils may be covered by water from local runoff. Fertility and organic matter are moderate to low. The soils are strongly acid to neutral. Good tilth is easily maintained in most areas, but the finer textured Ooltewah and Lindside soils puddle easily if cultivated when wet.

These soils are not subject to erosion, but some bare areas may be scoured by floodwaters. Artificial drainage will improve the productivity of these soils and the range of crops that can be grown. Except for some of the finer textured Lindside and Ooltewah soils, all soils are sufficiently permeable to allow the use of tile drainage systems. However, drainage may not be practical for all areas.

These soils can be used intensively, but wetness limits the kinds of crops that can be grown. Corn, soybeans, most grasses, annual lespedeza, and alsike and red clovers are well suited to the soils. Alfalfa, sericea lespedeza, and orchardgrass are not suited. Cotton is not well suited. Small grains may be drowned by winter and spring overflows and are apt to lodge. The soils tend to be rather cold, and seed is usually slow in germinating. Tillage in spring may be delayed by wetness following rains. Under good management, the soils respond to fertilizers. The Lindside and Ooltewah soils may not respond to additional lime.

All of these soils are well suited to pasture because they have more available moisture in summer than most of the other better drained soils. On the silt loam soils, many of the more desirable grasses and legumes develop into good, easily maintained pastures.

The soils in this unit are also suited to many species of hardwood trees and to pine. Soils of this group that have a high water table are slightly less desirable for pine than the better drained soils.

CAPABILITY UNIT IIw-2

Moderately well drained friable soils with subsoils permeable to depths of 24 to 30 inches, on nearly level to gently sloping stream terraces:

Monongahela and Holston fine sandy loams, level phases.

Monongahela and Holston fine sandy loams, undulating phases.
Monongahela and Holston fine sandy loams, eroded undulating phases.

This unit occupies 4,839 acres in the Tennessee Valley. The soils are low in supplies of plant nutrients and organic matter and are medium to strongly acid. The capacity to hold available moisture is moderate. The Monongahela soils have a pan below depths of 24 to 30 inches that retards the movement of moisture and restricts the growth of roots. Where the pan is absent, the soils are better drained. The soils of this unit are easily worked, have good tilth that is not difficult to maintain, and are responsive to management.

The soils are suitable for corn, cotton, small grains, soybeans, grain sorghum, some truck crops, and most legumes used for hay and pasture. The better drained areas are suitable for alfalfa. Applications of large quantities of all plant nutrients and additions of organic matter are required to produce high yields of crops. The nearly level soils can be cultivated intensively. The stronger slopes should be terraced, cultivated along the contour, and used in 2- to 3-year rotations made up of row crops and close-growing crops.

Good pastures can be obtained if soil fertility is brought to a high level. Most grasses and legumes need complete fertilizers and periodic applications of lime. Alfalfa needs additional boron.

The characteristics of these soils make them suitable for trees. Depth of the root zone and the supply of moisture are more favorable for rapid tree growth than on most of the higher lying soils.

CAPABILITY UNIT IIIe-2

Well-drained friable, permeable, moderately deep to deep soils on sloping ridgetops, foot slopes, and high stream terraces:

Allen fine sandy loam, eroded rolling phase.
Allen fine sandy loam, rolling phase.
Hartsells fine sandy loam, rolling phase.
Hartsells fine sandy loam, eroded rolling phase.
Jefferson fine sandy loam, rolling phase.
Jefferson fine sandy loam, eroded rolling phase.
Linker fine sandy loam, rolling phase.
Linker fine sandy loam, eroded rolling phase.
Nolichucky fine sandy loam, eroded rolling phase.
Ruston sandy loam, rolling phase.
Ruston sandy loam, eroded rolling phase.

This unit occupies 21,329 acres. The soils are low in organic matter and plant nutrients and moderately to strongly acid. The capacity to hold available moisture is moderate, and the root zone is deep. Most of the acreage is used for crops and pasture.

These soils are suitable for corn, cotton, small grains, grass, and legumes. They should be kept in close-growing crops most of the time, and all tillage should be along the contour. The milder slopes should be terraced. The stronger slopes are too steep for terracing and should be stripcropped or kept in close-growing crops. The soils are responsive to management. High productivity is maintained by applying fertilizers that contain all plant nutrients and by adding organic matter.

Good pastures can be developed if soil fertility is maintained at a high level. Most grasses and legumes need fertilizer and periodic applications of lime. Alfalfa requires boron. The growing season is noticeably shorter on these soils than on deep soils with less slope.

Loblolly and other pines are suited to these soils. The site index for trees on soils of this unit, especially on the more sloping, shallower areas, is lower than on soils in capability units IIe-1, IIe-2, and IIw-1.

CAPABILITY UNIT IIIe-3

Moderately well drained to well drained, light-colored soils with friable surface soils and firm, compact subsoils:

Enders loam, rolling phase.
Enders loam, eroded rolling phase.
Tilsit silt loam, rolling phase.
Tilsit silt loam, eroded rolling phase.

This unit occupies 29,642 acres on the rolling slopes and ridges of Little Mountain. All these soils are low in plant nutrients and organic matter and are medium to strongly acid. The subsoils are moderately permeable. However, the compact subsoil of the Enders soils and the siltpan of the Tilsit interfere somewhat with the penetration of roots and water. The capacity of the soils of this unit to hold available moisture is moderate. The soils are fairly easily tilled, except on the stronger slopes. They should not be cultivated when wet, especially if the plow layer is mainly subsoil. Most of the acreage is cultivated or in pasture; a small area is in cutover deciduous forest.

The soils are suitable for small grains, grasses, and legumes and occasionally can be used for corn and cotton. If fertilizers are applied and organic matter is added to the soils, good yields can be obtained. Because of the moderately strong slopes, impaired permeability, and fairly shallow depth, these soils require long rotations. As a rule, row crops should be grown no more than 1 year in 3 or 4 years. All cultivation should be along the contour, and the deeper soils on milder slopes should also be terraced to control runoff. Terracing is not practical for the shallow soils on strong slopes.

These soils produce fairly good pastures if properly seeded, fertilized, and limed. Sericea lespedeza, grown alone or with grasses, is one of the more desirable pasture plants. The carrying capacity of pastures in the drier months of the growing season is less than that of the deeper and less sloping soils.

All of these soils are fairly good for the commercially valuable pines and hardwoods. Trees do not grow so rapidly on these soils as on the deeper, less sloping soils.

CAPABILITY UNIT IIIe-8

Well-drained friable reddish soils with firm subsoils, on rolling uplands and stream terraces:

Baxter cherty silt loam, eroded rolling phase.
Cumberland loam, eroded rolling phase.
Decatur and Cumberland silty clay loams, eroded rolling phases.
Decatur and Cumberland silty clays, severely eroded undulating phases.
Dewey cherty silty clay loam, eroded rolling phase.
Etowah silty clay loam, eroded rolling phase.

This unit is widely distributed in the Moulton and the Tennessee Valleys, where it occupies 7,589 acres. The soils are moderately fertile, medium to strongly acid, and permeable to roots and moisture. Root zones are deep, and the capacity to hold available moisture is moderate. These soils contain a little more organic matter than those in capability units IIIe-2 and IIIe-3. Tillage under ordinary conditions is fairly easy, except where the plow layer consists mainly of subsoil. These soils, however, should not be tilled when wet. Chert in the Dewey and Baxter soils interferes with cultivation. Most of the soils are in crops or pasture.

These soils are suited to nearly all commonly grown crops, including cotton and alfalfa. Because these soils tend to erode, row crops should not be grown more than 1 year in 4. All cultivation should be along the contour. Terracing and stripcropping help control runoff, but terraces are not practical on the stronger slopes. These soils require fertilizer and organic matter for highest yields of crops. Lime should be applied at regular intervals to plants that have a high lime requirement. The response to management is good, and high yields can be maintained with less difficulty than on soils in capability units IIIe-2 and IIIe-3.

When properly seeded, limed, and fertilized, these soils are good for pasture. Sericea lespedeza, grown alone or with grasses, is one of the more desirable pasture plants. Dallisgrass, fescue, and whiteclover are also desirable for these soils.

These soils are also good sites for loblolly and shortleaf pines, oak, and yellow-poplar.

CAPABILITY UNIT IIIe-12

Slowly permeable, moderately shallow loams to silty clay loams with plastic clay subsoils, on gentle slopes:

Colbert silt loam, undulating phase.
Colbert silty clay loam, eroded undulating phase.
Colbert silt loam, level phase.
Colbert cherty silt loam, eroded undulating phase.
Colbert loam, undulating phase.
Colbert loam, eroded undulating phase.
Lawrence and Colbert silt loams, undulating phases.
Lawrence and Colbert silty clay loams, eroded undulating phases.
Talbott silt loam, undulating phase.
Talbott silty clay loam, eroded undulating phase.
Talbott loam, eroded undulating phase.

This capability unit is mainly in Moulton Valley and on Little Mountain. Its total area is 32,429 acres. The soils are moderate to low in plant nutrients and organic matter and are medium to strongly acid. Most of the soils are droughty because their capacity to hold available moisture is low. Talbott soils and the undifferentiated Lawrence and Colbert soils are somewhat better for cultivation, as they are not quite so shallow to the plastic clay and to bedrock. The deeper, less eroded areas of this unit are used for crops; most of the rest is in pasture. A small acreage is in cutover hardwood forest.

The soils in this unit are suitable for cultivation, but slopes and shallowness to the plastic clay subsoil limit their productivity. In addition, they are susceptible to erosion if cultivated. They do not respond to management so well as the more loamy soils, but their productivity can be improved by adding organic matter and large quantities of fertilizer. Small grains, legumes, and grasses are best suited to these soils. If properly managed, much of the acreage is moderately good for corn, cotton, and grain sorghum. Row crops should be grown 1 year in 4 in rotation with close-growing crops.

Good pastures can be maintained if management is good. The grazing season is shorter than on the more permeable soils because moisture supplies are less. Lime is required for the more desirable legumes and grasses; alfalfa responds to additional boron.

These soils are not good for pine; they are too shallow and droughty. Cedar is best suited, especially on the shallower and more stony soils.

CAPABILITY UNIT IIIw-1

Poorly drained, permeable, deep soils on nearly level slopes, subject to overflow:

Atkins silt loam.
Melvin silt loam.
Prader silt loam.

These soils are widely distributed over the county. They occupy 19,708 acres of low bottom lands along creeks. The water table is at or near the surface much of the time, except late in summer and early in fall. The Melvin and Prader soils are moderately fertile and slightly acid to slightly alkaline. The Atkins soil is low in fertility and medium to strongly acid. Under natural conditions, the soils of this unit are not suitable for cultivation. Bare soil in a few areas is susceptible to erosion by floodwaters. Most of the acreage is used for pasture; the rest is in hardwood forest or is used for crops.

If these soils are well drained by use of tile, they are good for corn, soybeans, grain sorghum, grass, and legumes. In addition, small grains can be grown on drained areas not subject to flooding. Alfalfa and cotton are not suited. The drainage of surface water by ditches generally improves the soils enough to make them good for pasture. The best plants for pasture are fescue, bluegrass, and whiteclover. Pastures on the Atkins soil need lime and fertilizer.

These soils are not suited to loblolly and shortleaf pines. They are suited to sweetgum and several species of water-loving oaks.

CAPABILITY UNIT IIIw-2

Somewhat poorly drained deep soils with plastic clay or pan subsoils, on nearly level to very gentle slopes:

Johnsburg loam.
Tupelo loam.
Tupelo silt loam.
Tyler fine sandy loam.
Tyler and Monongahela fine sandy loams, level phases.
Tyler and Monongahela fine sandy loams, undulating phases.
Tyler and Monongahela fine sandy loams, eroded undulating phases.

These soils occupy 14,450 acres, mainly in the Ten-

nessee and Moulton Valleys. A small area of Johnsburg soil is on Little Mountain. All of these soils are low in plant nutrients and organic matter, and they are medium to strongly acid. Their capacity to hold available moisture is only moderate, but the high water table is a fairly good source of moisture for crops during much of the growing season.

Permeability is moderately slow in the subsoils. Tupelo soils have a plastic clay subsoil at a depth of about 12 inches. The other soils in most places have a moderate pan at depths ranging from 14 to 28 inches. Good tilth is not difficult to maintain, but heavy rains or prolonged wetness limit the periods in which these soils can be worked. During the wet season, from December 15 to April 15, the water table for much of the acreage of these soils (except the Monongahela) is within 6 to 18 inches of the surface. Most of the acreage is used for crops and pasture.

These soils can be used intensively, but their somewhat poor drainage limits the crops that can be grown. Corn, soybeans, and grain sorghum are the row crops best suited to these soils. Small grains are also suited, but in winter they may be damaged by excessive water on the lower lying soils. Drainage improves the response of these soils to fertilizers and their suitability for crops.

Because of the favorable moisture supply, fescue, lespedeza, and whiteclovers are suitable pasture plants. Most legumes respond to additions of lime.

These soils are suited to loblolly and shortleaf pines. The smooth surface of these soils is favorable for forestry operations.

CAPABILITY UNIT IIIw-4

Very slowly permeable clayey soils on nearly level to gentle slopes, underlain by limestone at depths of 12 to 30 inches:

Dowellton silty clay loam.
Hollywood silty clay.

The soils of this capability unit have a total area of 11,459 acres; they are mainly in Moulton Valley. The plow layer and subsoil are tough and plastic. The capacity to hold available moisture is low; consequently, the soils are droughty. The Hollywood soil is slightly acid to slightly alkaline; the Dowellton is medium to strongly acid. The Hollywood soil contains more organic matter and is more fertile than the Dowellton. Clay in the plow layer and the shortage of available moisture limit the suitability of these soils for cultivation. The Dowellton soil is in pasture and in cutover hardwood forest. Most of the Hollywood soil is used for pasture or crops.

If given adequate amounts of lime, fertilizer, and organic matter, these soils are fairly well suited to small grains, Caley-peas, grain sorghum, and sericea lespedeza. High yields cannot be expected, especially from the Dowellton soil. Most of Hollywood soil is suitable for pasture consisting of grass and whiteclover. Improved drainage will benefit some areas of this capability unit.

Because of shallowness and the plastic subsoil, these soils are not good for loblolly pine and yellow-poplar.

CAPABILITY UNIT IIIs-2

Very rapidly permeable soil on very gently sloping natural levees, subject to overflow:

Bruno loamy fine sand.

The area of this unit is 1,075 acres. The soil is medium acid and very low in plant nutrients and organic matter. It is easily worked and can be tilled when wet. The capacity to hold available moisture is very limited. Water erosion is not a hazard, but the soil blows easily when bare. Floodwaters may erode the soil by scouring or by causing the banks to cave.

This soil is not well suited to many crops; it is droughty and loses plant nutrients rapidly. It is fairly well suited to melons, if it is irrigated and receives special fertilizers. This soil is suitable for strawberries, early potatoes, beans, sweet corn, and other early maturing truck crops. Good yields depend on heavy and frequent applications of a complete fertilizer. Narrow-tired farm implements are difficult to handle in this sandy soil.

This soil is not very good for pasture, as a good stand of grasses and clovers is difficult to maintain. For best growth, clover and other legumes should be given lime. Bermudagrass produces a good cover in most places but has moderate value for pasture.

Most of this unit is moderately good for sycamore, other hardwoods, and possibly pine. Tree roots should be able to penetrate the dry, permeable layers and reach the moist soil at depths of several feet.

CAPABILITY UNIT IVe-2

Well-drained, deep to moderately deep, firm, plastic red soils, on rolling slopes:

Allen clay loam, severely eroded rolling phase.
Decatur and Cumberland silty clays, severely eroded rolling phases.
Decatur and Cumberland silty clays, gullied phases.
Linker clay loam, severely eroded rolling phase.
Waynesboro clay loam, severely eroded rolling phase.

The total area of this unit is about 8,577 acres. The soils are medium to strongly acid, droughty, and not very fertile. They are moderately permeable and have a low capacity to hold available moisture. The amount of organic matter is low. Gullies are common. In the past, all the soils have been in cultivation, but most of them are now in pasture or are idle. Some of the acreage is cultivated along with the associated soils.

These soils are poorly suited to cultivation. In areas that are used for tilled crops, the supplies of plant nutrients and organic matter should be improved and terraces built. Tillage should be along the contour, and the drainageways should be kept in permanent sod. Long rotations consisting of small grains, hay, and pasture are preferred on these soils. If adequately fertilized and properly seeded, most of the acreage would be best suited to permanent pasture.

The more severely eroded areas of these soils should be in forests. Pines and hardwoods grow well. Kudzu will stabilize the soils and will provide forage if grazing is carefully managed.

CAPABILITY UNIT IVe-12

Shallow soils with very slowly permeable plastic clay subsoils:

Colbert silt loam, rolling phase.
Colbert silty clay loam, eroded rolling phase.
Colbert cherty silt loam, rolling phase.
Colbert loam, rolling phase.
Colbert loam, eroded rolling phase.
Lawrence and Colbert silt loams, rolling phases.
Lawrence and Colbert silty clay loams, eroded rolling phases.
Talbott silty clay loam, eroded rolling phase.
Talbott loam, eroded rolling phase.
Talbott silty clay, severely eroded undulating phase.
Talbott silty clay, severely eroded rolling phase.

This unit occupies 11,743 acres. Most of the Colbert and Talbott soils are along the southern edge of the Tennessee Valley and in Moulton Valley. The undifferentiated units of Lawrence and Colbert soils are along the southern edge of Little Mountain. Supplies of plant nutrients and organic matter are low, and the reaction is medium to strongly acid. The soils are droughty, as their capacity to hold available moisture is low. Most of the acreage is used for crops and pasture; some is in cutover hardwood forest.

These soils are not suitable for row crops, chiefly because of slopes, shallowness, and slow permeability. If they are cultivated, they should be used for small grains, hay, and pasture in 5- to 6-year rotations. These soils require fertilizer and lime, but they do not respond to these amendments so well as the deeper, more loamy soils. They are not suitable for terracing, because they are shallow and have plastic subsoils. All cultivation should be along the contour. Much of the acreage should be in permanent pasture. Legumes and grasses are suitable pasture plants.

These soils are not very good for pine because they are shallow, have plastic subsoils, and hold a small amount of moisture for plants.

CAPABILITY UNIT IVw-2

Poorly drained soils with a pan or clay subsoil at depths of less than 30 inches, on nearly level slopes:

Dunning silty clay.
Lickdale silt loam.
Robertsville silt loam.

The soils in this unit occur as small areas in association with level to undulating better drained soils. The total area of the unit is 28,766 acres. The Dunning soil has a plastic clay subsoil. It has slow permeability at a shallow depth. It is moderately fertile, slightly alkaline, and subject to overflow. The Robertsville soil is permeable to depths of 10 to 20 inches, below which it is very slowly permeable. It has a compact layer at a depth of less than 30 inches. It is low in fertility and organic matter and is medium to strongly acid. Although not subject to overflow, water stands on it during the wetter parts of the year. The Lickdale soil is similar to the Robertsville soil in reaction, fertility, and permeability.

Much of the acreage is used for pasture, but some of it is in hardwood forest. A small part is in cultivation, but yields from most crops are low.

Drainage improves these soils for crops and pasture. However, deep drainage by use of tile may be difficult because of the slowly permeable subsoil. Areas that can be drained adequately for cultivation are suitable for corn, soybeans, and grain sorghum. The planting, tilling, and harvesting of crops on these soils will often be delayed by wetness.

These soils can be adequately improved for pasture by use of drainage ditches. Such drainage makes these soils suitable for fescue and whiteclover. Proper seeding and the addition of plant nutrients and lime are needed to develop good forage. The carrying capacity is low during dry parts of the growing season, but drainage makes the soils less droughty by increasing the depth of the root zone.

In their natural poorly drained condition, these soils are not good for pine. The gums and water-tolerant oaks are suited to these conditions.

CAPABILITY UNIT VIe-2

Infertile acid soils with slopes ranging from 12 to 25 percent:

Allen fine sandy loam, eroded hilly phase.
Baxter cherty silt loam, hilly phase.
Colbert silty clay loam, eroded hilly phase.
Colbert loam, hilly phase.
Jefferson fine sandy loam, eroded hilly phase.
Linker fine sandy loam, eroded hilly phase.
Muskingum fine sandy loam, hilly phase.
Pottsville shaly silt loam, hilly phase.

The soils of this capability unit have a total area of 12,116 acres. They are widely distributed over the county. All the soils are low in plant nutrients and organic matter, and they are medium to strongly acid. The Allen, Jefferson, and Linker soils are friable, permeable, and moderately deep to bedrock. The Baxter soil is cherty, has a cherty silty clay subsoil, and is deep to bedrock. The Muskingum and Pottsville soils are friable and shallow to bedrock. The Colbert soils have a plastic clay subsoil and are shallow to limestone bedrock. The capacity of the soils of this unit to hold available moisture generally varies with depth to bedrock. The Baxter soil has the greatest capacity to hold moisture, and Colbert soils the least.

Some of the acreage in this unit is cultivated. The acreage in pasture and cutover forest is concentrated in the southern quarter of the county.

Much of this capability unit can be kept in productive pastures if the plant cover prevents erosion. Productivity is limited, however, by capacity of the soils to hold available moisture. The Pottsville and Colbert soils are the most droughty. However, a good stand of grass is more easily maintained on the Colbert than on other soils, although it becomes dormant early in the dry season. Common and sericea lespedeza, fescue, whiteclover, and dallisgrass are among the better plants for pasture. Adequate quantities of fertilizer and lime are needed to establish and maintain good pastures.

All these soils except the Colbert are suitable for loblolly and shortleaf pines. The Colbert soils are more suitable for cedar, walnut, oak, and hickory.

CAPABILITY UNIT VIIe-1

Shallow acid soils with rock outcrops on the surface:

Gullied land, sandstone, material.
Muskingum stony fine sandy loam, hilly phase.
Muskingum stony fine sandy loam, steep phase.
Pottsville shaly silt loam, steep phase.
Stony steep land, Muskingum soil material.

These soils occur mainly in the southern one-fourth of the county, but some of the acreage is on Little Mountain. This is the most extensive capability unit in the county. The total area is 80,480 acres. Most of the acreage is in cutover forest made up of hardwoods intermixed with pine. A small acreage on the milder slopes is in pasture.

These soils are not suited to cultivation, and only the milder slopes are suitable for pasture. To develop and maintain a good stand of forage plants and to prevent erosion, the soil should be limed, fertilized, properly seeded, and carefully managed. Grazing should be controlled to avoid damage to the pasture.

Most of this unit should be used for forestry. The soils are suitable for loblolly and shortleaf pines, but their rate of growth varies according to the direction of slope. The north-facing slopes and those of low elevation are fairly good sites for trees. The south-facing slopes are dry and, consequently, poor for most trees. Virginia pine is suited to the deeper, moist draws. Oak and hickory are suited to all but the driest sites. Forestry operations are more difficult on the stony steep soils than on less stony, more mildly sloping soils.

CAPABILITY UNIT VIIe-2

Shallow soils with many limestone rock outcrops, unsuitable for tillage:

Rockland, limestone, rolling.
Rockland, limestone, steep.
Stony rolling land, Talbott and Colbert soil materials.

The total area of this capability unit is 21,575 acres. Stony rolling land, Talbott and Colbert soil materials, contains enough soil to be moderately good for permanent pasture. However, the material is clayey and shallow to limestone bedrock, and it has a low capacity for holding available moisture. Much of it provides good grazing only during the wet parts of the growing season.

Under virgin conditions both rolling and steep Rockland limestone support dense stands of cedar and little grass. Most of the cedar has been severely cut over, and the rate of growth is slow. Some areas contain hardwood trees. These land types are best suited to cedar forest.

Estimated Yields

The estimated average yields that can be expected from the principal crops grown on soils of Lawrence County, under two levels of management, are given in table 2. The estimates shown are based mainly on information gathered through interviews with farmers, county agricultural workers, and others who have observed yields. The yields are as accurate as can be given without detailed and lengthy search of production records; they indicate the relative productivity of soils shown on the soils map.

Yields in columns A were obtained under the management that prevails on most farms. The yields in columns B were obtained under improved management. This includes the use of suitable plant varieties or hybrid seeds, recommended rates of fertilization based on soil tests, proper preparation of seedbed and cultivation, and the application of insecticides to control insects.

TABLE 2.—*Estimated average acre yields of principal crops*

[Yields in columns A are those to be expected over a period of years under common management practices; those in columns B, under improved management. Absence of yield indicates crop is seldom, if ever, grown, or that the soil is not suited to its production]

Soil	Corn		Cotton (lint)		Wheat		Oats		Lespedeza		Alfalfa		Potatoes		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Lbs.*	*Lbs.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Ton*	*Ton*	*Ton*	*Ton*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Abernathy silt loam:																
Level phase	40	70	300	500	12	20	33	50	1.3	1.8	3.1	4.0	130	190	160	240
Undulating phase	37	67	300	500	13	22	34	52	1.3	1.8	3.1	4.0	130	190	160	240
Abernathy fine sandy loam:																
Level phase	30	60	300	500	12	22	35	50	1.1	1.7	2.8	3.6	120	190	145	215
Undulating phase	30	60	300	500	13	23	35	52	1.1	1.7	2.8	3.6	120	190	140	210
Allen fine sandy loam:																
Eroded undulating phase	25	49	310	520	16	23	28	50	.6	1.4	2.1	3.2	80	120	80	160
Rolling phase	24	47	300	500	15	21	26	48	.5	1.3	2.0	3.1	75	110	75	150
Eroded rolling phase	23	47	300	490	15	20	25	48	.5	1.3	2.0	3.1	75	110	70	150
Eroded hilly phase	19	42	270	450	13	17	24	46	.5	1.2	-----	2.8	70	110	60	140
Allen clay loam, severely eroded rolling phase	13	30	150	350	6	18	12	30	.3	.7	1.2	2.0	-----	-----	40	130
Atkins silt loam [2]	-----	50	-----	-----	-----	-----	-----	-----	.6	1.4	-----	-----	-----	-----	80	200
Barbourville fine sandy loam	27	60	380	600	16	23	28	52	.9	1.6	1.9	3.2	155	200	70	170
Baxter cherty silt loam:																
Eroded rolling phase	20	38	290	480	14	18	25	46	.5	1.2	-----	2.8	70	110	60	140
Hilly phase	15	36	280	450	12	16	23	45	.5	1.3	-----	2.7	65	110	55	135
Bruno loamy fine sand	25	45	-----	-----	11	16	20	30	1.0	1.4	-----	-----	75	160	80	125

See footnotes at end of table.

TABLE 2.—*Estimated average acre yields of principal crops*—Continued

Soil	Corn		Cotton (lint)		Wheat		Oats		Lespedeza		Alfalfa		Potatoes		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Lbs.*	*Lbs.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Ton*	*Ton*	*Ton*	*Ton*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Colbert silt loam:																
Undulating phase	15	35	200	340	11	20	21	40	.6	1.0	1.3	2.5			70	130
Level phase	17	38	160	350	12	22	20	45	.7	1.2					75	140
Rolling phase	12	32	170	330	9	18	20	38	.5	1.0	1.2	2.4			60	120
Colbert silty clay loam:																
Eroded undulating phase	12	32	170	330	9	18	18	38	.5	1.0	1.2	2.4			60	120
Eroded rolling phase	10	25	140	300	7	14	17	32	.4	.9	1.1	2.2			50	100
Eroded hilly phase	9	23	130	280	6	12	15	30	.3	.8	1.0	2.0			45	90
Colbert cherty silt loam:																
Eroded undulating phase	10	35	140	300	7	14	12	30	.3	.8		2.2			50	110
Rolling phase	12	32	170	330	9	18	16	30	.4	.9	1.2	2.4			60	120
Colbert loam:																
Undulating phase	17	39	220	360	12	21	23	42	.6	1.1	1.3	2.5			70	130
Eroded undulating phase	12	32	180	340	10	19	18	39	.5	1.0	1.2	2.4			60	120
Rolling phase	14	34	190	340	10	19	21	39	.5	1.0	1.2	2.4			65	125
Eroded rolling phase	12	30	165	320	8	16	19	36	.4	.9	1.1	2.3			50	100
Hilly phase	11	28	160	310	8	15	18	35	.4	.9	1.0	2.2			50	100
Cotaco silt loam	25	58							.5	1.2					50	170
Cumberland loam:																
Undulating phase	32	55	380	580	20	27	35	57	.8	1.7	3.0	3.5	85	130	95	190
Eroded undulating phase	28	50	350	550	18	25	30	55	.8	1.6	2.8	3.4	80	120	90	175
Eroded rolling phase	24	47	300	510	15	23	27	48	.7	1.5	2.4	3.2	65	110	80	160
Decatur and Cumberland silt loams, undulating phases	32	55	380	580	20	27	35	57	.8	1.7	3.0	3.5	85	130	95	190
Decatur and Cumberland silty clay loams:																
Eroded undulating phases	28	50	350	550	18	25	30	55	.8	1.7	2.8	3.4	80	120	90	175
Eroded rolling phases	23	48	310	510	15	23	27	50	.7	1.5	2.4	3.2	65	110	80	165
Decatur and Cumberland silty clays:																
Severely eroded undulating phases	14	33	170	370	6	19	12	30	.3	.8	1.2	2.1			50	140
Severely eroded rolling phases	13	30	160	360	6	18	12	30	.3	.7	1.2	2.0			50	135
Gullied phases		28		350		17		28		.7		2.0				130
Dewey cherty silty clay loam:																
Eroded undulating phase	26	48	330	500	16	23	28	50	.7	1.5	2.1	3.2	75	115	80	160
Eroded rolling phase	21	44	300	490	14	20	25	48	.6	1.3	2.0	3.0	65	110	65	150
Dowellton silty clay loam	12	33	160	350	12	22	20	43	.4	.8					75	140
Dunning silty clay	22	40							.7	1.5					120	200
Enders loam:																
Rolling phase	20	40	220	400	9	18	22	42	.6	1.3	1.1	2.3		105	50	120
Eroded rolling phase	18	36	200	385	8	16	20	38	.5	1.2	1.0	2.1		95	45	115
Eroded undulating phase	21	42	220	420	10	18	23	44	.6	1.3	1.2	2.5	75	120	50	125
Etowah silt loam, undulating phase	30	60	350	550	18	25	32	55	.7	1.8	2.8	3.5	85	135	100	200
Etowah silty clay loam:																
Eroded undulating phase	28	58	350	550	17	25	30	53	.7	1.8	2.7	3.4	80	130	90	190
Eroded rolling phase	22	48	300	490	14	21	24	48	.6	1.4	2.2	3.1	65	110	75	155
Etowah loam:																
Undulating phase	30	60	350	550	17	24	30	53	.7	1.8	2.7	3.4	80	130	90	190
Eroded undulating phase	28	58	330	530	17	24	29	50	.7	1.8	2.6	3.3	80	130	85	185
Gullied land, sandstone material																
Hamblen fine sandy loam	30	60	200	480			30	50	1.2	1.8					125	190
Hartsells fine sandy loam:																
Eroded undulating phase	26	49	380	600	15	22	25	50	.8	1.5		2.8	150	200	55	150
Rolling phase	25	47	315	530	12	20	23	45	.7	1.3		2.6	135	190	45	140
Eroded rolling phase	24	46	310	510	12	20	23	45	.7	1.2		2.5	130	185	45	135
Hollywood silty clay	30	45		300	15	30	30	60	.5	1.0					100	180
Huntington silt loam	40	70	300	500	10	20	40	50	1.3	1.8	3.1	4.0	130	190	160	240
Jefferson fine sandy loam:																
Eroded undulating phase	24	45	320	520	14	21	26	50	.5	1.3	1.8	2.9	75	120	75	155
Rolling phase	22	42	290	500	13	19	24	46	.5	1.2	1.6	2.7	70	110	70	145
Eroded rolling phase	22	42	290	500	13	19	24	46	.5	1.2	1.6	2.7	70	105	65	145
Eroded hilly phase	17	40	260	440	12	16	22	44	.4	1.1		2.6	65	100	55	140
Johnsburg loam	22	46	280	480	12	22	24	46	.7	1.6			70	140	70	140
Lawrence and Colbert silt loams:																
Undulating phases	20	42	200	400	13	22	24	44	0.7	1.1	1.5	2.7			75	140
Rolling phases	12	32	170	330	9	18	20	38	.5	1.0	1.2	2.4			60	120
Lawrence and Colbert silty clay loams:																
Eroded undulating phases	15	36	180	360	10	19	20	40	.6	1.0	1.3	2.5			65	125
Eroded rolling phases	11	26	150	310	8	15	18	34	.5	.9	1.2	2.3			50	100
Lickdale silt loam [2]		40				20		38	.3	1.1					50	140
Lindside silty clay loam	40	70		400		18		48	1.4	1.8					170	240

See footnotes at end of table.

TABLE 2.—*Estimated average acre yields of principal crops*—Continued

Soil	Corn		Cotton (lint)		Wheat		Oats		Lespedeza		Alfalfa		Potatoes		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Lbs.*	*Lbs.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Ton*	*Ton*	*Ton*	*Ton*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Linker fine sandy loam:																
Eroded undulating phase	27	49	380	600	15	22	26	52	.8	1.5	----	3.0	150	200	60	150
Rolling phase	26	48	315	530	13	21	25	47	.7	1.4	----	2.9	135	195	55	145
Eroded rolling phase	24	46	310	510	14	21	25	47	.7	1.3	----	2.9	130	190	50	140
Eroded hilly phase	19	42	290	480	13	17	24	46	.5	1.2	----	2.8	90	130	45	145
Linker clay loam, severely eroded rolling phase	17	42	280	480	11	17	22	46	.3	1.2	----	2.8	60	130	40	145
Melvin silt loam [2]	----	55	----	----	----	----	----	----	.7	1.5	----	----	----	----	90	220
Monongahela and Holston fine sandy loams:																
Undulating phases	24	45	320	520	16	21	27	50	.6	1.4	1.8	2.9	80	120	75	155
Eroded undulating phases	24	45	320	520	16	21	27	50	.6	1.4	1.8	2.9	80	120	75	155
Level phases	27	50	340	520	18	25	30	55	.7	1.5	1.9	3.0	85	125	80	160
Muskingum fine sandy loam, hilly phase	15	30	165	330	7	13	18	34	.4	1.0	----	----	----	----	35	120
Muskingum stony fine sandy loam:																
Hilly phase	----	----	----	----	----	----	----	----	----	----	----	----	----	----	30	110
Steep phase	----	----	----	----	----	----	----	----	----	----	----	----	----	----	20	65
Nolichucky fine sandy loam:																
Eroded undulating phase	25	47	300	510	15	22	25	48	.6	1.4	2.1	3.0	70	120	65	150
Eroded rolling phase	24	45	280	440	12	20	23	45	.5	1.1	----	2.8	65	110	55	135
Ooltewah silt loam [2]	40	70	----	400	----	18	----	48	1.4	1.8	----	----	----	----	170	240
Ooltewah fine sandy loam [2]	30	60	----	400	10	20	34	48	1.1	1.7	----	----	----	----	145	215
Philo fine sandy loam [2]	30	55	----	----	----	----	----	----	.7	1.5	----	----	----	----	100	210
Pottsville shaly silt loam:																
Hilly phase	15	30	165	330	7	13	18	34	.3	1.0	----	----	----	----	40	125
Steep phase	----	----	----	----	----	----	----	----	----	----	----	----	----	----	30	100
Prader silt loam [2]	----	50	----	----	----	----	----	----	.6	1.4	----	----	----	----	80	200
Robertsville silt loam [2]	----	45	----	----	----	30	----	45	.4	1.4	----	----	----	----	60	150
Rockland, limestone:																
Rolling	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Steep	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Ruston sandy loam:																
Undulating phase	20	35	300	450	10	16	20	38	.5	1.0	----	----	65	110	40	100
Rolling phase	18	32	280	430	9	15	18	32	.5	1.0	----	----	60	100	40	100
Eroded rolling phase	18	32	280	430	9	15	18	32	.5	1.0	----	----	60	100	40	100
Sequatchie fine sandy loam:																
Undulating phase	27	60	350	550	18	25	30	55	.8	1.5	2.1	3.5	120	185	90	170
Eroded undulating phase	27	60	350	550	18	25	30	55	.8	1.5	2.1	3.5	120	185	90	170
Staser fine sandy loam	32	58	300	500	13	22	34	48	.8	1.5	2.7	3.6	110	190	100	190
Stony rolling land, Talbott and Colbert soil materials	----	----	----	----	----	----	----	----	----	----	----	----	----	----	40	75
Stony steep land, Muskingum soil material	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Talbott silt loam, undulating phase	20	42	260	450	16	32	28	47	.7	1.3	1.9	2.8	75	115	80	170
Talbott silty clay loam:																
Eroded undulating phase	18	38	240	410	15	21	27	45	.6	1.2	1.8	2.6	----	----	70	145
Eroded rolling phase	15	34	200	340	13	18	23	40	.4	1.0	1.5	2.1	----	----	60	125
Talbott silty clay:																
Severely eroded undulating phase	11	23	85	230	5	11	11	22	.3	.7	----	1.6	----	----	35	75
Severely eroded rolling phase	10	20	80	220	5	11	10	20	.3	.6	----	1.5	----	----	30	65
Talbott loam:																
Eroded undulating phase	20	40	250	420	16	22	28	47	.6	1.2	1.9	2.7	----	----	75	150
Eroded rolling phase	16	35	210	350	14	19	25	42	.5	1.1	1.6	2.2	----	----	65	130
Tilsit silt loam:																
Undulating phase	28	55	420	580	15	22	22	42	.8	1.5	2.1	3.1	120	190	75	160
Eroded undulating phase	28	55	420	580	15	22	22	42	.8	1.5	2.1	3.1	120	190	75	160
Rolling phase	23	48	360	500	12	18	20	40	.7	1.3	1.9	2.9	100	175	65	145
Eroded rolling phase	22	46	350	480	11	17	18	37	.7	1.2	1.8	2.8	----	----	65	140
Tupelo silt loam	15	35	200	400	9	18	18	40	.7	1.2	----	----	----	----	70	130
Tupelo loam	25	45	250	500	10	20	20	42	.8	1.4	----	----	----	----	80	160
Tyler fine sandy loam [2]	----	45	----	----	----	23	----	42	.7	1.4	----	----	----	----	30	140
Tyler and Monongahela fine sandy loams:																
Level phases	18	40	----	350	8	18	24	46	.6	1.3	----	----	----	----	70	150
Undulating phases	18	40	----	350	8	18	24	46	.6	1.3	----	----	----	----	70	150
Eroded undulating phases	17	38	----	340	7	18	22	46	.6	1.3	----	----	----	----	65	145
Waynesboro fine sandy loam, eroded undulating phase	26	49	320	530	17	24	29	50	.7	1.5	2.3	3.2	80	125	80	160
Waynesboro clay loam, severely eroded rolling phase	13	28	155	350	6	17	12	28	.3	.7	1.1	1.9	----	----	45	130

[1] Cow-acre-days is the number of days 1 acre will graze a cow of mature age without injury to the pasture.

[2] Yields for these soils in columns B apply if the soils are adequately drained.

Soils of Lawrence County

This section tells how soils are mapped and described, points out the physiographic relations of the soil series, and provides a detailed description of all soils mapped in the county.

Soil Survey Methods and Definitions

The scientist who makes a soil survey examines soils in the field, classifies the soils in accordance with facts that he observes, and maps their boundaries on an aerial photograph or other map.

FIELD STUDY.—The soil surveyor bores or digs many holes to see what the soils are like. The holes are not spaced in a regular pattern but are located according to the lay of the land. Usually they are not more than a quarter of a mile apart and sometimes they are much closer. In most soils such a boring or hole reveals several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from others in the profile and to learn the things about this soil that affect its capacity to support plant growth. The following are among the more important soil characteristics:

Color is usually related to the amount of organic matter. The darker the surface soils, as a rule, the more organic matter they contain. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration.

Texture, or the content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers. It is later checked by laboratory analysis. Texture determines how well the soil retains moisture, plant nutrients, and fertilizer, and whether it is easy or difficult to cultivate. A coarse-textured soil is one high in content of sand; a fine-textured one has a large proportion of clay.

Structure, which is the way the individual soil particles are arranged in larger grains and the amount of pore space between grains, gives us clues to the ease or difficulty with which the soil is penetrated by plant roots and by moisture. Texture is described so as to show the distinctness, size, and shape of the aggregates. For example, "moderate coarse subangular blocky" means moderately distinct, rather large aggregates of subangular blocky shape.

Consistence, or the tendency of the soil to crumble or to stick together, indicates whether it is easy or difficult to keep the soil open and porous under cultivation.

Slope determines, in part, the rate of runoff and the ease with which field operations can be conducted. The exposure to sunlight is affected by the steepness of slopes. The slopes used in naming of phases and in mapping the soils in Lawrence County follow.

For Hartsells, Linker, Tilsit, Muskingum, and associated soils, and miscellaneous land types:

Slope classes	*Percent*	*Slope classes*	*Percent*
Nearly level phase	0 to 2	Hilly phase	10 to 20
Undulating phase	2 to 5	Steep phase	20 or more
Rolling phase	5 to 10		

For all other soils:

Slope classes	*Percent*	*Slope classes*	*Percent*
Nearly level phase	0 to 2	Hilly phase	12 to 25
Undulating phase	2 to 5	Steep phase	25 or more
Rolling phase	5 to 12		

Soils not given a slope designation generally are nearly level.

Other characteristics observed in the field study and considered in classifying the soil include the following: The depth of the soil over bedrock or compact layers; the presence of gravel or stones in amounts that will interfere with cultivation; the nature of the underlying rocks, or other parent material, from which the soil has developed; and acidity or alkalinity of the soil as measured by chemical tests. Many definitions of soil characteristics are given in the glossary at the end of the report.

CLASSIFICATION.—On the basis of the characteristics observed by the survey team or determined by laboratory tests, soils are classified in phases, types, and series. The soil type is the basic classification unit. A soil type may consist of several phases. Types that resemble each other in most of the characteristics are grouped into soil series.

Soil type.—Soils having the same texture in the surface layers and similar in kind, thickness, and arrangement of soil layers are classified as one soil type.

Soil phase.—Because of differences other than those of kind, thickness, and arrangement of layers, some soil types are divided into two or more phases. Slope variations, frequency of rock outcrops, degree of erosion, depth of soil over the substratum, or natural drainage, are examples of characteristics that suggest dividing a soil type into phases.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. Use and management practices, therefore, can be specified more easily than for soil series or yet broader groups that contain more variation.

Soil series.—Two or more soil types that differ in surface texture but are otherwise similar in kind, thickness, and arrangement of soil layers, are normally designated as a soil series. In a given area, however, it frequently happens that a soil series is represented by only one soil type. Each series is named for a place near which the soil was first mapped.

As an example of soil classification, consider the Talbott series of Lawrence County. This series is made up of four soil types, subdivided into phases as follows:

Series	*Type*	*Phase*
Talbott	loam	eroded undulating phase.
		eroded rolling phase.
	silt loam	undulating phase.
	silty clay loam	eroded undulating phase.
		eroded rolling phase.
	silty clay	severely eroded undulating phase.
		severely eroded rolling phase.

Miscellaneous land types.—Bare rocky mountainsides, gullied land, and other areas that have little true soil are not classified into types and series, but they are identified by descriptive names, such as Rockland, limestone, steep; and Gullied land, sandstone material.

Undifferentiated soil groups consist of two or more soils, generally having several similarities in their characteristics, that are mapped together because of the difficulty of distinguishing the areas of the separate soils. Unlike the complex, the areas of the two or more soils are not necessarily intricately associated. Decatur and Cumberland silt loams, undulating phases, is an undifferentiated soil group.

Physiographic Relations of the Soil Series

It is necessary to understand the physiographic relations of the soil series in order to make full use of the soil survey. The relationships are more easily understood if the soils are placed in groups according to their position on the landscape. These groups are (1) soils of the uplands, (2) soils on stream terraces, (3) soils on old colluvium, (4) soils on young colluvium, and (5) soils on bottom lands.

Soils of uplands are on that part of the landscape unworked by water in recent geologic time. They are generally at higher elevation than the alluvial plains. Soils on stream terraces consist of old alluvial material. After this material was deposited, the streams became sufficiently entrenched to prevent overflow. As a result, the soils have had time to develop profiles. Soils on old colluvium occur on foot slopes. They consist of local accumulations of soil and rock that have been carried by water or gravity from adjacent higher areas. The soil material has been in place long enough to develop genetic profiles. Soils on young colluvium consist predominantly of recently accumulated local alluvium along drainageways. They are too young to have developed genetic profiles. Soils of bottom lands consist of young general alluvium still subject to overflow by floodwaters.

Soils of the uplands

Soils of the uplands are members of the Decatur, Dewey, Baxter, Talbott, Colbert, Dowellton, Muskingum, Lawrence, Linker, Hartsells, Pottsville, Enders, Tilsit, Johnsburg, Lickdale, and Ruston series.

Decatur and Dewey soils have developed from parent materials that weathered from high-grade limestone. Both of these soils are deep to bedrock, well drained, and well supplied with mineral nutrients. The Decatur soils have a darker brown surface soil and a deeper red, finer textured or more clayey subsoil than the Dewey soils. All of the Decatur soils were mapped with the Cumberland silt loam, silty clay loam, and silty clay soils, and the combined area of these undifferentiated soils is about 27,171 acres. A great part of the Dewey and of the undifferentiated Decatur and Cumberland soils is in the Tennessee Valley physiographic division. Some of the acreage of Decatur and Cumberland soils is in Moulton Valley.

The Baxter soils developed from parent materials that weathered from cherty limestone. They are deep to bedrock and well drained. The Baxter soils have a lighter colored surface soil, a lighter red subsoil, and contain less mineral nutrients than the Dewey or the Decatur soils. Baxter soils contain a noticeable amount of chert. They have a total area of about 1,336 acres.

The Talbott, Colbert, and Dowellton soils have developed from argillaceous, or clayey, limestone, and they are dense and slowly permeable to moisture. In addition they are shallow or moderately shallow to limestone bedrock. Most areas have occasional outcrops of limestone. The Talbott soils have a brown surface soil and a light-reddish, plastic subsoil. They are shallower to bedrock than the Dewey and Decatur soils and somewhat deeper than the Colbert and Dowellton soils.

The Colbert soils have a lighter colored surface soil, are somewhat shallower to limestone bedrock, and have more rock outcrops than the Talbott soils. The Colbert subsoil is a yellowish plastic clay. Colbert and Talbott soils occur throughout much of the Moulton Valley and the southern part of the Tennessee Valley physiographic divisions.

The Dowellton soils are extremely plastic and have a thin surface soil underlain by a mottled very plastic clay subsoil. Their depth to bedrock is approximately the same as that of the Colbert soils. The surface is nearly level to gently undulating. Nearly all of Dowellton soil is in the western part of the Moulton Valley. The total area of Talbott, Colbert, and Dowellton soils is about 44,740 acres. Of this area, 69 percent is Colbert soils, 25 percent is Talbott soils, and 6 percent is Dowellton soils.

Lawrence and Colbert soils have developed from argillaceous limestone that in places contained interbedded shale or sandy shale. The moderately well drained Colbert soils occur at a slightly higher elevation than the somewhat poorly drained Lawrence soils. The Lawrence soils have a yellowish-brown compact subsoil with mottles of gray and red in the lower part. The Colbert soils have a yellowish-brown plastic subsoil. Most of the undifferentiated Lawrence and Colbert soils occur along the border of Little Mountain and Moulton Valley.

The Muskingum, Hartsells, and Linker soils were derived chiefly from weathered sandstone, although in some places shale is intermixed. These soils are light colored, acid, permeable, and of low fertility. The Hartsells soils have an undulating to rolling surface, a fine sandy loam surface layer, and a yellowish sandy clay loam subsoil. They occur in small areas in the eastern part of Sand Mountain. The Linker soils are also undulating to rolling, but their surface soil is a little browner, and their subsoil is notably reddish. Linker soils occupy about 16,514 acres in the Little Mountain and Sand Mountain physiographic divisions. Hartsells and Linker soils are moderately deep to bedrock, whereas the Muskingum is shallow. In addition, the Muskingum soils are hilly to steep. Fragments of sandstone occur on the surface and throughout the profile in many areas. The Muskingum series is the most extensive in the county and has a total area of about 78,896 acres. It occupies large areas in the Sand Mountain physiographic division, but less extensive areas are in the larger valleys in the Little Mountain physiographic division.

The Pottsville, Enders, Tilsit, Johnsburg, and Lickdale soils have formed from materials that weathered from interbedded sandstone and shale. These five soils are light colored, acid, and of low fertility. They are less sandy and less permeable to roots and moisture than the Hartsells and Linker soils and generally have slower internal drainage. Differences in internal

drainage distinguish the Enders, Tilsit, Johnsburg, and Lickdale series from each other. The Pottsville differs from these soils in having a more weakly developed profile and a shallower depth to shale bedrock.

The Enders soils are undulating to rolling. They have a loam surface soil and a strong-brown, firm clay loam or silty clay loam subsoil with fine to very fine mottled material below a depth of about 22 inches. These soils occupy about 16,124 acres on Sand Mountain.

The Tilsit soils have a yellowish-brown subsoil in which there is a mottled siltpan at depths of about 22 inches. The internal drainage of the Tilsit is somewhat more impaired than that of the Enders soils. Tilsit soils occupy about 37,272 acres on Sand Mountain and Little Mountain.

The Johnsburg soils are grayish-brown loam in the top 4 or 5 inches. Below this depth is yellowish-brown silty clay loam commonly mottled with gray. These soils are somewhat poorly drained and occupy about 632 acres on Sand Mountain and Little Mountain.

The Lickdale soils are poorly drained, occupy gentle depressions, and are associated with the Enders, Tilsit, and Johnsburg soils. The surface soil of the Lickdale soils is gray silt loam that grades at about 12 inches to gray, somewhat mottled, compact silty clay loam or silty clay. Lickdale soils occupy 1,450 acres on Sand Mountain and Little Mountain.

The Pottsville soils are steep and are shallow to bedrock. The surface layer is yellowish-brown loam containing fragments of shale; the subsoil is silty clay and is weakly developed. Acid shale bedrock is at depths of about 6 inches. Pottsville soils occupy about 4,733 acres on Sand Mountain.

Ruston soils have formed from acid sandy Coastal Plain material that is 2 to more than 4 feet thick. This material overlies beds of shale. The surface layer is light yellowish-brown fine sandy loam or sandy loam, and the subsoil is reddish-yellow fine sandy clay loam. Supplies of plant nutrients are low. Internal drainage is rapid. Ruston soils occupy 4,198 acres on the extreme southwestern part of Sand Mountain.

Soils on stream terraces

The alluvial deposits on stream terraces are a mixture of materials that washed mainly from limestone, sandstone, and shale. They range in thickness from less than 2 feet to more than 25 feet. The soils that have formed from them are a little more friable than the associated upland soils, and their surfaces are smoother. Cumberland, Etowah, Robertsville, Waynesburg, Nolichucky, Holston, Monongahela, Tyler, Sequatchie, and Tupelo soils are on stream terraces.

Cumberland, Etowah, and Robertsville soils have developed from parent materials more strongly influenced by limestone than those of the other soils on stream terraces.

The Cumberland soils in uneroded areas have a brown to reddish-brown loam to silt loam surface soil and a red to dark-red firm silty clay loam subsoil. They have smooth surfaces and are well drained. The amount of plant nutrients is moderate to high. Cumberland soils occur in the Tennessee and Moulton Valleys. A great part of their acreage is on old terrace remnants, where they are associated with the similar Decatur soils. It was impractical to map the Cumberland silt loam and Decatur soils separately, and they are shown on the soil map as undifferentiated Decatur and Cumberland soils. The Cumberland loams, however, are mapped separately because they can be distinguished from the Decatur soils by texture.

The Etowah soils have a dark-brown surface soil and a yellowish red, somewhat more friable subsoil. They are on younger stream terraces than the Cumberland soils. They have predominantly smooth surfaces and are well drained. The content of plant nutrients is moderate to high.

The Robertsville soil has a dark grayish-brown surface soil and a firm and clayey subsoil. It occupies the nearly level low terraces and slight depressions, chiefly in association with other somewhat poorly and moderately well drained soils. Robertsville soil is poorly drained. The total area is about 19,560 acres.

The Waynesboro, Nolichucky, Holston, Monongahela, and Tyler soils consist of mixed general alluvium. They contain more sand than the Cumberland, Etowah, and Robertsville soils.

The Waynesboro soils have a dark-brown loamy surface soil and a firm, red silty clay subsoil. They are well drained. They are undulating to rolling and are mostly in the northern part of the Tennessee Valley. The Nolichucky soils have a yellowish-brown loamy surface soil and a yellowish-red friable sandy clay loam subsoil. They are rolling to undulating and well drained. They occur in the northern half of the Tennessee Valley. Holston and Monongahela soils are moderately well drained to well drained and have a light yellowish-brown fine sandy loam surface soil and yellowish-brown friable to firm subsoil. They are rolling to undulating and are in the Moulton and Tennessee Valleys. The combined area of Waynesboro, Nolichucky, Monongahela, and Holston soils is about 9,772 acres.

Tyler soil is somewhat poorly drained. It occupies low positions on stream terraces and is nearly level. Outlets for surface and internal drainage are poor. Tyler soil is widely distributed throughout the southern half of the Tennessee Valley and throughout much of Moulton Valley. The total area is about 10,694 acres.

Sequatchie soils have a pale-brown fine sandy loam surface soil and a reddish-brown fine sandy clay loam or a fine sandy loam subsoil. They are mostly on low sandy stream terraces and are associated with the Holston and Monongahela soils. They occupy about 2 521 acres and occur mainly in the southern half of the Tennessee Valley.

Tupelo soils consist of a thin layer of old alluvium underlain by very firm clay that weathered in place from clayey limestone. The soils are nearly level to undulating, and they are associated with the other less well-drained soils on stream terraces. They occupy about 3.575 acres in Moulton Valley and in the southern half of the Tennessee Valley.

Soils on old colluvium

The Allen, Jefferson, and Hollywood soils have developed from old colluvium on gently to strongly sloping foot slopes.

The Allen and Jefferson soils have developed from colluvium that originated mainly from sandstone inter-

mixed with materials from shale and limestone. Both series are undulating to hilly, and they are well drained. The Allen soils have a pale-brown to brown surface soil and yellowish-red subsoil. The area of Allen soils is about 5,636 acres. The Jefferson soils have a yellowish-brown surface soil and a reddish-yellow or yellowish-brown subsoil. Most of the acreage of Allen and Jefferson soils is at the base of Little Mountain, where they are in association with Muskingum and Pottsville soils, and at the base of Sand Mountain, where they are in association with the Talbott and Colbert soils. Jefferson soils have a total area of about 3,524 acres.

The Hollywood soil has a dark grayish-brown silty clay surface layer and a dark-gray plastic clay subsoil. The parent material consisted of clayey colluvium that washed from higher lying adjacent areas of Stony rolling land and Rockland. Some of the parent material was residuum from the underlying limestone. Hollywood soil is shallow or less than 1 foot to about 5 feet deep to bedrock. There are some rock outcrops. Slopes have a maximum gradient of 3 percent. Hollywood soil occupies about 8,734 acres and is mostly in Moulton Valley.

Soils on young colluvium

Soils on young colluvium are of the Abernathy, Ooltewah, Barbourville, Cotaco, and Lickdale series.

The Abernathy and Ooltewah soils have developed from young colluvial material that originated mainly from limestone. The Abernathy soils are predominantly brown or reddish brown, and they are well drained. Most Abernathy soils are in gentle sinks and are closely associated with the Cumberland and Decatur soils. Ooltewah soils are somewhat poorly drained to moderately well drained, and they also occupy gentle depressions or sinks. They are associated with a wide variety of soils that developed from limestone.

The Barbourville and Cotaco soils and some of the Lickdale soils have developed from young colluvium or local alluvium that originated from soils underlain by sandstone and shale. The Barbourville soil is well drained, the Cotaco is somewhat poorly drained to moderately well drained, and the Lickdale is poorly drained. These soils are more sandy and of lower fertility than the Abernathy and Ooltewah soils. They occupy about 5,000 acres on Little Mountain and Sand Mountain and are associated mainly with the Hartsells, Tilsit, and Linker soils.

Soils on bottom lands

Soils of the bottom lands lie along the largest streams and are for the most part nearly level. The strongest contrast in these soils is in drainage, which ranges from good to poor. All the bottom lands along the Tennessee River have been covered by waters of the Wheeler Reservoir.

The bottom-land soils are of the Huntington, Lindside, Melvin, Dunning, Staser, Hamblen, Prader, Bruno, Philo, and Atkins series.

The Huntington, Lindside, Melvin, and Dunning soils are forming mainly from fine-textured deposits that originated from limestone soils. These soils are all high in plant nutrients.

The Huntington soil is well drained, occupies only 132 acres, and is mostly along Town Creek. The Lindside soil is somewhat poorly drained to moderately well drained, and it occupies about 7,309 acres throughout the Moulton and Tennessee Valleys.

The Melvin and Dunning soils are poorly drained. The Dunning soil has a dark-gray to very dark grayish brown plastic silty clay surface soil. The Melvin surface soil is a dark-brown silt loam. The Dunning soil occupies 7,305 acres, and the Melvin, 6,300. Most of the Dunning soil is in Moulton Valley in association with the Dowellton, Colbert, and Talbott soils. The Melvin is somewhat more widely distributed throughout the Moulton and Tennessee Valleys.

The Staser, Hamblen, and Prader soils have formed from general alluvium that originated mainly from shale, sandstone, and limestone. The colluvium from which these soils formed was more mixed than that of the Huntington, Lindside, Melvin, and Dunning soils. The Staser, Hamblen, and Prader soils are a little more acid and less fertile than the Huntington, Lindside, and Melvin soils. They are also somewhat lighter brown than the Huntingdon and Lindside soils. The Staser soil is well drained, and it occupies about 289 acres in the Tennessee and Moulton Valleys. The Hamblen soil is somewhat poorly drained to moderately well drained. It occupies about 5,212 acres in the Tennessee and Moulton Valleys. The Prader soil is poorly drained and occupies about 9,577 acres in the Moulton and Tennessee Valleys.

The Bruno soil consists of brown to dark-brown, loose loamy fine sand. It occurs as small areas, chiefly on natural levees in association with the Staser and Hamblen soils. The Bruno soil occupies about 1,075 acres and is mostly along Town and Big Nance Creeks.

The Philo and Atkins soils have formed from alluvium that originated from acid sandstone and shale on Little Mountain and Sand Mountain. Philo soil is somewhat poorly drained to moderately well drained; the Atkins is poorly drained. Both soils are strongly acid and of low fertility. They occur in small strips along the larger creeks in the Little Mountain and Sand Mountain physiographic divisions. Their total area is about 4,703 acres.

Descriptions of the Soils

In this section the soil series, types, phases, land types, and undifferentiated mapping units are described in detail, and their relation to agriculture is set forth to the extent that present knowledge permits. The figures in parentheses following the soil colors in some of the profile descriptions refer to the Munsell notations, which are used to express hue, value, and chroma, the three variables that combine to give all colors.

The approximate acreage of the soils mapped in this county are listed in table 3. The location and distribution of the soils are shown on the soil maps in the back of the report.

TABLE 3.—*Approximate acreage and proportionate extent of soils*

Soil	Acres	Percent
Abernathy silt loam:		
Level phase	8,330	1.9
Undulating phase	3,479	.8
Abernathy fine sandy loam:		
Level phase	1,214	.3
Undulating phase	2,055	.5
Allen fine sandy loam:		
Eroded undulating phase	1,388	.3
Rolling phase	441	.1
Eroded rolling phase	2,318	.5
Eroded hilly phase	1,268	.3
Allen clay loam, severely eroded rolling phase	221	(1)
Atkins silt loam	3,831	.9
Barbourville fine sandy loam	836	.2
Baxter cherty silt loam:		
Eroded rolling phase	356	.1
Hilly phase	980	.2
Bruno loamy fine sand	1,075	.2
Colbert silt loam:		
Undulating phase	4,326	1.0
Level phase	841	.2
Rolling phase	839	.2
Colbert silty clay loam:		
Eroded undulating phase	9,197	2.1
Eroded rolling phase	2,478	.6
Eroded hilly phase	577	.1
Colbert cherty silt loam:		
Eroded undulating phase	326	.1
Rolling phase	386	.1
Colbert loam:		
Undulating phase	1,090	.2
Eroded undulating phase	4,344	1.0
Rolling phase	1,533	.3
Eroded rolling phase	2,170	.5
Hilly phase	2,105	.5
Cotaco silt loam	2,670	.6
Cumberland loam:		
Undulating phase	679	.2
Eroded undulating phase	14,462	3.3
Eroded rolling phase	2,487	.6
Decatur and Cumberland silt loams, undulating phases	331	.1
Decatur and Cumberland silty clay loams:		
Eroded undulating phases	17,467	4.0
Eroded rolling phases	1,784	.4
Decatur and Cumberland silty clays:		
Severely eroded undulating phases	1,095	.2
Severely eroded rolling phases	6,151	1.4
Gullied phases	343	.1
Dewey cherty silty clay loam:		
Eroded undulating phase	466	.1
Eroded rolling phase	193	(1)
Dowellton silty clay loam	2,725	.6
Dunning silty clay	7,305	1.7
Enders loam:		
Rolling phase	13,622	3.1
Eroded rolling phase	2,064	.5
Eroded undulating phase	438	.1
Etowah silt loam, undulating phase	289	.1
Etowah silty clay loam:		
Eroded undulating phase	693	.2
Eroded rolling phase	1,674	.4
Etowah loam:		
Undulating phase	2,395	.5
Eroded undulating phase	17,765	4.0
Gullied land, sandstone material	159	(1)
Hamblen fine sandy loam	5,212	1.2
Hartsells fine sandy loam:		
Eroded undulating phase	187	(1)
Rolling phase	514	.1
Eroded rolling phase	194	(1)
Hollywood silty clay	8,734	2.0
Huntington silt loam	132	(1)
Jefferson fine sandy loam:		
Eroded undulating phase	1,974	.4
Rolling phase	385	.1
Eroded rolling phase	728	.2
Eroded hilly phase	437	.1
Johnsburg loam	632	0.1
Lawrence and Colbert silt loams:		
Undulating phases	839	.2
Rolling phases	425	.1
Lawrence and Colbert silty clay loams:		
Eroded undulating phases	2,244	.5
Eroded rolling phases	1,331	.3
Lickdale silt loam	1,450	.3
Lindside silty clay loam	7,309	1.7
Linker fine sandy loam:		
Eroded undulating phase	3,140	.7
Rolling phase	6,010	1.4
Eroded rolling phase	5,930	1.4
Eroded hilly phase	1,076	.2
Linker clay loam, severely eroded rolling phase	358	.1
Melvin silt loam	6,300	1.4
Monongahela and Holston fine sandy loams:		
Undulating phases	1,001	.2
Eroded undulating phases	2,987	.7
Level phases	851	.2
Muskingum fine sandy loam, hilly phase	1,780	.4
Muskingum stony fine sandy loam:		
Hilly phase	2,649	.6
Steep phase	74,467	17.0
Nolichucky fine sandy loam:		
Eroded undulating phase	2,257	.5
Eroded rolling phase	796	.2
Ooltewah silt loam	8,764	2.0
Ooltewah fine sandy loam	1,772	.4
Philo fine sandy loam	872	.2
Pottsville shaly silt loam:		
Hilly phase	3,893	.9
Steep phase	840	.2
Prader silt loam	9,577	2.2
Robertsville silt loam	19,560	4.5
Rockland, limestone:		
Rolling	1,773	.4
Steep	15,118	3.4
Ruston sandy loam:		
Undulating phase	185	(1)
Rolling phase	3,531	.8
Eroded rolling phase	482	.1
Sequatchie fine sandy loam:		
Undulating phase	1,098	.2
Eroded undulating phase	1,423	.3
Staser fine sandy loam	289	.1
Stony rolling land, Talbott and Colbert soil materials	4,684	1.1
Stony steep land, Muskingum soil material	2,365	.5
Talbott silt loam, undulating phase	470	.1
Talbott silty clay loam:		
Eroded undulating phase	7,735	1.8
Eroded rolling phase	983	.2
Talbott silty clay:		
Severely eroded undulating phase	173	(1)
Severely eroded rolling phase	1,117	.3
Talbott loam:		
Eroded undulating phase	1,017	.2
Eroded rolling phase	308	.1
Tilsit silt loam:		
Undulating phase	2,900	.7
Eroded undulating phase	20,416	4.7
Rolling phase	2,175	.5
Eroded rolling phase	11,781	2.7
Tupelo silt loam	2,411	.5
Tupelo loam	1,164	.3
Tyler fine sandy loam	1,138	.3
Tyler and Monongahela fine sandy loams:		
Level phases	5,555	1.3
Undulating phases	2,259	.5
Eroded undulating phases	1,742	.4
Waynesboro fine sandy loam, eroded undulating phase	376	.1
Waynesboro clay loam, severely eroded rolling phase	1,504	.3
Total	439,040	100.0

[1] Less than 0.1 percent.

Abernathy Series

Soils of the Abernathy series have formed from young local alluvium that washed from surrounding limestone soils. They occupy nearly flat or saucer-shaped swales that are subject to flooding and in places to ponding. They occur in the northern part of the county, mainly in the Tennessee Valley, and to a lesser extent in the Moulton Valley. They are associated with the Decatur and Cumberland soils and with other soils of the limestone valleys.

Abernathy silt loam, level phase (Ac).—This well-drained soil occurs in small areas that range from 1 to more than 40 acres.

Profile description:

0 to 8 inches, brown to dark reddish-brown silt loam.
8 to 24 inches, dark reddish-brown silt loam to silty clay loam; friable, but more firm than surface layer.
24 to 33 inches, dark reddish-brown to reddish-brown silty clay loam, faintly mottled with brown, red, and gray; grades to a moderately mottled silty clay at various depths; friable to firm.

Limestone bedrock occurs at depths ranging from 6 to 35 or more feet.

This is one of the more productive soils of Lawrence County. It has a large amount of plant nutrients and organic matter, and it is not very acid. Internal drainage is medium, and the capacity to hold water that plants can use is very high, compared with the capacity of most other well-drained soils. The soil is permeable to roots and moisture, and it is not subject to erosion.

Use and suitability.—Most of this soil is used for corn and cotton, but lespedeza, oats, soybeans, and grain sorghum are also commonly grown. A small acreage is used for pasture. Fertilizers are not applied regularly, but yields are high for corn, soybeans, sorghum, and lespedeza.

This soil is particularly well suited to intensive use for corn, soybeans, grain sorghum, alfalfa, and practically all hay crops. Oats and other small grains commonly lodge. Only in the driest years are yields of cotton as good on this soil as on the Decatur, Etowah, and similar higher lying soils. In wet seasons boll formation is poor and weevil infestation is exceptionally bad. Because of favorable moisture relations, this soil produces more palatable grasses and legumes in dry weather than most of the upland soils. It is therefore especially good for late summer grazing. Abernathy silt loam, level phase, is in capability unit I-1.

Abernathy silt loam, undulating phase (Ad).—This soil differs from the level phase of Abernathy silt loam mainly in degree of slope. Gradients are as much as 6 percent. Nearly all the soil is at the heads of drainageways and along drainageways.

The profile is nearly similar to that of the level phase, except that the subsoil color is a little redder and the consistence is a little firmer in places. The depth to the mottled layer is generally greater than in the level phase. The soil is high in natural fertility, contains moderate to large amounts of organic matter, and has a high capacity to hold moisture that plants can use.

Use and suitability.—Nearly all of this soil is in cultivation. The main crops are cotton and corn, but lespedeza, oats, soybeans, and sorghum are commonly grown. A small acreage is used for pasture. Fertilizers are commonly used but not in large quantities. Yields are high for nearly all the commonly grown crops.

This soil is well suited to intensive use for many crops It is also well suited to pasture because of abundant supplies of moisture. This soil is in capability unit IIe-1.

Abernathy fine sandy loam, level phase (Aa).—This soil differs from Abernathy silt loam, level phase, chiefly in content of sand. It occupies swales and sinks in association with the Waynesboro and Nolichucky soils. Smaller areas in much of the Tennessee Valley and Moulton Valley are associated with areas of Decatur and Cumberland soils.

Profile description:

0 to 8 inches, grayish-brown to reddish-brown fine sandy loam.
8 to 18 inches, reddish-brown fine sandy loam grading to fine sandy clay loam; friable.
18 inches +, reddish-brown fine sandy loam or fine sandy clay loam, somewhat mottled with brown and gray below a depth of about 30 inches; friable and somewhat stratified.

In some areas below a depth of about 10 inches, the subsoil is a silt loam or silty clay loam that is similar to the subsoil of the Abernathy silt loams.

The fertility is moderately high, but it is lower than that of the Abernathy silt loams. Supplies of organic matter are moderate, and the reaction is slightly acid to medium acid. This soil is easily permeable to both roots and moisture. Runoff is slow to very slow, but internal drainage is medium.

Use and suitability.—A large part of this soil is used continuously for row crops, mainly cotton and corn. Fertilizers are not used in large quantities. However, somewhat larger amounts are applied to this soil than to the Abernathy silt loams, because of greater loss through leaching.

This soil is well suited to many crops, and it can be used intensively for row crops. Although not so desirable for legumes and grasses as the Abernathy silt loams, it produces good pasture if adequately fertilized. This soil is in capability unit I-1.

Abernathy fine sandy loam, undulating phase (Ab).—This soil differs from the level phase of Abernathy fine sandy loam chiefly in slope. Gradients are as much as 6 percent.

Profile description:

0 to 8 inches, grayish-brown to reddish-brown fine sandy loam.
8 to 18 inches, reddish-brown fine sandy loam grading to fine sandy clay loam.
18 inches +, reddish-brown fine sandy loam or fine sandy clay loam; friable and somewhat stratified; below about 30 inches, moderately mottled in some places and moderately free of mottlings in others; grades to more reddish, firmer silty clay.

This soil is moderately fertile, slightly acid to

medium acid, and permeable to roots and moisture. It has good tilth. Internal drainage is moderate. Moisture relations are good, but the available moisture-holding capacity is probably a little lower than that of the Abernathy silt loams.

Use and suitability.—Much of the acreage is used continually for row crops, mainly cotton and corn. Some of it is in hay or pasture. Fertilizers are used regularly, but not in large quantities.

This soil can be used intensively for nearly all crops commonly grown, including alfalfa. It is well suited to the more desirable legumes and grasses for pasture, but less so than the Abernathy silt loams. The more strongly sloping areas need adequate control of runoff, but, on the whole, erosion is not a management problem. This soil is less subject to temporary flooding, and consequently it has a wider range of suitability for crops than the level phases of the Abernathy soils. This soil is in capability unit IIe-1.

Allen Series

Soils of the Allen series have developed from local alluvium and colluvium that originated from weathered sandstone and shale mixed with limestone. They occupy foot slopes below the steep areas of Muskingum and Pottsville soils and Rockland, limestone. Most of the soil is underlain by limestone. Nearly all of the series is in the southern edge of the Tennessee Valley adjacent to Little Mountain and along the southern edge of Moulton Valley adjacent to Sand Mountain. The soils are commonly associated with the Talbott and Colbert soils.

Allen fine sandy loam, eroded undulating phase (Ah).—This soil has slopes of less than 5 percent. A large part of the acreage has been so eroded that the plow layer is now a mixture of original surface soil and subsoil.

Profile description:

0 to 6 inches, grayish-brown to reddish-brown fine sandy loam; in native forested areas, the top 1 or 2 inches is noticeably dark and the rest of the layer is grayish brown.
6 to 13 inches, reddish-yellow to red fine sandy loam grading to fine sandy clay loam; friable.
13 to 38 inches, reddish-brown to yellowish-red fine sandy clay; friable to firm; breaks easily into subangular fragments ½ to 1½ inches in diameter.
38 inches +, red fine sandy clay or fine sandy clay loam, moderately splotched with yellow; friable.

Limestone bedrock, in most places, is from 2½ to more than 8 feet below the surface.

In the more eroded spots, the surface layer is more nearly a reddish brown and the texture a fine sandy clay loam. Sandstone fragments as much as 8 inches long are scattered throughout the profile, but they do not interfere with tillage.

This soil is moderately fertile, medium to strongly acid, and low in amount of organic matter. It is well drained and permeable to roots and moisture. It has good tilth, and its capacity to hold moisture that plants can use is moderate.

Use and suitability.—Most of this soil has been cleared and is used mainly for cotton, corn, hay, and pasture. Small areas are idle part of the time. The row crops, especially cotton, receive moderate quantities of a complete fertilizer.

This soil responds to management, and it is well suited to cotton, corn, sorghum, and soybeans. It is also good for grasses and summer and winter legumes, including alfalfa for hay and pasture. Leguminous winter cover crops, chiefly vetch, are well suited. Large quantities of fertilizer are needed for high yields of crops on this soil. Runoff must be controlled to prevent erosion on the steeper areas. This soil is in capability unit IIe-2.

Allen fine sandy loam, rolling phase (Ak).—This well-drained soil occupies foot slopes ranging in gradient from 5 to 10 percent. Most areas are on the stronger slopes below and adjacent to the smoother Allen soils. This soil is also associated with the Talbott and Colbert soils.

Profile description:

0 to 2 inches, dark grayish-brown loose fine sandy loam.
2 to 6 inches, grayish-brown to yellowish-red fine sandy loam.
6 to 13 inches, reddish-yellow to red fine sandy loam.
13 to 30 inches, reddish-brown to yellowish-red fine sandy clay; friable to firm.
30 inches +, red friable fine sandy clay or fine sandy clay loam, moderately splotched with yellow.

Limestone bedrock is at depths ranging from 2 to 7 feet.

This soil is moderately fertile and has good tilth. The capacity to hold water that plants can use is high. In most places, the fragments of sandstone and limestone in the soil do not greatly interfere with tillage.

Use and suitability.—Nearly all of this soil is in cut-over hardwood forest. The soil is suited to practically all of the commonly grown crops, including cotton and corn. It is also suited to grasses and alfalfa and other legumes usually grown for hay and pasture. Large quantities of fertilizer are needed for high yields. Careful control of runoff is necessary. This soil is in capability unit IIIe-2.

Allen fine sandy loam, eroded rolling phase (Ag).—This soil differs from the rolling phase of Allen fine sandy loam chiefly in erosion. Much of the original surface soil has been lost through erosion. In places all of the surface soil is gone. This soil is associated with the Jefferson, Colbert, and Talbott soils and with other Allen soils.

Profile description:

0 to 5 inches, reddish-yellow or reddish-brown fine sandy loam to fine sandy clay loam.
5 to 24 inches, reddish-brown to yellowish-red sandy clay; friable to firm.
24 inches +, red fine sandy clay loam to fine sandy clay, moderately splotched with yellow; friable.

Limestone bedrock in most places is at depths ranging from 2 to 6 feet.

This soil is moderately fertile, medium to strongly acid, and low in organic matter. It is permeable to

roots and moisture, and it has a moderate capacity to hold water that plants can use. Moisture is least favorable in the severely eroded areas. Fragments of sandstone and limestone are in the soil but do not interfere greatly with tillage. The plow layer in most places consists of surface soil mixed with subsoil, but it has good tilth except in severely eroded areas.

Use and suitability.—All of this soil has been cleared and used for crops. Much of the acreage is now used chiefly for cotton and corn; some, however, is in unimproved pasture or idle.

This soil is suitable for crops requiring cultivation, but runoff must be controlled. Good management consists of terracing and contour tillage and the use of cover crops and close-growing crops in moderately long rotations. This soil is in capability unit IIIe-2.

Allen fine sandy loam, eroded hilly phase (Af).—This soil occupies slopes (10 to 20 percent) below and adjacent to areas of the smoother Allen soils. The degree of erosion varies according to the past use of the soil. About three-fourths of the acreage has been noticeably eroded; a small part has been severely eroded. The rest is in cutover hardwood forest.

Profile from a moderately eroded area:

0 to 5 inches, reddish-yellow fine sandy loam.
5 to 20 inches, red or yellowish-red fine sandy clay loam grading to fine sandy clay; firm but friable.
20 inches +, red fine sandy clay or fine sandy clay loam, moderately splotched with yellow; friable to firm.

Limestone bedrock, in most places, is at depths ranging from 1½ to 6 feet.

Where the soil has not been in cultivation, the top 6 inches is grayish-brown to reddish-yellow fine sandy loam and the subsoil is a redder and firmer fine sandy clay. In spots where nearly all the surface soil is gone, the plow layer consists of firm but friable red fine sandy clay loam. Some shallow gullies and a few deep gullies that cannot be crossed by farm machinery have formed.

The eroded areas of this soil are moderately fertile, are medium to strongly acid, and contain little organic matter. The uneroded areas, however, contain fair supplies of organic matter. The soil is permeable to roots and moisture, and it has a moderate capacity to hold water that plants can use. A small part of the acreage contains sandstone fragments in numbers sufficient to interfere with cultivation.

Use and suitability.—About one-fourth of the acreage is still under native forest. The rest has been cleared and is used for crops. Part of the cleared area is still used for cultivated crops, chiefly cotton; but a large part is idle or in unimproved pasture.

Most of this soil is suitable for cultivated crops. Cotton, corn, and many other crops can be grown, but they require large quantities of fertilizer. Strict management is required to prevent erosion on the strong slopes. Field operations require particular care, and long rotations are necessary. This soil is in capability unit VIe-2.

Allen clay loam, severely eroded rolling phase (Ae).—This soil differs from the rolling phase of Allen fine sandy clay loam chiefly in having lost nearly all of the original surface soil as a result of erosion. Small gullies are common, but most of them can be crossed by farm machinery. The soil occupies small areas on slopes of 5 to 10 percent in association with the eroded undulating phase of Allen fine sandy loam.

The 4- or 5-inch surface layer consists of reddish-brown or red firm but friable clay loam. Below this is firm but friable red fine sandy clay. This material, at a depth of about 20 inches, grades to a red, moderately splotched with yellow, fine sandy clay loam or fine sandy clay. Fragments of sandstone, and in places limestone, are in the soil but do not interfere materially with tillage.

This soil is not very fertile, and the supply of organic matter is low. It is moderately to strongly acid. Because of erosion, this soil has less ability to absorb moisture and loses more moisture through evaporation. Consequently, its capacity to hold water that plants can use is rather low. Tilth of the plow layer is not favorable. The soil should not be cultivated when wet, as it will puddle.

Use and suitability.—All of this soil has been cleared and used for crops. Some of it is now used chiefly for cotton, and the rest is idle. Moderate quantities of fertilizers are applied to cotton, but pastures or idle areas have not been fertilized for a long time.

This soil is suitable for cultivation, but its management is exacting. To maintain high productivity, the soil should receive adequate quantities of fertilizer and additional organic matter and be used in long rotations in which close-growing crops predominate. If row crops are grown, the soil should be tilled along the contour and terraced. This soil is in capability unit IVe-2.

Atkins Series

Atkins silt loam (Al).—This poorly drained soil has formed from alluvium that originated chiefly from sandstone and shale. It occupies narrow strips or entire bottom lands along the creeks in association with the better drained bottom-land soils. The areas are nearly level and are subject to flooding. Most of the acreage is on Little Mountain, but small tracts are on Sand Mountain.

Profile description:

0 to 4 inches, light brownish-gray to brown silt loam; finely mottled; friable.
4 to 30 inches +, mottled gray, brown, and yellow silty clay loam; grayness increases with depth.

Sandstone or shale bedrock is at depths ranging from 3 to about 10 feet.

In areas containing considerable sand, the surface layer ranges from fine sandy loam to loam, and the subsoil ranges from fine sandy clay loam to fine sandy clay. Shale and sandstone fragments occur in the lower part of the subsoil in places.

The soil generally has low fertility and little organic matter and is strongly to very strongly acid. The surface layer, however, contains moderate amounts of organic matter. The soil is permeable to roots and moisture. The water table is near the surface except during dry periods.

Use and suitability.—A large part of the acreage is in forest consisting mainly of beech, poplar, elm, hickory, post and willow oaks, elder, maple, sweetgum, and willow. Some acreage has been cleared and is used for pasture. The forage is not of good quality, and the

carrying capacity is not high. A very small part of the better drained acreage may be used for crops, but yields are not high and crop losses are common because of excessive wetness.

Poor drainage makes this soil unsuitable for cultivation. Most areas are not good for pasture, but they could be improved by drainage (fig. 2). The establishment of pasture requires proper seeding of desirable legumes and grasses and large quantities of fertilizer. Atkins silt loam is in capability unit IIIw-1.

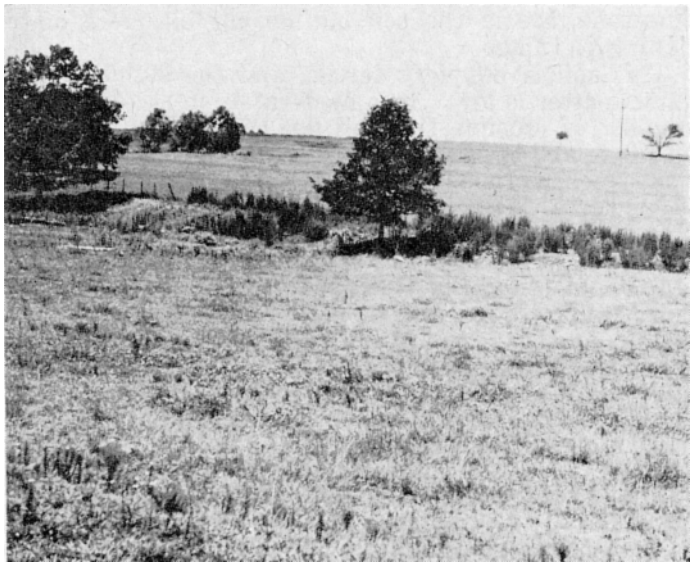

Figure 2.—**Pasture of dallisgrass and whiteclover in foreground on area of Atkins silt loam that has improved surface drainage.**

Barbourville Series

Barbourville fine sandy loam (Ba).—This well-drained soil has formed from young local alluvium that washed mainly from soils originating from acid sandstone and shale. Nearly all the alluvium has accumulated since the surrounding areas have been in cultivation. Slopes are as much as 3 percent, but the lower lying acreage is subject to occasional flooding. Most of the areas are small and occur in narrow strips at the base of slopes and along the sides and at the heads of drainageways on Little Mountain. The soil occupies gently sloping topography in association with Tilsit, Enders, and Hartsells soils.

Profile description:

0 to 15 inches, brown to dark-brown fine sandy loam.
15 to 28 inches, yellowish-brown fine sandy loam; weak blocky structure in some places.
28 inches +, brownish-yellow or yellowish-brown fine sandy loam, moderately mottled with gray.

Sandy and acid bedrock is at depths ranging from 2½ to 6 feet.

The surface soil ranges from fine sandy loam to loam, and the subsoil ranges from fine sandy loam to silt loam or silty clay loam. Fragments of sandstone are in the soil but do not interfere materially with cultivation. A few spots are wet, but they are too small to map separately.

The soil is moderately low in fertility and strongly to very strongly acid. It has a moderate supply of organic matter in the surface layer. The moderate to high available moisture-holding capacity makes this soil favorable for plants. The subsoil is permeable to moisture and roots.

Use and suitability.—A large part of this soil has been cleared and is used chiefly for corn, cotton, and hay. Cotton receives most of the fertilizer. This soil can be used intensively for corn, sorghum, melons, and garden vegetables. It is suited to practically all crops commonly grown and to the legumes and grasses more desirable for hay and pasture. It responds well to fertilizer. Barbourville fine sandy loam is in capability unit IIe-1.

Baxter Series

Soils of the Baxter series are well drained and have formed on uplands from cherty limestone. They occupy the strong slopes adjacent to Wheeler Reservoir and its tributaries and the smooth uplands in the extreme northern part of the county. They occur in association with the Waynesboro, Nolichucky, Etowah, and Cumberland soils, but they differ from them in having a more clayey substratum and moderately large quantities of chert fragments in the profile. In addition, the Baxter soils are more grayish than the Cumberland, Etowah, and Waynesboro soils.

Baxter cherty silt loam, eroded rolling phase (Bb).—This soil occupies narrow ridgetops and is adjacent to the hilly phase of Baxter cherty silt loam. Slopes range from about 6 to 12 percent.

Profile description:

0 to 10 inches, yellowish-brown cherty silt loam to reddish-yellow cherty silty clay loam; moderate medium blocky structure.
10 to 40 inches, yellowish-red to red cherty silty clay or cherty silty clay loam; lower part somewhat splotched or mottled with yellow and gray; firm but moderately friable.
40 inches +, splotched or mottled red, yellow, and gray cherty clay; firm to very firm.

Cherty limestone bedrock is at depths ranging from 8 to 36 feet.

On areas that have not been eroded, the 7-inch surface layer is grayish-brown friable cherty silt loam. The upper 1 to 1½ inches of this layer is well supplied with organic matter. On knobs that have lost nearly all the surface soil, the subsoil is exposed and the plow layer is now a yellowish-red firm cherty silty clay loam or cherty silty clay.

This soil is low to moderate in fertility, generally low in organic matter, and medium to strongly acid. It is moderately permeable to roots and moisture. Much of the acreage is a little droughty because it is on narrow ridgetops. Fragments of chert in some places interfere with tillage. Tilth is good where erosion has not been severe. However, tilth is poor and seedbed preparation is difficult where most of the surface soil is gone and the cherty silty clay subsoil is exposed.

Use and suitability.—Nearly all of this soil has been cleared and used for crops. Some is still cropped, but

a large part is now reforested or is idle. This soil is suitable for cultivation. It can be made productive of most crops commonly grown in the county. It requires, however, measures to control runoff and additions of organic matter and large quantities of fertilizer. The droughtiness of this soil limits the yield of crops except in favorable seasons. This soil is in capability unit IIIe-8.

Baxter cherty silt loam, hilly phase (Bc).—This soil differs from the eroded rolling phase of Baxter cherty silt loam chiefly in slopes, which range from 12 to 25 percent. It has had less damage by erosion, however, because a large part of it is still in cutover hardwood forest.

In most places the 5- to 7-inch surface layer is a grayish-brown friable cherty silt loam. Below this layer and to depths of 10 to 12 inches is light yellowish-brown friable silt loam. Below depths of 10 to 12 inches is yellowish-red firm cherty silty clay loam or silty clay. This material grades, at about 30 inches, to splotched or mottled red, yellow, and gray firm cherty clay. Cherty limestone bedrock is at depths ranging from 6 to 36 feet.

In eroded areas the plow layer is now a brownish-yellow or reddish-yellow cherty silty clay loam or cherty silt loam. This material is underlain by a subsoil of yellowish red firm cherty silty clay loam.

This soil is moderately low in fertility and organic matter, medium to strongly acid, and permeable to roots and moisture. The capacity to hold moisture that plants can use is moderate. Tilth of the surface layer is good. In many places there is sufficient chert to interfere greatly with tillage.

Use and suitability.—Much of this soil has not been cleared. Only a small acreage is used for crops or pasture. This soil is suitable for many of the commonly grown crops, but it needs strict management. If cultivated, the soil should be kept in close-growing crops most of the time, given large quantities of fertilizer, and cultivated along the contour. This soil is in capability unit VIe-2.

Bruno Series

Bruno loamy fine sand (Bd).—This soil has formed from young sandy general alluvium that originated from sandstone. Slopes are nearly level or very gently undulating. Most of the acreage is on first bottoms along Big Nance and Town Creeks in the Tennessee Valley.

Profile description:

0 to 7 inches, brown to dark-brown loamy fine sand; loose.
7 to 20 inches, yellowish-brown to pale-yellow loose loamy fine sand grading to fine sand.

Limestone bedrock is at depths ranging from 6 to 25 feet or more. Fine to moderately coarse gravel occurs on some areas.

This soil is very low in plant nutrients and organic matter and in most places is medium acid. It is loose and permeability is rapid; the capacity to hold water that plants can use is very low. However, during most of the year the water table is probably within 5 to 6 feet of the surface. Plant nutrients are rapidly leached from this soil.

Use and suitability.—Most of this soil has been cleared and is now used for pasture. A small part is in forest consisting mainly of sycamore, willow, poplar, and pine. The more productive areas of this soil are used for crops; corn is the chief crop, but yields are fairly low.

Unfavorable characteristics greatly limit the suitability of this soil for crops. Melons, potatoes, truck crops that mature early in summer, and such general farm crops as corn and soybeans are suitable. The susceptibility to flooding makes it risky to grow high-value crops. Large quantities of fertilizer are needed for high yields. This soil is not good for pasture, but in places good stands of bermudagrass have been developed. Bruno loamy fine sand is in capability unit IIIs-2.

Colbert Series

Soils of the Colbert series have developed on uplands from weathered clayey limestone. They are underlain at shallow depths by limestone. Slopes are predominantly undulating. The soils occur in the southern part of the Tennessee Valley and throughout much of the Moulton Valley, mainly in association with the Talbott soils. The soils are medium to strongly acid and not very fertile. Much of their acreage is suitable for cultivation, but they are not among the more desirable soils for agriculture, chiefly because of unfavorable tilth, slow moisture absorption, and low capacity to hold water that plants can use.

Colbert silt loam, undulating phase (Co).—This soil has maximum slopes of 6 percent. Soil areas range from less than 5 acres to more than 40.

Profile description:

0 to 6 inches, light yellowish-brown silt loam or silty clay loam; friable; the upper 1 or 2 inches in undisturbed areas is a dark grayish-brown silt loam.
6 to 12 inches, brownish-yellow silty clay loam; friable; moderate to strong medium subangular blocky structure.
12 to 22 inches, brownish-yellow clay mottled with gray and brown; very sticky and plastic when wet, hard when dry.
22 to 40 inches, mottled gray, yellowish-brown, and brown clay; heavy and very sticky and plastic; breaks to angular fragments.

Limestone bedrock is at depths ranging from 1½ to 4 feet, but it is at the surface in a few places.

This soil is low in organic matter and is medium to strongly acid. The surface soil has fairly good tilth. The subsoil is very hard to work, is slowly permeable to roots and moisture, and has a rather low capacity to hold water that plants can use. During dry periods this soil is somewhat droughty.

Use and suitability.—Nearly all of this soil is in cutover forest consisting of hardwoods mixed with cedar. It is suitable for cultivation and responds to proper fertilization, but the kinds of crops that can be grown and the yields are restricted. This soil is in capability unit IIIe-12.

Colbert silt loam, level phase (Cm).—This soil differs from the undulating phase of Colbert silt loam, mainly in slope. In addition, the surface layer is thicker and

the depths to the underlying bedrock are somewhat greater. Slopes seldom exceed 2 percent. This is one of the less extensive Colbert soils. Most of it is in Moulton Valley in association with the Dowellton, Robertsville, and Hollywood soils and with other Colbert soils.

The 6- to 8-inch surface layer is light yellowish-brown silt loam. The subsoil is brownish-yellow plastic silty clay that grades to mottled material at depths ranging from 10 to 12 inches. Limestone bedrock is at depths ranging from 2 to 4 feet. Rock outcrops are fewer than in the more rolling Colbert soils.

The upper 2 or 3 inches of surface soil contains organic matter in uncultivated areas. Permeability of the subsoil to moisture and roots is slow. Available moisture for plants is a little higher in this soil than in the undulating and rolling phases of Colbert silt loam. This soil is medium to strongly acid.

Use and suitability.—Much of this soil has been cleared, but a large acreage is still in forest. This soil is probably the most desirable of the Colbert series for agriculture because it has better physical properties and is less likely to be eroded. It is suitable for most of the commonly grown crops, but it is particularly good for corn, hay, and pasture. This soil is not so well suited to cotton as the deeper, more permeable soils. Although it responds to fertilization, high yields are more difficult to obtain because of the slow permeability of the subsoil and the limited supply of moisture. This soil is in capability unit IIIe-12.

Colbert silt loam, rolling phase (Cn).—This soil differs from the undulating phase of Colbert silt loam, mainly in slopes and in depth to bedrock. Slopes range from about 6 to 13 percent. Associated soils are Talbott, Dowellton, and Hollywood and other Colbert soils.

The 4- to 6-inch surface layer is light yellowish-brown silt loam. Under this is brownish-yellow plastic silty clay with a moderately strong medium blocky structure. Below depths of 12 to 14 inches is mottled brownish-yellow and gray plastic silty clay. Limestone bedrock is at depths ranging from 1 to 3 feet. Outcroppings of limestone are rare.

This soil is not very high in organic matter and is medium to strongly acid. It tends to be droughty. It retains plant nutrients fairly well. The surface soil is friable and has good tilth. The subsoil is hard to cultivate and is slowly permeable to moisture and roots.

Use and suitability.—This soil is nearly all in cutover forest consisting of hardwoods mixed with cedar. It is suitable for cultivation and pasture. However, unfavorable properties limit the crops that can be grown and their yields. This soil is in capability unit IVe-12.

Colbert silty clay loam, eroded undulating phase (Cs). This soil differs from the undulating phase of Colbert silt loam mainly in having lost most of the original surface soil through erosion. It is the most extensive of the Colbert series. Many of the areas are 30 or 40 acres in size. The soil is associated chiefly with the Talbott and Dowellton soils and with the Stony rolling land, Talbott and Colbert soil materials, and Rockland, limestone.

The plow layer consists of the original surface soil mixed with subsoil. It is predominantly a brownish-yellow silty clay loam. In many small areas all of the surface soil is gone and the plow layer is a brownish-yellow plastic silty clay. Limestone bedrock is at depths ranging from 1 to 3 feet, and there are occasional limestone outcrops.

This soil is low in organic matter. It tends to be droughty and is slowly permeable to roots and moisture. The plow layer has good to poor tilth, depending on the amount of clay it contains. Internal drainage is slow.

Use and suitability.—All of this soil has been cleared and used for crops. Most of it is now in unimproved pasture or is idle; some of the acreage is in row crops.

This soil is suitable for cultivation, but unfavorable properties greatly limit the crops that can be grown. It is fairly good for cotton. Most of the soil should be used in long rotations consisting chiefly of legumes and grasses for hay and pasture and occasional row crops, as cotton, corn, or grain sorghum. This soil is in capability unit IIIe-12.

Colbert silty clay loam, eroded rolling phase (Cr).—This soil differs from the rolling phase of Colbert silt loam mainly in having lost much of the original surface soil through erosion. The 4- to 5-inch surface layer now consists of the original surface soil mixed with subsoil, and it is predominantly a brownish-yellow silty clay loam. Under this layer is a brownish-yellow plastic silty clay that grades to mottled silty clay at depths of 8 to 12 inches. Limestone bedrock is at depths ranging from ½ to 2½ feet (fig. 3). Limestone outcrops are fairly common but do not prevent tillage.

Numerous spots have lost nearly all of the surface soil. In these the plow layer consists of the brownish-yellow plastic silty clay subsoil. Small gullies have formed, but they are not deep enough to interfere greatly with tillage.

This soil is low in organic matter and is medium to strongly acid. It tends to be droughty and is slowly permeable to roots and moisture. The plow layer is firm when moist and slightly plastic when wet. Tillage should not be attempted when the soil is too wet or too dry.

Use and suitability.—All of this soil has been cleared and cropped. Part of the acreage is now used mainly for cotton and hay; some is idle or in unimproved pasture. Fertilizer is applied regularly to cotton, but the soil generally is not kept highly productive. Much of the area in cultivation is not protected by winter cover crops.

The unfavorable characteristics of this soil limit its productivity. The best use of the soil is for permanent pasture, but droughtiness reduces the growth of forage in the drier parts of the growing season. A good stand of legumes and grasses can be maintained through proper seeding and adequate fertilization. This soil is in capability unit IVe-12.

Colbert silty clay loam, eroded hilly phase (Cp).—This soil differs from the eroded rolling phase of Colbert silty clay loam in slope and in depth to bedrock. A great part of it occupies strong slopes directly below and adjacent to higher lying hilly and steep Muskingum soils. Slopes range from 12 to 25 percent.

About one-fourth of the acreage is still in forest and has not been materially damaged by erosion. Here the

4- or 5-inch surface layer is light yellowish-brown silt loam or silty clay loam. Below this layer and to a depth of about 10 inches is brownish-yellow plastic silty clay that grades to mottled plastic silty clay. Limestone bedrock is at depths ranging from ½ to 1½

Figure 3.—**Area of Colbert silty clay loam, eroded rolling phase, showing the parent rock at a depth of about 16 inches.**

feet. Limestone outcrops and loose limestone fragments are on the surface. Some areas are cherty.

Over most of the eroded acreage, the plow layer is a brownish-yellow silty clay loam, underlain by a plastic, brownish-yellow silty clay. Where nearly all the original surface soil is gone, the plow layer consists of the brownish-yellow or mottled brownish-yellow and gray plastic silty clay subsoil. A few gullies have formed in the more severely eroded areas, but most of them are not deep enough to interfere greatly with tillage.

This soil is low in organic matter and medium to strongly acid. It tends to be droughty. Permeability of the subsoil to moisture and roots is slow. Tillage is difficult on the stony slopes.

Use and suitability.—About one-fourth of the acreage is in cutover forest consisting of hardwoods mixed with cedar. The rest of the acreage has been cleared and used for crops. Most of the cleared acreage is now used as unimproved pasture; small percentages are in reforested and idle areas. Unfavorable characteristics limit the suitability of this soil for crops. Permanent pasture is its best use. Good stands of legumes and grasses can be established by proper seeding and adequate fertilization. Droughtiness of the soil reduces the carrying capacity of pastures in dry parts of the growing season. This soil is in capability unit VIe-2.

Colbert cherty silt loam, eroded undulating phase (Cd).—This soil differs from Colbert silt loam, undulating phase, mainly in having chert in the plow layer that interferes with tillage. The chert was in the parent rock. This soil occurs with other Colbert soils.

A great part of the acreage has been eroded to the extent that the plow layer now consists of original surface soil mixed with subsoil. In most places it is a light yellowish-brown cherty silt loam. Below the plow layer is brownish-yellow, plastic cherty silty clay. This material grades to a mottled yellow and gray, plastic cherty silty clay at depths of 12 to 14 inches. Limestone bedrock or very cherty material is at depths ranging from 1½ to 3 feet.

In some places the subsoil is less cherty than the surface layer; in others chertiness increases with depth to the partly weathered, impure limestone parent rock. Over the small acreage that has not been materially eroded, the 5- or 6-inch surface layer is a light yellowish-brown cherty silt loam. In the few patches that have lost nearly all the surface soil, the plow layer is a brownish-yellow cherty silty clay or cherty clay.

This soil is somewhat low in organic matter and medium to strongly acid. Its low capacity to hold water that plants can use makes it somewhat droughty. Where not badly eroded, the surface soil absorbs moisture fairly well and has good tilth, but chert interferes with tillage. The subsoil is slowly permeable to moisture and roots. Areas where subsoil makes up part of the plow layer are very difficult to till.

Use and suitability.—Most of this soil has been cleared and used for crops. Much of it is now used mainly for cotton, annual lespedeza, sericea lespedeza, and pasture. Cotton is fertilized, but yields generally are not very high.

This soil is suitable for cultivation, but shallowness to the plastic clay subsoil and to bedrock limits the crops that can be grown and restricts yields. Hay is harvested with difficulty because of chert on the surface. This soil is in capability unit IIIe-12.

Colbert cherty silt loam, rolling phase (Ce).—This soil differs from Colbert silt loam, rolling phase, mainly in having chert in the surface soil in quantities that interfere with tillage. About half the acreage has not been materially eroded. In this part the 5-inch surface layer is a light yellowish-brown cherty silt loam. This material is brownish-yellow cherty plastic silty clay that grades to mottled cherty silty clay or cherty clay at depths of 10 to 14 inches.

In the eroded areas the surface soil is more yellowish-brown and finer in texture. It consists of the remain-

ing original surface and subsurface layers mixed with the upper part of the subsoil. It is hard when dry and sticky when wet. More chert is concentrated on the surface in the eroded areas because the finer textured materials have been washed away. Limestone bedrock is at depths ranging from 1 to 3 feet. Outcrops and a few fragments of limestone are on the surface.

On some of the stronger slopes, chert has rolled down from higher lying bedrock and has accumulated mainly in the surface soil. The subsoil on these slopes commonly is brownish-yellow plastic silty clay or clay containing very little chert.

This soil is low in organic matter and medium to strongly acid. The subsoil is slowly permeable to moisture.

Use and suitability.—About half of this soil is in cutover forest consisting of hardwoods mixed with cedar. The rest of the acreage has been cleared and used for crops. Part of the cleared area is now used for cotton, lespedeza hay, and a few other crops, and part of it is in unimproved pasture or is idle. Cotton gets regular applications of moderate amounts of fertilizer. Winter cover crops are not very commonly grown.

The unfavorable characteristics of this soil make it poorly suited to cultivation. If properly fertilized, limed, and seeded, it will produce a desirable stand of pasture plants. The carrying capacity, however, is limited by lack of moisture during dry periods of the growing season. This soil is in capability unit IVe-12.

Colbert loam, undulating phase (Cl).—This soil differs from the silt loam Colbert soils in texture of the surface soil. It consists of a thin layer of alluvium or colluvium that contains a considerable amount of sand and overlies residuum from clayey limestone. The internal drainage of Colbert loam is a little better than that of Colbert silt loam soils, and the plow layer has somewhat more favorable tilth. Slopes range from about 2 to 6 percent, but mostly from 1 to 5 percent. This soil occurs in association with the Talbott, Monongahela, Jefferson, and Dowellton soils and with other Colbert soils.

Profile description:

0 to 6 inches, grayish-brown or light yellowish-brown loam.
6 to 12 inches, brownish-yellow silty clay loam; friable.
12 to 22 inches, brownish-yellow silty clay, somewhat mottled in the lower part; plastic.
22 inches +, mottled gray and yellow silty clay; plastic.

Limestone bedrock is at depths ranging from 1½ to 4 feet.

This soil is low in organic matter. The subsoil is slowly permeable to roots and moisture, but tilth and the capacity to hold water that plants can use are noticeably better than in the Colbert silt loam soils.

Use and suitability.—Only a small part of this soil has been cleared and used for crops. Most of it is in cutover forest consisting of hardwoods mixed with cedar. The soil is suitable for cultivation and pasture, but its productivity is restricted by shallowness to clay and to bedrock. It is in capability unit IIIe-12.

Colbert loam, eroded undulating phase (Cg).—This soil differs from the undulating phase of Colbert loam mainly in having lost much of the original surface soil through erosion. The plow layer now consists of a brownish-yellow loam or clay loam. In the more heavily eroded areas, the plow layer is mainly a brownish-yellow silty clay loam or clay. The subsoil is a brownish-yellow plastic silty clay grading to mottled parent material. Limestone bedrock is at depths ranging from 1 to 4 feet.

This soil is low in organic matter and medium to strongly acid. Tilth of the surface soil is fair, but workability becomes more difficult as the percentage of clay increases in the plow layer. The surface soil has a moderately good capacity to absorb moisture, but the permeability of the clayey subsoil to moisture and roots is slow. Colbert loam is subject to erosion because of the moderately friable surface soil and relatively tight subsoil. This soil responds to adequate fertilization and to other good management practices.

Use and suitability.—All of this soil has been cleared and used for crops. Most of it is now used mainly for cotton, lespedeza, and pasture. Some acreage is used for corn, grain sorghum, and hay other than lespedeza. This soil is suitable for cultivation, but the number of crops that can be grown and the yields are restricted by unfavorable characteristics. If this soil is properly fertilized and seeded, a desirable stand of pasture plants can be established. The pasture carrying capacity, however, is reduced by droughtiness in dry weather. This soil is in capability unit IIIe-12.

Colbert loam, rolling phase (Ck).—This soil differs from the undulating phase of Colbert loam mainly in slope. It has slopes that range from about 6 to 12 percent. It is associated with the Talbott, Jefferson, Monongahela, and Dowellton soils and with other Colbert soils. The 5-inch surface layer is grayish-brown or light yellowish-brown loam. Below this layer is a brownish-yellow silty clay loam to plastic silty clay. At a depth of about 16 inches is mottled yellow and gray plastic clay. Limestone bedrock is at depths ranging from 1 to 3 feet. A few outcroppings and loose fragments of limestone are on the surface and in the soil.

This soil is low in organic matter and medium to strongly acid. Tilth of the surface soil is good, but areas where the underlying material is within plow depth are hard to work. The subsoil is very slowly permeable to roots and moisture.

Use and suitability.—Nearly all of this soil is in cutover forest consisting of hardwoods mixed with cedar. This soil is suitable for cultivation and for pasture, but its unfavorable characteristics limit the crops that can be grown and the yields that can be obtained under good management. It is in capability unit IVe-12.

Colbert loam, eroded rolling phase (Cf).—This soil differs from Colbert loam, rolling phase, chiefly in having lost much of the original surface soil through erosion. Slopes range from 6 to 12 percent. This soil occurs in association with the Talbott, Jefferson, and Allen soils and with other Colbert soil.

The plow layer consists of remnants of the original surface soil mixed with subsoil. It is now predominantly a brownish-yellow loam or clay loam. On the more exposed knobs from which nearly all the surface soil has been lost, the plow layer is a brownish-yellow,

plastic, very firm clay or silty clay. The subsoil is a mottled yellow and gray plastic clay or silty clay. Limestone bedrock is at depths ranging from ½ to 2½ feet. Rock outcrops are fairly common, but they do not seriously interfere with tillage.

This soil is low in organic matter and medium to strongly acid. The subsoil is slowly permeable to roots and moisture, and its capacity to hold water that plants can use is low. Runoff becomes rapid if this soil is cropped, particularly in areas used for row crops. Internal drainage remains slow but is offset by slow absorption. As a result, internal drainage is ample to excessive throughout the growing season.

Erosion has increased the rate of runoff and impaired workability, tilth, and moisture absorption. Much of the friable surface soil has been washed away, and subsoil material has been exposed. As a result, the soil is harder to work and the range in moisture content suitable for tillage has been narrowed. The soil puddles if worked when too wet and clods if worked when too dry.

Use and suitability.—This soil has all been cleared and used for crops. A considerable acreage is now idle or in unimproved pasture, and a part is used mainly for cotton and lespedeza. Cotton is fertilized regularly, but other crops are not. The soil responds to adequate fertilization, but its unfavorable characteristics make it only fairly well suited to cultivation. If properly managed, good stands of desirable legumes and grasses can be developed for pasture. The carrying capacity, however, is limited during the dry parts of the growing season. This soil is in capability unit IVe-12.

Colbert loam, hilly phase (Ch).—This soil differs from the rolling phase of Colbert loam chiefly in slope. It also differs in having less depth to bedrock and more numerous rock outcrops. Slopes range from 12 to 20 percent or more. The soil occurs in association with the Talbott, Dowellton, and Hollywood soils and with other Colbert soils.

The 4- or 5-inch surface layer is a light yellowish-brown loam. Below this layer is brownish-yellow plastic silty clay to silty clay loam that is mottled yellow and gray below depths of 10 to 15 inches. Limestone bedrock is at depths ranging from ½ to 2 feet.

Rock outcrops are common but do not prevent tillage. Chert and limestone fragments are numerous enough in some areas to interfere somewhat with cultivation. In the few areas that have lost much of the surface soil through erosion, the plow layer is now a brownish-yellow silty clay or silty clay loam.

This soil is low in organic matter and medium to strongly acid. The subsoil is slowly permeable to roots and moisture. Areas where the subsoil is at the surface are very difficult to work.

Use and suitability.—Most of this soil is in cutover forest consisting of hardwoods and cedar; very little of it is used for crops. Its unfavorable characteristics make it poorly suited to cultivation. It can be used for pasture and, if properly fertilized and seeded, will produce good stands of pasture plants. However, the expense of establishing pasture may exceed the returns. The carrying capacity is very limited because this soil is rather droughty during the drier parts of the grazing season. Most of this soil is best used for forestry. Colbert loam, hilly phase, is in capability unit VIe-2.

Cotaco Series

Cotaco silt loam (Ct).—This somewhat poorly drained soil has formed from young local alluvium that washed from adjacent higher lying Tilsit, Linker, and associated soils. It has parent material similar to that of the Barbourville soils. It differs from those soils, however, in being less well drained. Cotaco silt loam occupies gently sloping strips along the upland drainageways and at the heads of draws on the smooth uplands of Little Mountain.

Profile description:

0 to 12 inches, light yellowish-brown silt loam; the upper 4 inches contains organic matter in noticeable amounts.

12 to 24 inches, mottled gray and yellowish-brown silty clay loam; very friable; weak or very weak blocky structure.

24 to 36 inches, mottled yellow, gray, and brown fine sandy loam to fine sandy clay loam or silt loam; more or less stratified.

Sandy shale or sandstone bedrock is at depths ranging from 2½ to 6 feet or more.

The subsoil is somewhat more sandy in places. In some areas it contains, at depths ranging from 8 to 15 inches, a comparatively dark layer that was an old surface soil before the alluvium was deposited.

This soil is strongly acid, and it contains moderate amounts of organic matter and fair amounts of plant nutrients. Its capacity to hold water that plants can use is high. The surface layer has good tilth; roots and moisture penetrate the subsoil easily. The position on the landscape favors good moisture relations during most of the growing season. In the warm, moist periods of the growing season, this soil is too wet for some crops. The lower lying areas along the drainageways are subject to flooding during heavy rains.

Use and suitability.—Most of this soil has been cleared and is used mainly for corn, soybeans, lespedeza, and cotton. Many areas are used continually for row crops. Fertilizers are applied to cotton, but other crops do not get it consistently.

This soil is suitable for cultivation, but inadequate drainage limits the number of crops that can be grown. Corn, grain sorghum, soybeans, lespedeza, and certain legumes and grasses for hay and pasture are well suited. Cotton yields well during exceptionally dry seasons, but the crop may fail during wet seasons. Lime and large quantities of fertilizer are needed for legumes and grasses. Pastures are good in midsummer because the soil provides enough moisture for plants during a good part of the dry season. This soil is in capability unit IIw-1.

Cumberland Series

Soils of the Cumberland series are well drained, and they have developed from old general alluvium derived principally from soils that weathered from limestone. They resemble the Decatur soils, but their subsoils are less firm and contain less clay. They are widely distributed throughout the Tennessee Valley and much of the Moulton Valley. They are on what are apparently

very old remnants of stream terraces. They occur with soils formed in place, as the Decatur, Dewey, and Talbott soils. The Cumberland silt loams, silty clays, and silty clay loams are so similar to the Decatur soils and occur in such intricate association that it was difficult to map them separately. Accordingly, they have been mapped with the Decatur soils as undifferentiated Decatur and Cumberland mapping units.

Cumberland loam, undulating phase (Cc and Cw).—The maximum slopes of this soil are generally 3 percent but in places are as much as 6 percent. This soil occurs with the Etowah, Nolichucky, and Waynesboro soils in the Tennessee Valley.

Profile description:

0 to 5 inches, grayish-brown to dark-brown loam.
5 to 9 inches, reddish-brown silt loam to silty clay loam; friable.
9 to 20 inches, reddish-brown to red silty clay loam; firm but friable; medium subangular blocky structure.
20 to 50 inches, dark-red or dark reddish-brown silty clay; streaks or splotches of yellow and gray increase with depth; firm; structural aggregates are coarser as depth increases.

Limestone bedrock is at depths ranging from 4 to 20 feet.

The loam layer ranges from 9 to 12 inches in thickness, and in places the subsoil contains a noticeable amount of sand. Below depths of 3 to 5 feet, the material is believed to be residuum from limestone. Small dark concretions are in most of the profile. In some places small rounded pebbles of quartzite are imbedded in the soil.

This soil contains moderate amounts of plant nutrients and organic matter, and it is medium to strongly acid. Its capacity for holding water that plants can use is moderate. The surface soil has good tilth, and the subsoil is firm but permeable to roots and moisture.

Use and suitability.—Most of this soil is in cultivation. It is well suited to this use and to pasture. It responds to fertilizer and retains plant nutrients well. If managed properly it produces high yields of practically all the commonly grown crops, including cotton, alfalfa, grain sorghum, and legumes and grasses for hay and pasture. Most of the soil is on mild slopes, so erosion is usually not serious. Terraces may be needed in places, but generally this soil is not difficult to conserve and to keep highly productive. Cumberland loam, undulating phase, is in capability unit IIe-7.

Cumberland loam, eroded undulating phase (Cb and Cv).—This well-drained soil differs from the undulating phase of Cumberland loam, chiefly in having lost part of its original surface soil through erosion. The plow layer now consists of surface soil mixed with subsoil; it is dark reddish-brown to reddish-brown loam or clay loam. Below the plow layer, the soil ranges from reddish-brown silty clay loam to red firm but friable silty clay loam or silty clay. Below about 40 inches are streaks or splotches of yellow and gray. Limestone bedrock is at depths ranging from 4 to 20 feet. The alluvium from which the soil has formed is less thick in Moulton Valley than in the Tennessee Valley. Areas of this soil are 5 to more than 25 acres in size.

In places that have lost all the original surface soil, the plow layer is dark reddish-brown or red firm silty clay loam or silty clay. Very small dark concretions are common throughout the subsoil. A few small rounded pebbles of quartzite occur.

This soil contains moderate amounts of organic matter in the plow layer, except where all of the original surface soil has been lost. It is medium to strongly acid and has a moderately high capacity to hold water that plants can use. The capacity to absorb moisture has been greatly reduced in the severely eroded areas. The soil responds well to fertilization and holds plant nutrients well. Tilth of the plow layer in the less eroded areas is good; in the severely eroded areas it is poor because of the plastic clay in the plow layer. The subsoil is permeable to roots and moderately permeable to moisture.

Use and suitability.—All of this soil has been cleared and used for crops. A large percentage is now used mainly for cotton and for winter legumes in rotation with cotton. Corn, lespedeza, grasses and other legumes for hay are also commonly grown. Part of the acreage is in pasture.

Favorable characteristics make this one of the most desirable soils of the county. It is suitable for many kinds of crops, including cotton and grasses and alfalfa and other legumes for hay or pasture. Productivity is easily maintained. Runoff should be controlled on the stronger slopes. This soil is in capability unit IIe-7.

Cumberland loam, eroded rolling phase (Ca and Cu).—This soil differs from the eroded undulating phase of Cumberland loam chiefly in slope. It occupies slopes ranging from about 6 to 12 percent and occurs in association with the Waynesboro, Nolichucky, Decatur, and other Cumberland soils. The original surface soil has been partly lost through erosion. The plow layer now consists of the original surface soil mixed with subsoil, and in most places it is a reddish-brown loam or clay loam. The subsoil ranges from reddish-brown to dark-red firm silty clay or silty clay loam. Below a depth of about 30 inches, the subsoil is streaked or splotched with yellow and gray and is predominantly silty clay. Limestone bedrock is at depths ranging from 3 to 16 feet.

On the exposed knobs where the original surface soil is gone, the plow layer is red very firm silty clay or silty clay loam.

This soil is fairly high in plant nutrients, has a moderate amount of organic matter, and is medium to strongly acid. It responds well to fertilizers. The subsoil is firm but permeable to roots and moisture. Infiltration of water is somewhat retarded, and as a result there is more runoff from this soil than from some of the more open soils, as those of the Hartsells series.

Use and suitability.—All of this soil has been cleared and used for crops. Most of it is now used mainly for cotton, corn, and hay. On part of the acreage, winter legumes are grown in rotation with cotton. Cotton is heavily fertilized. Some farmers use fairly large amounts of fertilizer on corn.

This is a desirable soil because it is suitable for many kinds of crops and is capable of high yields if management is good. The runoff from the strong slopes will erode the soil, and much of the acreage should be used in moderately long rotations that include close-growing

crops. Cumberland loam, eroded rolling phase, is in capability unit IIIe-8.

Decatur and Cumberland Soils

In Lawrence County, soils of the Decatur series and the Cumberland series occur in intricate association and are similar in many profile characteristics and in use and management requirements. They were therefore mapped as undifferentiated units. As previously stated, the soils of the Cumberland series have formed from old general alluvium that came principally from soils that weathered from limestone. In areas where this alluvium is very thin or lacking, the underlying silty clay residuum from high-grade limestone is exposed. This residuum is the parent material of the Decatur soils. The main recognizable differences in the Decatur and Cumberland soils are the more permeable, friable upper subsoil and the occasional small rounded quartzite pebbles in the Cumberland soils.

The undifferentiated Decatur and Cumberland mapping units are mainly in the central part of the Tennessee Valley and in Moulton Valley. They occur in association with the Abernathy, Ooltewah, and Etowah soils and with other members of their own series.

Decatur and Cumberland silt loams, undulating phases (Dc).—This mapping unit occurs on broad smooth topography having slopes of less than 6 percent. Most slopes are less than 3 percent. As erosion has not been very active, the plow layer consists almost entirely of the original surface soil.

Profile description of Decatur silt loam:

0 to 3 inches, dark reddish-brown heavy silt loam or silty clay loam; friable.
3 to 20 inches, dusky-red to dark-red silty clay; friable to firm; breaks fairly easily to subangular blocky pieces ½ to 1 inch in diameter.
20 to 60 inches, dark-red clay to silty clay; firm grading to very firm with depth.
60 inches +, light red plastic clay splotched with yellow.

Limestone bedrock is at depths ranging from 5 to 20 feet.

In some places the surface layer is as much as 6 inches thick. Small dark concretions are common throughout this soil, especially in the subsoil. A few small angular chert fragments occur below a depth of about 30 inches.

Profile description of Cumberland silt loam:

0 to 9 inches, dark-brown to dark reddish-brown silt loam that grades to a red silty clay loam as depth increases.
9 to 33 inches, red silty clay loam that grades to a dark-red silty clay; breaks easily into firm subangular fragments ½ to 1 inch in diameter.
33 to 50 inches, dark-red firm silty clay mottled with brown.
50 inches +, red silty clay splotched or streaked with light red and yellow; very firm; breaks to somewhat larger and more angular fragments than material in layer above.

Limestone bedrock is at depths ranging from 5 to 20 feet.

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The surface soil is 6 to 10 inches thick. Small dark concretions are common throughout this soil, especially in the subsoil. In places there is a noticeable quantity of sand to depths of 2 or 3 feet and a few small rounded pieces of quartzite gravel.

Decatur and Cumberland silt loams, undulating phases, are high in plant nutrients and organic matter and are medium acid. The firm subsoil reduces infiltration of moisture, but it is well drained and permeable to roots and moisture. The plow layer has fairly good tilth, but it has a tendency to stick to tillage implements. The risk of erosion is not great. Moisture relations generally are favorable for all the commonly grown crops, except for short periods during the driest part of the growing season.

Use and suitability.—Practically all of this soil has been cleared and is used for crops. Cotton is the main crop, but in some places leguminous cover crops are used in rotation with cotton. Corn and lespedeza, and alfalfa for hay, are also commonly grown. Crops, especially cotton, commonly receive moderately heavy applications of fertilizer.

These are some of the most desirable soils of the county for general agriculture. Their favorable characteristics and response to fertilizer make them very productive and suited to intensive use. They are especially suitable for cotton and for the more desirable legumes and grasses for hay and pasture. These soils are in capability unit IIe-7.

Decatur and Cumberland silty clay loams, eroded undulating phases (Dc).—This mapping unit differs from the undulating phases of Decatur and Cumberland silt loams in having lost much of its original surface soil through erosion. It is the most extensive of the undifferentiated Decatur and Cumberland soils. It occupies smooth landscapes on slopes that have a maximum gradient of 6 percent.

The 5- or 6-inch surface layer consists of brownish-red silty clay loam. Below this layer is a dark reddish-brown or dark-red firm to very firm silty clay or silty clay loam. Limestone bedrock is at depths ranging from 5 to 20 feet. Fine to very fine dark concretions occur throughout the soil. In the more exposed areas where nearly all the original surface soil is gone, the plow layer is dark reddish-brown or dark-red firm silty clay.

Tilth of the plow layer is fair to good where erosion has not been severe. It is poor where all the surface soil is gone. The material in the plow layer sticks to tillage implements. The soil is permeable to roots and moisture. Its capacity to hold water that plants can use is moderately high, except during the dry parts of the growing season. The firm subsoil reduces infiltration of moisture and is the cause of rapid surface runoff. Internal drainage is rapid.

Use and suitability.—All of this mapping unit has been cleared, and most of it is now in crops or pasture. Cotton is the main crop, but in the Moulton Valley corn and hay are also important. Other crops are fall-sown small grains, soybeans, grain sorghum, and field peas. Winter legumes and small grains are grown to some extent. Cotton and alfalfa are fairly heavily fertilized. Much of the acreage is used continually for

cotton in the Tennessee Valley and for cotton and corn in the Moulton Valley.

This mapping unit contains some of the most desirable agricultural soils in the county. It is especially suitable for cotton and for alfalfa and other deep-rooted legumes. It is also suitable for many other crops, including corn and legumes and grasses for hay and pasture. The more severely eroded areas are less well suited to corn and truck crops, because of the reduced supply of available moisture. These soils respond well to management and fertilization, and high productivity is easily maintained. The areas of strongest slopes are subject to erosion and require conservation practices. This mapping unit is in capability unit IIe-7.

Decatur and Cumberland silty clay loams, eroded rolling phases (Db).—This mapping unit differs from the eroded undulating phases of Decatur and Cumberland silty clay loams chiefly in having greater slope and more erosion. It occupies slopes of 6 to 12 percent.

Much of the original surface soil has been lost through erosion. The 5- or 6-inch surface layer is a brownish-red moderately friable silty clay loam. It consists of the remaining original surface soil mixed in tillage with the upper part of the subsoil. Under this layer is a dark reddish-brown or dark-red firm to very firm silty clay loam grading to silty clay. The transition from the present surface soil to the subsoil is abrupt. Bedrock of high-grade limestone is at depths ranging from 4 to 16 feet.

On the more severely eroded stronger slopes, all of the original surface soil is gone and the plow layer now is a dark reddish-brown to red firm to very firm silty clay. There are gullies on some of the more eroded parts, but most of these can be filled in by use of heavy tillage implements.

The characteristics of these soils vary according to the amount of original surface soil that has been lost through erosion. The soils are moderately fertile, have a fair amount of organic matter, and are medium to strongly acid. They are well drained and permeable to roots and moisture. Their capacity to hold water that plants can use is moderately high. Infiltration of moisture is somewhat reduced by the firm, compact subsoil, particularly where most of the original friable surface soil has been lost through erosion. This causes the soils to be droughty during dry periods of the growing season. Tilth of the surface layer ranges from moderately good to poor.

Use and suitability.—All areas of Decatur and Cumberland silty clay loams, eroded rolling phases, have been cleared and cultivated. Most of them are now used for cotton. A small total acreage is in hay, chiefly lespedeza (fig. 4) and alfalfa, and in small grains, soybeans, grain sorghum, and field peas. Much of the acreage is used continually for cotton. In some areas winter legumes are grown in rotation with cotton.

These soils are suitable for many kinds of crops and pasture. The strong slopes and erosion limit the productivity and the intensity with which the soils can be used for row crops. The soils respond well to fertilizers, but they should be cultivated along the contour and protected by close-growing winter cover crops. This mapping unit is in capability unit IIIe-8.

Decatur and Cumberland silty clays, severely eroded undulating phases (Df).—Areas of this mapping unit are small and irregular. They range from less than 10 to about 40 acres in size. Slopes range from 2 to 6 percent.

These soils have lost nearly all the original surface soil and, in places, part of the subsoil. The 4- or 5-inch surface layer consists of dark reddish-brown or dark-red firm or very firm silty clay. The transition from the surface soil to the subsoil is very abrupt. The subsoil, similar to that of the less eroded undulating phases, becomes very firm and more clayey as depth increases. Limestone bedrock is at depths ranging from 3½ to 20 feet.

Gullies are fairly common on the more severely eroded stronger slopes, but usually they are shallow and can be filled in by use of heavy tillage implements. A few gullies are deep and require special handling to make the fields tillable.

Figure 4.—Pasture of sericea lespedeza on Decatur and Cumberland silty clay loams, eroded rolling phases.

The soils are moderately fertile, moderate to low in organic matter, and medium to strongly acid. They are permeable to roots and moisture. The capacity to hold moisture that plants can use is low, and these soils are therefore droughty. Internal drainage is rapid, but runoff collects rapidly and causes erosion on recently cultivated areas. The loss of soil through erosion has reduced the infiltration rate. The plow layer has poor tilth because of the high content of clay. It puddles easily if cultivated when too wet and forms hard clods if cultivated when too dry.

Use and suitability.—These soils have been cleared and intensively used, mainly for cotton. As a result they have been damaged by erosion. Most of the soils are still used mainly for cotton, but smaller acreages are used for corn, soybeans, lespedeza, and other crops.

Some of the acreage is idle or in unimproved pasture. Crop yields are low, but they can be improved because the soils are moderately fertile and respond fairly well to management. The soils need adequate control of runoff and erosion and additional organic matter to improve soil structure. These soils are in capability unit IIIe-8.

Decatur and Cumberland silty clays, severely eroded rolling phases (De).—This mapping unit has lost nearly all the original surface soil and in places parts of the upper subsoil. It occupies small areas on slopes ranging chiefly from 6 to 12 percent.

The 4- or 5-inch surface layer is a dark reddish-brown to dark-red firm or very firm silty clay. It consists mainly of upper subsoil, which extends to depths ranging from 20 to more than 48 inches. Below this layer is a red, very firm silty clay, splotched with yellow and gray. Limestone bedrock is at depths ranging from 3 to 15 feet.

These soils have a fairly large amount of plant nutrients and are medium to strongly acid. Erosion has reduced the supply of organic matter, impaired tilth and workability, and decreased moisture absorption. The soils are permeable to moisture and roots, and they have a low capacity to hold water that plants can use. However, they are droughty during dry periods of the growing season, because of their reduced capacity to absorb and hold moisture from summer rains. Small gullies are common, but they can be easily filled in by use of heavy tillage implements; a few are difficult to cross with machinery.

Use and suitability.—All areas of these soils have been cleared and cultivated. Much of the acreage is still cropped, but a considerable part is in unimproved pasture, volunteer forest, or idle areas. Cotton is the chief crop, but lespedeza, corn, soybeans, grain sorghum, small grains, and hay are also grown. A small acreage is in improved pasture. Fertilizers are commonly used, especially for cotton, but yields of all crops are generally not very high.

Management requirements are rather exacting on these soils because of their unfavorable characteristics and tendency to erode when cultivated. These soils respond to management that includes use of fertilizers, addition of organic matter, and careful tillage. If properly managed, they are good for cotton, corn, grain sorghum, and many of the more desirable legumes and grasses. Row crops should be grown only occasionally, unless management includes runoff control. These soils can be used safely for pasture. They are in capability unit IVe-2.

Decatur and Cumberland silty clays, gullied phases (Dd).—This mapping unit consists of small areas, generally of 3 or 4 acres, that have lost most of the surface soil and subsoil through erosion. Most areas are cut by many gullies. Slopes generally range from 6 to 12 percent, but some are less.

Most of the acreage consists of gullied Cumberland, Decatur, and Dewey soils on which the 2- or 3-foot surface material is predominantly red or yellowish-red firm to very firm silty clay or silty clay loam. Limestone bedrock is deep and is very seldom exposed. Areas of gullied Talbott or Colbert soils included in this mapping unit are more reddish-yellow or yellowish-brown and are extremely firm or plastic clay. Limestone bedrock is at a shallow depth in these areas. Included areas of gullied Allen soils are red, moderately friable, and moderately deep to limestone bedrock.

Gullies in the Decatur, Dewey, Cumberland, Talbott, and Colbert soils can be filled in by use of heavy tillage implements. Gullies in the Allen soils are several feet deep and require special treatment.

This mapping unit is generally very low in organic matter, but there is a fair to moderate supply of plant nutrients in some places. Practically all of it is medium to strongly acid. The surface layer has poor tilth, and infiltration of moisture has been noticeably reduced. The subsoil usually is permeable to roots and moisture, but its capacity to hold water that plants can use is very low. Consequently, the soils are limited in moisture during dry periods of the growing season.

Use and suitability.—All of this mapping unit has been cleared and cultivated. Most of it is now idle or reseeding to forest trees. Most of the acreage can be made suitable for cultivation if the fields are smoothed and made tillable, large quantities of fertilizer are applied, and tilth is improved by additions of organic matter. If carefully managed to maintain productivity, the soils can be used for cotton and the deeper rooted legumes. However, the best use for most of the acreage is permanent pasture. This mapping unit is in capability unit IVe-2.

Dewey Series

Soils of the Dewey series are well-drained upland soils. They have formed from limestone of moderately high grade. Like the Decatur soils, they are fertile and deep to bedrock, but they differ from them chiefly in having a lighter brown surface soil and a lighter red somewhat more friable upper subsoil. Dewey soils in Lawrence County contain enough chert to interfere with tillage. Practically all their small total acreage occurs between the communities of Courtland and Town Creek.

Dewey cherty silty clay loam, eroded undulating phase (Dh).—This soil has lost much of its original surface soil through erosion. It occupies slopes ranging from 2 to 6 percent. It occurs in association with Dewey cherty silty clay loam, eroded rolling phase, and with the Decatur and Cumberland soils.

Profile description:

0 to 7 inches, dark-brown to reddish-brown cherty silt loam to cherty silty clay loam; friable.
7 to 12 inches, reddish-brown to yellowish-red cherty silt loam to cherty silty clay loam.
12 to 28 inches, yellowish-red to dark-red cherty silty clay loam or cherty silty clay; firm; breaks easily to subangular fragments from ½ to 1 inch in diameter.
28 to 38 inches +, yellowish-red cherty silty clay splotched with reddish yellow and yellowish brown; firm or very firm.

Bedrock of high-grade cherty limestone is at depths ranging from 8 to 12 feet.

The quantity of chert varies considerably, but in nearly all places it interferes with cultivation. The texture and color of the plow layer differ according to the amount of surface soil lost through erosion. In

the most severely eroded areas the plow layer is yellowish-red cherty silty clay loam.

This soil is moderately fertile, but it is somewhat less fertile than the Decatur and Cumberland soils. It is medium to strongly acid and has a moderate capacity for holding water that plants can use. The surface layer contains a small amount of organic matter where erosion has not been very severe. Tilth of the plow layer is generally good, except in severely eroded areas where the soil is clayey. The firm subsoil retards percolation, but it is permeable to roots and moisture. Drainage is adequate for all crops, including cotton and alfalfa.

Use and suitability.—Nearly all of this soil has been cleared and cultivated. Most of it is now used mainly for cotton, but smaller acreages are in corn or hay, chiefly lespedeza and alfalfa. Some acreage is in small grains, soybeans, grain sorghum, and field peas. Cotton is fertilized moderately heavily, and part of the cotton acreage is used in rotation with winter legumes.

This soil responds well to fertilizer, and productivity can be kept moderately high without difficulty. Its favorable characteristics make it suitable for many kinds of crops, including cotton, corn, alfalfa, small grains, soybeans, and practically all of the legumes and grasses commonly grown for hay or pasture. There is some risk of erosion on the stronger slopes, but erosion can be controlled without difficulty. This soil is somewhat less desirable for general agriculture than the Decatur and Cumberland soils. Dewey cherty silty clay loam, eroded undulating phase, is in capability unit IIe-7.

Dewey cherty silty clay loam, eroded rolling phase (Dg).—This soil differs from the eroded undulating phase of Dewey cherty silty clay loam chiefly in slope. In most places gradients range from 6 to 12 percent.

The 4- or 5-inch surface layer is a brown to reddish-brown cherty silty clay loam. Below this layer is a yellowish-red or brownish-red firm to very firm silty clay or silty clay loam. Below a depth of 28 inches the material is red firm to very firm cherty silty clay, faintly splotched with reddish yellow, brown, and yellowish brown. Bedrock of cherty limestone is at depths ranging from 7 to 18 feet.

In many areas the original surface soil is nearly all gone. Here the plow layer is a yellowish-red or brownish-red very firm silty clay containing moderate amounts of chert. A few small gullies have formed in some of these areas.

This soil is moderately fertile and has a rather small amount of organic matter. It is medium to strongly acid. It has a moderate capacity to hold water that plants can use, but it tends to be droughty in the driest periods of the growing season. The plow layer has fairly good tilth, but chert interferes with cultivation to some extent. The firm subsoil retards percolation, but it is permeable to roots and moisture. Drainage is good. Chert in the surface soil helps absorb moisture and retards evaporation from the surface.

Use and suitability.—This soil has all been cleared and cultivated. Most of it is now used mainly for cotton.

This soil is fairly productive, and it responds to management. If properly managed it is well suited to many kinds of crops, including cotton, corn, and the more desirable legumes and grasses for hay and pasture. In some places the chert on the surface makes the harvesting of hay somewhat difficult. Cultivation on the strong slopes should be along the contour to prevent erosion. Rotations should include close-growing crops to protect the soil, especially in winter. This soil is in capability unit IIIe-8.

Dowellton Series

Dowellton silty clay loam (Dk).—This somewhat poorly drained, plastic, clayey soil has developed from argillaceous limestone. It differs from the Colbert soils in being more poorly drained and, consequently, in having a less well-developed profile. The relief is nearly level to gently undulating. Most of the soil is in the west end of the Moulton Valley. A few small areas are in other parts of the Moulton Valley and in the southwestern part of the Tennessee Valley.

Profile description:

0 to 3 inches, brown or grayish-brown silty clay loam with mottles of gray.
3 to 8 inches, mottled yellowish-brown and light-gray clay; very firm; extremely plastic.
8 to 36 inches, mottled brownish-yellow, gray, and red clay; very firm; extremely plastic.

Limestone bedrock is normally at depths of 1 to 3½ feet, but it is exposed in a few places.

This soil is low in plant nutrients and organic matter and medium to strongly acid. The capacity for holding available moisture is low; consequently, the soil is droughty in dry periods. The plow layer has poor tilth because it is plastic and firm. Infiltration is low, and the soil is not easily penetrated by roots and moisture. Internal drainage is very slow, and surface drainage is slow.

Use and suitability.—From one-third to one-half of this soil has been cleared and cultivated. Some of the cleared acreage is now used for crops and permanent pasture. Yields are not high. The rest of the acreage is in cutover forest consisting mainly of oak, hickory, and other hardwoods mixed with some cedar and shortleaf pine.

The unfavorable characteristics of this soil make it poorly suited to cultivation. It is productive enough for pasture if properly managed and adequately fertilized. The carrying capacity is considerably reduced by the lack of soil moisture in dry periods of the growing season. This soil is in capability unit IIIw-4.

Dunning Series

Dunning silty clay (Dl).—This poorly drained soil on the bottom lands is forming from comparatively young alluvium that originated mainly from argillaceous limestone. It occupies the upper parts of large drainageways and creeks and the tributaries throughout much of the Moulton Valley and the southern part of the Tennessee Valley. It occurs in nearly level areas subject to flooding in association with the Hollywood, Colbert, Talbott, Robertsville, Decatur, and Cumberland soils.

Profile description:

0 to 4 inches, dark-gray to very dark grayish-

brown silty clay; some concretions of brown to dark brown; plastic.
4 to 10 inches, very dark gray silty clay; numerous concretions of dark brown; very firm; extremely plastic.
10 to 36 inches, mottled very dark gray or olive-gray, brown and yellowish-red clay; very firm; extremely plastic.

Limestone bedrock is at depths ranging from 3 to 6 feet or more.

This soil is fertile and contains considerable amounts of organic matter in the upper 8 to 10 inches. It is ordinarily neutral to slightly acid, but some areas are medium acid. The soil absorbs moisture slowly, and it is not very permeable to roots or moisture. The plow layer has only fair tilth, but when the moisture content is favorable, it can be worked to a fairly good seedbed. The supply of moisture is normally too great, but drainage will make the soil more favorable for crops.

Use and suitability.—Some of this soil has been cleared, but a large percentage of it is still in forest consisting of water-tolerant hardwoods mixed with cedar. A large part of the cleared acreage is now in unimproved pasture of only fair quality. The soil can be improved for cultivation by adequately draining it through use of ditches. Tile drainage is not practicable, because the subsoil is compact and extremely plastic. If adequately drained and properly seeded to good pasture plants, this soil probably is best suited to permanent pasture. The carrying capacity will be high except in the wettest part of the growing season. Dunning silty clay is in capability unit IVw-2.

Enders Series

Soils of the Enders series are on uplands. They have developed from acid interbedded sandstone and shale. They are well drained and of moderate depth to bedrock. They occupy narrow ridgetops on Sand Mountain in association with the steep Muskingum soils.

Enders loam, rolling phase (Ec).—This soil is on slopes that range from 5 to about 10 percent. It is the most extensive soil of the Enders series.

Profile description:

0 to 4 inches, light yellowish-brown loam; friable; upper inch contains considerable partly decomposed organic matter that makes it noticeably darker than the rest of layer.
4 to 11 inches, yellowish-brown silty clay loam; friable; a few thin fragments of sandstone or sandy shale.
11 to 20 inches, strong-brown clay to silty clay loam; firm to very firm or compact; breaks easily to subangular fragments ½ to 1 inch in diameter.
20 to 36 inches, mottled strong-brown, yellow, and red silty clay or clay; very firm; tough.
36 to 46 inches, red, gray, and pale-yellow thinly interbedded shale and sandstone; laminated; partly weathered; gradual transition to weathered, firmer bedrock of interbedded shale and sandstone.

Thin fine fragments of sandstone or sandy shale are common throughout the profile. In some places, below a depth of 20 inches, the texture of the parent material ranges to silty clay loam. The quantity of shale and sandstone in the bedrock varies from place to place.

This soil is low in plant nutrients and organic matter and strongly to very strongly acid for its entire depth. It is well drained or moderately well drained and has a moderate capacity to hold moisture that plants can use. The firm subsoil impedes infiltration, but roots and moisture penetrate with moderate ease.

Use and suitability.—A large part of this soil is still in cutover hardwood forest because the narrow ridges on which it occurs are flanked by extensive areas of Muskingum soils that are very poorly suited to crops or pasture. Enders loam, rolling phase, is moderately well suited to cultivation, but productivity is limited by shallowness to bedrock and inadequate available moisture. Under present conditions, forestry is the best use of this soil. It is in capability unit IIIe-3.

Enders loam, eroded rolling phase (Eo).—This soil is south of Moulton; it occupies slopes ranging from 5 to 10 percent. It has been eroded to the extent that the plow layer now consists of original surface soil mixed with subsoil. This 4- or 5-inch layer is yellowish-brown loam. Below the plow layer is strong-brown firm to very firm or compact silty clay or silty clay loam. Below a depth of about 20 inches is mottled strong-brown, yellow, and red, very firm silty clay that grades to partly disintegrated shale and sandstone at a depth of about 36 inches.

In most places fine thin fragments of sandstone or sandy shale are in the profile. On the more exposed slopes where nearly all of the original surface soil is gone, the plow layer is a very firm, strong-brown silty clay.

This soil is low in plant nutrients and organic matter and strongly to very strongly acid. The capacity for holding moisture for plants is moderate. The soil is droughty during dry parts of the growing season, as infiltration of moisture is slow. The plow layer has fairly good tilth, except where the subsoil has been exposed. This clayey plow layer should not be worked when it is wet. The very firm subsoil retards infiltration of moisture, but moisture and roots penetrate the soil fairly well. Drainage is generally fairly good.

Use and suitability.—This soil has been cleared and cultivated. It is inside the William B. Bankhead National Forest, and most of it is now idle or reforesting. This soil is thought to be suited to cultivation, but its undesirable characteristics greatly limit its productivity and range of suitability for crops. This soil is in capability unit IIIe-3.

Enders loam, eroded undulating phase (Eb).—This moderately well drained soil differs from the rolling phase of Enders loam chiefly in having less slope and greater depth to bedrock. Slopes range up to 5 percent.

The 4- or 5-inch surface layer in most places consists of original surface soil mixed with subsoil; it is a light yellowish-brown loam. Below this and to a depth of about 16 inches is strong-brown, compact, firm to very firm sity clay loam or silty clay. Between the depths of 16 and about 25 inches is mottled strong-brown, yellow, and red very firm or tough silty clay. Below 25 inches is red, gray, and pale-yellow partly weathered, interbedded sandstone and shale.

The soil is low in plant nutrients and organic matter and strongly to very strongly acid. It has a moderate capacity for holding moisture that plants can use. The soil has a low rate of infiltration and is droughty during dry parts of the growing season. The plow layer has fairly good tilth. The very firm subsoil noticeably retards percolation of moisture. Nevertheless, the soil is permeable to roots and moisture.

Use and suitability.—All of this soil has been cleared and cultivated, but most of it is now forested. It is suitable for cultivation, but its isolated position and inclusion in the William B. Bankhead National Forest make its use as cropland impractical. This soil is in capability unit IIe-3.

Etowah Series

Soils of the Etowah series, like those of the Cumberland series, have developed on old stream terraces consisting mainly of materials that originated from high-grade limestone. They are well drained to moderately well drained. Etowah soils are moderately fertile, are medium to strongly acid, and have moderate supplies of organic matter in the surface layer. The subsoil is permeable, and the plow layer has good tilth.

Compared with the Cumberland soils, the Etowah have a somewhat lighter colored surface soil, and the subsoil is more permeable. Also, the Etowah soils in some areas are on lower or younger stream terraces than the Cumberland soils. Compared with the Monongahela and Tupelo soils, the Etowah have a browner surface soil, better internal drainage, and a subsoil that lacks a strongly developed pan. However, much of the Etowah acreage contains a weak to moderate pan.

The Etowah series is widely distributed throughout much of the Tennessee and the Moulton Valleys. Etowah loams are more extensive than the silt loams or silty clay loams.

Etowah silt loam, undulating phase (Ef).—This soil has slopes of as much as 6 percent, but they are mostly less than 3 percent. The soil occurs as small areas bordered by soils on bottom lands and on low stream terraces.

Profile description of a well-drained area:

0 to 6 inches, dark-brown silt loam; friable; uncultivated areas are darker because the first 1½ to 2 inches contain more organic matter.
6 to 22 inches, yellowish-red to reddish-brown silty clay loam; firm; breaks easily to soft subangular fragments ½ to 1 inch in diameter.
22 to 46 inches, red silty clay loam; friable but firm; breaks to subangular fragments ½ to 1 inch in diameter that are of more definite shape than those in layer above.
46 inches +, red or yellowish-red silty clay loam splotched lightly with yellow and gray; friable.

Limestone bedrock is at depths ranging from 4 to 20 feet.

The surface layer is as much as 12 inches thick, and in places the subsoil contains chert.

Where internal drainage is somewhat impaired, the surface layer is yellowish-brown to dark-brown silt loam. Below this and to a depth of about 25 inches is strong-brown to yellowish-red friable silty clay loam. From a depth of 25 inches down to 32 inches there is mottled red and yellow friable silty clay loam that breaks easily to fine angular blocky pieces. At a depth of about 32 inches, the material is more dominantly a red silty clay mottled lightly with yellow.

This is one of the more fertile soils of the county, and it is medium acid. Supplies of organic matter are moderate. The capacity to hold moisture available is moderate. Moisture infiltrates at a fairly rapid rate. This soil is somewhat more permeable than the Cumberland soils.

Use and suitability.—Much of this soil is used continually for cultivated crops. Its favorable characteristics make it suitable for intensive cultivation and for pasture. It is suitable for many kinds of crops. This soil is in capability unit IIe-7.

Etowah silty clay loam, eroded undulating phase (Eh).—This soil has lost much of the original surface soil through erosion. It is associated with the Decatur and Cumberland soils, with other Etowah soils, and with some of the less well-drained soils such as those of the Monongahela series.

In most places the plow layer consists of the original surface soil mixed with subsoil; this layer is 4 to 5 inches of dark-brown to yellowish-brown silty clay loam. Below this layer the profile is similar to that of Etowah silt loam, undulating phase.

In some places fragments of chert are in the subsoil. The color and the texture of the plow layer vary, depending on the amount of soil that has been lost through erosion. In the less eroded smooth areas, the plow layer may be a dark-brown silt loam. In the more sloping areas where more of the original surface soil is gone, the plow layer normally is a yellowish-red friable silty clay loam.

This soil is medium acid. It has a moderately high capacity to hold moisture that plants can use. Moisture infiltrates fairly rapidly, although somewhat more slowly than in the undulating phase of Etowah silt loam. The plow layer has good tilth. The subsoil is fairly permeable to moisture and roots.

Use and suitability.—All of this soil has been cleared and cultivated. Most of it is now used mainly for cotton, but corn, soybeans, lespedeza, grain sorghum, winter legumes, and hay are also grown. Some of the acreage is in pasture. Moderate quantities of fertilizer are applied to row crops.

This is one of the more desirable soils. It is suitable for cultivation and pasture because of its favorable characteristics and good response to management. High productivity is easy to maintain. Erosion is somewhat of a hazard, but it can be controlled through management. This soil is in capability unit IIe-7.

Etowah silty clay loam, eroded rolling phase (Eg).—This soil differs from the undulating phase of Etowah silt loam chiefly in slope and erosion. Gradients range from 6 to 12 percent. The soil is associated with the Cumberland, Waynesboro, and Nolichucky soils, with the less well-drained Monongahela and Tupelo soils, and with other Etowah soils.

A considerable part of the original surface soil has been lost through erosion. The 4- to 6-inch surface layer now consists of remnants of the original surface soil mixed with subsoil; it is a dark-brown to yellowish-red friable silty clay loam. Below this layer, the ma-

terial is similar to that of Etowah silt loam, undulating phase. On the more exposed, stronger slopes, nearly all of the original surface soil is gone and the plow layer is a yellowish-red friable silty clay loam. In places there are chert fragments in the subsoil, but they do not interfere materially with tillage. Much of the acreage is eroding.

This soil is fertile, and it is permeable to roots and moisture. It has a moderately high capacity to hold moisture that plants can use. Infiltration of moisture in the more eroded areas is somewhat slower than it is in the less eroded areas. Tilth of the plow layer is fairly good, except on the severely eroded areas containing too much clay. In these spots the soil is harder to work and puddles easily if worked when too wet.

Use and suitability.—All of this soil has been cleared and cultivated. Most of it is now used mainly for cotton, but corn, winter legumes, soybeans, grain sorghum, and hay, chiefly alfalfa and lespedeza, are also grown. Cotton is commonly fertilized.

This soil is suitable for many crops, but they should be grown in moderately long rotations made up of grass, small grains, and hay. All cultivation should be along the contour, and in places terraces should be built. This soil is also well suited to pasture consisting of grasses and legumes. Etowah silty clay loam, eroded rolling phase, is in capability unit IIIe-8.

Etowah loam, undulating phase (Ee).—This well-drained soil occurs in areas ranging from a few acres to about 20 acres in size. It is associated with the Waynesboro, Nolichucky, Monongahela, Holston, and Robertsville soils and with other Etowah soils.

Profile description:

0 to 6 inches, brown to dark-brown loam.
6 to 22 inches, yellowish-red to red clay loam or silty clay loam; friable but firm.
22 to 45 inches, predominantly red silty clay loam; friable but firm; breaks easily to irregular fragments ranging from ½ to 1 inch in diameter.
45 inches +, red or yellowish-red silty clay, weakly splotched or mottled with yellow and gray; friable.

Limestone bedrock is at depths ranging from 4 to 20 feet or more.

In areas that have impaired internal drainage, the surface layer is a yellowish-brown to dark-brown loam. Below this layer and to a depth of about 25 inches is strong-brown to yellowish-red friable clay loam or silty clay loam. At depths between 25 and about 32 inches, the material is mottled red and yellow friable silty clay loam that breaks easily to fragments of fine angular blocky structure. At a depth of about 32 inches the material is predominantly red silty clay mottled with yellow.

This soil is medium acid. Moisture is readily absorbed, and the soil has a moderately good capacity to hold moisture that plants can use. The surface layer has good tilth, and the subsoil is permeable to roots and moisture.

Use and suitability.—Most of this soil has been cleared and cultivated, but some of the acreage is still in cutover hardwood forest. The cultivated acreage is used mainly for cotton but also for corn, soybeans, winter legumes, and hay, chiefly lespedeza. Some of the acreage is in pasture. Row crops, chiefly cotton, are fertilized moderately heavily.

This is one of the more desirable soils for crops and pasture. It is suitable for practically all the commonly grown crops, including cotton and alfalfa. It responds to management, and it is easily worked and conserved. This soil is in capability unit IIe-7.

Etowah loam, eroded undulating phase (Ed).—This well drained to moderately well drained soil differs from the undulating phase of Etowah loam mainly in having lost part of the original surface soil through erosion. It occurs on areas ranging from 20 to more than 80 acres in size and occurs with the Cumberland, Decatur, Waynesboro, Nolichucky, and Monongahela soils and with other Etowah soils.

The plow layer consists of remnants of the original surface soil mixed with the upper part of the subsoil. The 4- or 5-inch surface layer in most places is a brown to yellowish-red loam. In the more eroded areas this layer is a clay loam. Below the plow layer, the material is similar to that of Etowah loam, undulating phase.

In places chert fragments occur on the surface and in the subsoil. In places in some of the smoother areas the surface soil is a brown to dark-brown loam 6 to 8 inches thick.

This soil is medium acid, and it has a moderate capacity to hold moisture that plants can use. Moisture infiltrates fairly well, and runoff is generally not a serious hazard. The subsoil is permeable to roots and moisture. Tilth is good.

Use and suitability.—All of this soil has been cleared and cultivated, and most of it is now used mainly for cotton. Alfalfa, corn, soybeans, grain sorghum, winter legumes, and hay, chiefly lespedeza, are also grown. Some of the acreage is in pasture. Row crops are fertilized regularly, and they are grown several years in succession.

This is one of the more desirable soils for crops and pasture. Erosion is somewhat of a hazard on the stronger slopes, but it is not difficult to control if management is good. The favorable characteristics of this soil and its response to management make it suitable for fairly intensive use. It is good for many kinds of crops, including cotton, alfalfa, and the more desirable legumes and grasses for hay and pasture. This soil is in capability unit IIe-7.

Gullied Land

Gullied land, sandstone material (Ga).—This mapping unit consists of eroded and gullied sandy soils underlain by sandstone. Over most of the area nearly all of the original surface soil is gone, and many gullies have formed that are too deep to be crossed by most farm machinery. The gullies generally are not more than 3 or 4 feet deep, but they have reached bedrock. Bedrock is exposed on the sandstone plateaus. The slopes range from 5 to 20 percent. This land occurs with the Enders, Linker, and Hartsells soils on mountain tops and with the Allen and Jefferson soils at the foot of mountain slopes.

This land type is low in plant nutrients, very low in organic matter, and strongly to very strongly acid. It is permeable to roots and moisture, and it has a fairly rapid rate of infiltration if it is cultivated.

Use and suitability.—All of this mapping unit has been cleared and cultivated. Practically all of it is now idle or reseeding to forest trees. Some areas probably could be smoothed off by heavy machinery and made suitable for pasture. Forestry is the best use for this land type. Shortleaf, loblolly, and Virginia pines are among the trees best for use in reforestation. This land type is in capability unit VIIe-1.

Hamblen Series

Hamblen fine sandy loam (Ha).—This somewhat poorly drained to moderately well drained soil is on bottom lands. It is forming from general alluvium derived from shale, limestone, and sandstone. It is subject to flooding, and during much of the growing season the water table is 2 to 5 feet from the surface. This soil resembles Lindside silty clay loam in drainage and topographic position but is a little lighter colored and generally a little more acid. Most of the acreage is along creeks flowing northward from Sand Mountain into the Moulton Valley. A small part of the acreage is along Big Nance and Mallard Creeks in the Tennessee Valley, and a few small areas are along the large creeks in the Little Mountain area.

Profile description:

0 to 14 inches, brown to dark yellowish-brown fine sandy loam.
14 to 36 inches +, brown or yellowish-brown fine sandy loam to silty clay loam mottled with gray and yellow; gray color more evident as depth increases; friable.

Limestone bedrock is at depths ranging from 4 to 20 feet.

The surface layer is 8 to 18 inches thick, and in some places it is lighter brown and somewhat sandier than described. The profile in some areas contains a dark layer at depths ranging from 12 to 20 inches; this layer is a former surface soil buried by recent alluvial deposits.

Hamblen fine sandy loam is moderately fertile and is slightly acid to medium acid. It absorbs water easily, and the supply of moisture is good during most of the growing season. The surface layer contains some organic matter and has very good tilth. The subsoil is permeable to roots and moisture. Flooding is hazardous to crops, and some areas are subject to scouring by fast-flowing floodwaters. Otherwise, the soil is not subject to erosion, and its natural fertility is fairly easily maintained.

Use and suitability.—About two-thirds of this soil has been cleared; the rest is in cutover hardwood forest. The acreage still in forest is associated with the poorly drained and the extremely sandy soils and is not likely to be cleared for cultivation. Most of the cleared acreage is used intensively for row crops, chiefly corn. Some of the acreage is used for hay, chiefly lespedeza. Permanent pasture occupies some of the acreage. Corn is fertilized, and its yields are moderately high.

This soil is well suited to crops, but its restricted internal drainage and susceptibility to flooding somewhat limit the kinds of crops that can be grown. Corn, grain sorghum, and soybeans are the row crops best suited to these conditions. This soil is particularly well suited to permanent pasture in localities where forage is in demand during dry parts of the growing season. Fescue and whiteclover are probably the most desirable plants for hay and pasture. Hamblen fine sandy loam is in capability unit IIw-1.

Hartsells Series

In the Hartsells series are well-drained, shallow sandy soils on uplands; they have formed in material weathered from interbedded sandstone and shale. They are associated with the steeper, shallower Muskingum soils that occupy the stronger slopes, as well as with the Enders and Linker soils. Hartsells soils are sandier than the Enders soils. Compared to that of the Linker soils, the Hartsells subsoil is yellowish rather than reddish. Soils of the Hartsells series occur on Sand Mountain, southeast and directly south of Moulton.

Hartsells fine sandy loam, eroded undulating phase (Hc).—This soil has slopes of as much as 5 percent. It is on the winding, narrow ridgetops on the southeastern side of Sand Mountain.

Profile description:

0 to 5 inches, light yellowish-brown fine sandy loam.
5 to 27 inches, light yellowish-brown to strong-brown heavy fine sandy loam or sandy clay loam; friable; breaks easily to soft, easily crushed subangular fragments ½ to 1½ inches in diameter.
27 inches +, strong-brown or yellowish-brown fine sandy loam or loamy fine sand splotched with reddish-brown; very friable.

Sandstone bedrock is normally at depths ranging from 1½ to 3½ feet, but in places it is at depths of more than 5 feet.

The plow layer in most places is a mixture of original surface soil and subsoil. In the few areas that have not been cultivated, the 2-inch surface layer is a yellowish-brown to dark yellowish-brown loose fine sandy loam containing considerable organic matter. Below this layer and to a depth of 12 inches is light yellowish-brown fine sandy loam. From 12 to 20 inches is yellowish-brown fine sandy loam. From 20 to 32 inches is strong-brown, friable, heavy fine sandy loam or fine sandy clay loam. Below a depth of 32 inches is a strong-brown fine sandy loam splotched with reddish brown.

This soil is low in plant nutrients and organic matter and strongly to very strongly acid. Infiltration of moisture is rapid, and the capacity to hold moisture that plants can use is moderate where the profile is more than 3 feet to bedrock. The soil is permeable to roots and moisture, easily worked, and responds well to proper fertilization. It is not easily eroded.

Use and suitability.—Nearly all of this soil has been cleared and used for cotton. The acreage in the vicinity of Pine Grove in the extreme southeastern part of the county is still used mainly for cotton, and most of the acreage is in this crop many years in succession. The acreage west of Pine Grove is in the William B. Bankhead National Forest and is no longer in cultivation.

This soil is particularly well suited to cotton. It is also suited to truck crops, corn, and sorghum and to lespedeza, fescue, and whiteclover for hay and pas-

ture. It responds well to proper fertilization, and high yields can be expected if management is good. The soil needs control of runoff if row crops are grown continually. The need is greatest on the stronger slopes. This soil is in capability unit IIe-2.

Hartsells fine sandy loam, rolling phase (Hd).—This soil differs from the eroded undulating phase of Hartsells fine sandy loam chiefly in having slopes of 5 to 10 percent. It occurs on narrow winding ridges in the eastern half of the Sand Mountain area.

This soil has not been cultivated; consequently, it has not been damaged by erosion. The surface soil, about 10 inches thick, is a light yellowish-brown fine sandy loam. The upper 2 inches contain noticeable amounts of organic matter. From a depth of 10 inches down to about 28 inches there is a yellowish-brown fine sandy loam to sandy clay loam. The lower part of this layer may be strong brown. Below a depth of 28 inches is yellowish-brown or strong-brown fine sandy loam or loamy fine sand somewhat splotched with reddish brown. Sandstone bedrock is at depths ranging from 1 to 3 feet. In a few areas bedrock is at or very near the surface, but it does not greatly interfere with tillage.

This soil is low in plant nutrients and organic matter and strongly to very strongly acid. It is easily worked and responds to management. The rate of infiltration is rapid, but the capacity to hold moisture for plants is low. The soil is readily permeable to roots and moisture. The plow layer is very easy to work.

Use and suitability.—All of this soil is in cutover forest consisting chiefly of oak and hickory. Some loblolly pine and Virginia pine are intermixed with the hardwoods. The soil is suited to cotton, truck crops, corn, soybeans, and sericea lespedeza and to grasses and legumes for pasture. Its shallowness to bedrock and strong slopes require the use of large amounts of fertilizer and careful control of runoff and erosion. This soil is in capability unit IIIe-2.

Hartsells fine sandy loam, eroded rolling phase (Hb).—This soil differs from the rolling phase of Hartsells fine sandy loam mainly in having lost most of the original surface soil through erosion. It occurs as small areas on the winding ridges on Sand Mountain in the southeastern part of the county.

The plow layer, consisting of the original surface soil mixed with subsoil, is predominantly a pale-brown to light yellowish-brown fine sandy loam. Below this layer is a yellowish-brown to strong-brown heavy fine sandy loam or clay loam. At a depth of about 25 inches this material grades to yellowish-brown or strong-brown fine sandy loam or loamy fine sand that is moderately splotched with reddish brown. Sandstone bedrock is normally at depths ranging from 2 to 4 feet. The bedrock is at the surface in a few places, but it does not greatly interfere with tillage.

This soil is low in fertility and in organic matter and very strongly to strongly acid. It is permeable to roots and moisture and has good drainage. Only the shallow areas are excessively drained.

Use and suitability.—All of this soil has been cleared and cultivated. The acreage outside the William B. Bankhead National Forest is still used mainly for cotton, and to a less extent for corn and hay. Part of the acreage is in pasture. Fertilizer is used, especially on cotton. This soil is suited to many kinds of crops, but it requires cultivation along the contour, consistent use of fertilizers, and crop rotations of moderate length. Although the soil is not particularly erosive, it can be damaged through erosion if row crops are grown continually. Hartsells fine sandy loam, eroded rolling phase, is in capability unit IIIe-2.

Hollywood Series

Hollywood silty clay (He).—This somewhat poorly drained clayey soil is forming chiefly from local alluvium or colluvium derived from argillaceous limestone. It occupies slopes that seldom exceed a gradient of 3 percent. The areas are 5 to about 30 acres in size and occur in association with the Talbott, Colbert, and Dunning soils and with Rockland, limestone material. Most of the acreage is in the Moulton Valley, but a few small areas are in the southwestern part of the Tennessee Valley.

Profile description:

0 to 20 inches, dark grayish-brown to nearly black silty clay; plastic.
20 inches +, dark-gray clay mottled with reddish yellow and brown; plastic to very plastic.

Limestone bedrock is at depths ranging from 1 to 5 feet.

The surface layer is 5 to 20 inches or more in thickness, and in some places it is a dark-gray silt loam. The surface soil breaks to angular fragments that resist further breaking when dry. In places the surface soil cracks when dry.

This soil contains noticeably more organic matter than most of the soils of the county, and it is high in plant nutrients. It ranges from slightly alkaline to slightly acid, and in a few places it is medium acid. The capacity to hold available moisture is low. However, because of favorable lay of the land, moisture relations are fairly good during most of the growing season. The soil is slowly permeable to roots and moisture.

Use and suitability.—About half of this soil has been cleared and is now cultivated or used as pasture. Corn, soybeans, lespedeza, and, in places, cotton are the chief crops. Most of the rest is covered by a thin stand of forest trees and is used for pasture. A small acreage is covered by a moderately dense forest.

This soil can be cultivated, but its unfavorable characteristics greatly limit its suitability for crops. The better drained areas are fairly well suited to cotton. Corn, soybeans, grain sorghum, and some legumes and grasses for hay and pasture are among the better suited crops (fig. 5). This soil is in capability unit IIIw-4.

Huntington Series

Huntington silt loam (Hk).—This well-drained soil has formed from alluvium that was derived mainly from limestone. It occupies nearly level bottom lands that are subject to flooding. It is associated with the Lindside and Melvin soils, which are mostly on bottom lands and were derived from about the same kind of parent material. The Huntington soil is well drained, whereas the Lindside is somewhat poorly drained to moderately well drained, and the Melvin is poorly drained.

Huntington silt loam occupies small areas along

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some of the larger creeks in the Tennessee Valley. Much of this soil is permanently covered by the waters of Wheeler Reservoir.

Profile description:

0 to 12 inches, dark-brown or very dark grayish-brown silt loam; mellow and friable.
12 to 36 inches, brown or dark-brown silt loam or silty clay loam; friable; does not differ strikingly from the surface layer but is somewhat more firm in place.
36 inches +, dark-brown or dark yellowish-brown silt loam or silty clay loam mottled with yellow, brown, and gray; friable.

Limestone bedrock is at depths ranging from 5 feet to more than 20 feet.

In some places at a depth of about 12 inches there is a very dark brown firm layer that was surface soil before it was covered by the lighter colored material.

This soil is very fertile and contains moderate supplies of organic matter. It is normally slightly alkaline to slightly acid, but in a few places it is medium acid. The tilth of the surface soil is generally good, but in the spots of silty clay loam it is only fairly good. The soil is very permeable to roots and moisture, and it absorbs moisture moderately rapidly. It has a high capacity to hold moisture that plants can use.

Figure 5.—**Hollywood silty clay is a fertile soil well suited to corn, but it is difficult to work and has limited capacity to hold moisture that plants can use.**

Use and suitability.—Nearly all of this soil has been cleared and used for crops and pasture. Corn is the chief crop. Fertilizers have not been used much, but yields are fairly good. In recent years, however, many operators have used complete fertilizers to increase yields.

Huntington silt loam is one of the most desirable soils of the county for crops, but danger of flooding somewhat limits its suitability. It is particularly well suited to corn, to soybeans, and to many kinds of legumes and grasses for hay and pasture. Fertility is easily maintained. Its exceptionally good moisture relations favor its use for midsummer pasture. A good stand of pasture plants is easily maintained. Cotton is particularly susceptible to attacks of the boll weevil, and boll formation is poor. Small grains commonly lodge, and they are highly susceptible to disease; alfalfa is likely to be damaged by overflow. The soil is in capability unit I-1.

Jefferson Series

Soils of the Jefferson series have formed from old colluvium that originated mainly from weathered sandstone and shale mixed in places with material from limestone. They occupy gentle foot slopes below the steep Muskingum and Pottsville soils and Rockland, limestone. They occur along the southern edge of the Tennessee and Moulton Valleys adjacent to the strong slopes of Little and Sand Mountains, and they are practically all underlain by limestone. They differ from the Allen soils in having a lighter colored surface layer and a yellowish rather than a reddish subsoil.

Jefferson fine sandy loam, eroded undulating phase (Jc).—This well-drained soil has slopes that have a maximum gradient of 5 percent. It occurs in association with the Colbert and Talbott soils and with the more rolling phases of Jefferson soils.

Profile description:

0 to 6 inches, pale-brown to light yellowish-brown fine sandy loam.
6 to 26 inches, light yellowish-brown to yellowish-brown fine sandy clay loam grading in places to fine sandy clay; moderately firm but friable; easily broken into moderately soft subangular fragments from ½ to 1 inch in diameter.
26 inches +, yellowish-brown or reddish-yellow fine sandy clay loam or fine sandy clay, mottled brown and gray; friable but moderately firm.

Limestone bedrock is at depths ranging from 3 to 8 feet.

Fragments of sandstone occur in places. Where this soil has not been cultivated, the surface inch is dark-gray fine sandy loam and contains a noticeable amount of organic matter.

This soil has a small amount of plant nutrients and organic matter, and it is medium to strongly acid. It absorbs water fairly rapidly, and its capacity to hold water that plants can use is moderately high. The surface soil has good tilth, and the subsoil is permeable to roots and moisture.

Use and suitability.—A small acreage of this soil is still in cutover hardwood forest consisting mainly of oak and hickory intermixed with pine. The rest has been cleared and used for crops. Some of the soil is now idle. Cotton is the chief crop and is grown successively for many years. Some of the acreage is used for other crops, mainly corn, lespedeza, soybeans, and cowpeas. Cotton is ordinarily given large quantities of commercial fertilizer; most other crops are fertilized to some extent.

This soil is suitable for truck crops, corn, and cotton and for many legumes and grasses for hay or pasture. High yields can be obtained if large quantities of fertilizer are used and runoff is controlled on the stronger slopes. Alfalfa needs very heavy applications of fertilizer. The soil is in capability unit IIe-2.

Jefferson fine sandy loam, rolling phase (Jd).—This

soil differs from the eroded undulating phase of Jefferson fine sandy loam chiefly in having stronger slopes and less erosion. It occupies 5- to 10-percent slopes. It is associated with other Jefferson soils and is directly below the steep Muskingum and Pottsville soils.

The 5-inch surface layer is pale-brown fine sandy loam. Below this material, to a depth of 26 inches, is light yellowish-brown to yellowish-brown fine sandy clay loam or fine sandy clay. This layer is moderately firm but friable, and it breaks into subangular fragments ranging from ½ to 1 inch in diameter. Below about 24 inches is a yellowish-brown or reddish-yellow moderately firm but friable fine sandy clay loam or fine sandy clay. Bedrock limestone is at depths ranging from 2 to 7 feet.

The thickness of the surface layer ranges from 4 to 7 inches in places. It is thinnest on the stronger slopes. Many areas have sandstone fragments throughout the profile; outcroppings of limestone occur in a few places.

This soil is low in plant nutrients, and it contains but little organic matter, except in the surface inch. It is medium to strongly acid. Water is rapidly absorbed and drainage is good. The capacity to hold water that plants can use is moderate to high, except on the stronger slopes where the soil is shallow. The plow layer has very good tilth, and the subsoil is permeable to roots and moisture.

Use and suitability.—Nearly all of this soil is in cutover hardwood forest. It is moderately well suited to cultivated crops and to pasture. Cotton, corn, soybeans, lespedeza, and pasture are the most suitable crops. Large quantities of fertilizer are needed for high yields. The prevention of erosion and maintenance of productivity are difficult because of the low fertility and strong slopes of this soil. This soil is in capability unit IIIe-2.

Jefferson fine sandy loam, eroded rolling phase (Jb).—This soil differs from the rolling phase of Jefferson fine sandy loam chiefly in having lost much of the original surface soil as the result of erosion. It occupies 5- to 10-percent slopes and is associated with the Colbert, Talbott, and other Jefferson soils.

The 4- or 5-inch surface layer is brownish-yellow to yellowish-brown fine sandy loam. The subsoil is yellowish-brown fine sandy clay loam or fine sandy clay. Below a depth of about 20 inches, the subsoil is mottled brown and gray. Limestone bedrock is at depths ranging from 2 to 10 feet.

In places where nearly all of the original surface soil is gone, the plow layer is yellowish-brown fine sandy clay loam. A few small gullies have formed in these areas, but practically all of them can be filled by heavy tillage implements. Sandstone fragments are commonly found in this soil, but they do not interfere materially with cultivation.

This soil is low in plant nutrients and organic matter and is medium to strongly acid. Its capacity to hold water that plants can use is moderate, but the more exposed, severely eroded areas are noticeably droughty. The plow layer has fairly good tilth except in the severely eroded places, where the soil has a tendency to clod. The subsoil is permeable to roots and moisture.

Use and suitability.—This soil has been cleared and cultivated. Much of it now is used for row crops or pasture, but many areas are idle or are reseeding to pine and other trees. Cotton is the chief crop, but corn and lespedeza are commonly grown. Cotton usually gets moderately heavy applications of fertilizer; small amounts are used for corn. Little fertilizer is used on other crops.

This soil is suitable for many kinds of crops and for pasture. However, unfavorable characteristics limit its suitability for cultivated crops. Moderately long rotations and large quantities of fertilizer should be used to maintain productivity. Runoff should be controlled. This soil is in capability unit IIIe-2.

Jefferson fine sandy loam, eroded hilly phase (Jc).—This soil differs from the eroded rolling phase of Jefferson fine sandy loam chiefly in slope. It occupies slopes of 10 to 20 percent in association with other Jefferson soils.

In areas that have not been in cultivation, the 4- or 5-inch surface layer is light yellowish-brown fine sandy loam. The upper inch is darker because it contains more organic matter. Below the surface layer is a light yellowish-brown to yellowish-brown moderately firm but friable fine sandy clay loam or fine sandy clay. Below about 28 inches, the subsoil is somewhat splotched with gray and red. Limestone bedrock is at depths ranging from 1 foot to more than 6 feet.

In eroded areas the 4- or 5-inch surface layer consists of original surface soil mixed with subsoil. It is mainly a yellowish-brown fine sandy clay loam.

In some of the severely eroded areas, all the original surface soil has been lost. Here the plow layer is a yellowish-brown fine sandy clay loam or fine sandy clay. A few small gullies have formed in places, but most of them can be filled by heavy tillage implements. Some areas contain sandstone fragments that interfere with tillage; the steep slopes have a few limestone outcrops.

This soil has a small amount of plant nutrients and organic matter and is medium to strongly acid. It is permeable to roots and moisture and absorbs moisture fairly rapidly. The capacity to hold water that plants can use is moderate to low, especially on the strong slopes where the soil is shallow. Tilth of the plow layer is good where erosion has not been severe, but it is poor on the more eroded areas because the soil is clayey.

Use and suitability.—About one-third of the acreage is in cutover hardwood forest; the rest has been cleared and cropped. Most of the cleared area is used for cotton and corn, but some is idle or is in unimproved pasture. Fertilizer is used to some extent, but yields in general are not very high.

This soil is not well suited to cultivated crops, because of strong slopes and low fertility. However, it can be cultivated if erosion is prevented and productivity is kept at a high level. The best use of this soil is for permanent pasture. Lime, large quantities of fertilizer, and proper seeding are needed to establish good pastures. This soil is not so good for pasture as those that are more fertile and that have better moisture relations. It is in capability unit VIe-2.

Johnsburg Series

Johnsburg loam (Je).—This somewhat poorly drained soil has developed over acid sandstone and shale. It

occupies moderately low, nearly flat upland divides, very gently sloping benches, and slight depressions, chiefly at the heads of drainageways. Slopes are gentle to very gentle, and the low-lying areas are temporarily covered by water after heavy rains. This soil occurs in small and widely distributed areas on the broad ridgelands of Little Mountain. It is associated with the Tilsit soils but differs from them chiefly in being less well drained.

Profile description:

0 to 4 inches, grayish-brown loam; friable.
4 to 10 inches, yellowish-brown or pale-brown silt loam or loam; friable.
10 to 16 inches, yellowish-brown silty clay loam; friable but somewhat firm.
16 to 36 inches +, mottled gray and yellowish-brown clay loam or silty clay loam; compact or very firm.

Sandstone or shale bedrock is at depths ranging from 2 to 4 feet.

The texture of the surface soil grades to silt loam in some areas. The depth to mottling is somewhat less than 16 inches in places.

This soil is low in plant nutrients and organic matter and very strongly acid to strongly acid. Its capacity to hold water that plants can use is moderately high. The surface soil is friable, and the subsoil is permeable. The water table during much of the growing season is high; during the wettest part of the season, it may be very near the surface. Wetness severely limits the depth to which the roots of most crops will grow. Moisture relations during most of the growing season are unfavorable for cotton and alfalfa and for crops that require well-drained soils. However, the high water table favors pasture plants that can tolerate moderately moist conditions.

Use and suitability.—Most of this soil has been cleared and is now used for crops and for permanent pasture. Corn and soybeans are the chief crops, but a small acreage is in cotton. Crop yields in general are not high. Pastures on this soil are more productive than on some of the better drained associated upland soils. Fescue and ladino clover are commonly grown in pasture.

This soil is suitable for cultivation and pasture. Its somewhat poor drainage and high water table limit the kinds of crops that can be grown. Corn, soybeans, and legumes and grasses for hay and pasture are among the crops best suited to this soil. Productivity can be maintained if large quantities of fertilizer are used. Much of the soil can be improved for cropping by artificial drainage. Most of the soil is suitable for permanent pasture if adequately fertilized and properly seeded. Pastures stay green on this soil during the dry part of the growing season when they are dry on many other soils. This soil is in capability unit IIIw-2.

Lawrence and Colbert Soils

The Lawrence and Colbert soils, mapped as undifferentiated units, have developed from the residuum of argillaceous limestone that in places contained interbedded shale or sandy shale. The moderately well drained Colbert soils are generally in the higher topographic portions, and the somewhat poorly drained Lawrence soils are in the lower parts of depressions. Most of the acreage of these undifferentiated soils is along the border between the Little Mountain and the Moulton Valley physiographic divisions. Some acreage occurs throughout the Moulton Valley.

Lawrence and Colbert silt loams, undulating phases (Pd).—Slopes on these soils reach a maximum of 6 percent. Most areas occur southwest of Masterson Mill and south of Morris Chapel. The Colbert silt loam in this mapping unit has a profile similar to that described for Colbert silt loam, undulating phase. Lawrence silt loam has a profile as follows:

0 to 8 inches, light yellowish-brown silt loam; the upper 2 to 3 inches are dark grayish brown.
8 to 13 inches, brownish-yellow silty clay loam.
13 to 34 inches, yellowish-brown silty clay moderately mottled with red and a little gray.
34 to 48 inches, mottled yellowish-brown, gray, and red silty clay or clay; very plastic when wet.

Limestone bedrock is at depths ranging from 2 to 4 feet.

The soils in this mapping unit are strongly acid. They have a small amount of organic matter and a moderately small amount of plant nutrients. They are slowly permeable to roots and moisture, and the plow layers dry slowly. The Colbert soils are droughty. The Lawrence soils, however, are excessively moist for most of the commonly grown crops, except during the dry parts of the growing season.

Use and suitability.—Most of this mapping unit is in a cutover forest of hardwoods intermixed with pines and cedar. A small acreage is cultivated. These soils warm up slowly in spring, and tillage is delayed by slow drainage of excess water. These and other unfavorable characteristics limit the suitability of the soils for crops. This mapping unit is in capability unit IIIe-12.

Lawrence and Colbert silt loams, rolling phases (Pc).—This mapping unit differs from the Lawrence and Colbert silt loams, undulating phases, chiefly in slope. In addition, the surface layer is more variable in thickness and generally thinner, and the depth to bedrock is less. This is the least extensive of the Lawrence and Colbert undifferentiated mapping units.

Use and suitability.—Nearly all this mapping unit is in cutover hardwood forest. Many areas are used as woodland pasture. These soils of this mapping unit are suitable for cultivation, but their unfavorable characteristics greatly limit the crops that can be grown. The best use is for forest. This mapping unit is in capability unit IVe-12.

Lawrence and Colbert silty clay loams, eroded undulating phases (Pb).—This mapping unit has lost a considerable amount of soil through erosion. It is the most extensive of the Lawrence and Colbert undifferentiated mapping units. Most of the areas are small, but a few are as large as 30 acres.

The plow layer in most places consists of the original surface soil mixed with subsoil, and it is a brownish-yellow silty clay loam. In places, especially where Colbert soils predominate, all of the original surface soil is gone and the subsoil is exposed. Depths to bedrock are somewhat less than for Lawrence and Colbert silt loams, undulating phases.

Use and suitability.—Nearly all of this soil is used for general farm crops, mainly corn and cotton, and for pasture. Many farmers now use about the same amounts of fertilizer for corn as for cotton. Fairly large quantities of mixed complete mineral fertilizer are needed to produce satisfactory yields.

These soils are suitable for pasture. Good plants are fescue and whiteclover on the more level areas, and sericea lespedeza on the more eroded, stronger slopes. Until the tilth and capacity to absorb moisture can be improved in the present eroded surface layer, many areas with slopes of 3½ to 6 percent are better suited to sericea lespedeza than to ladino clover.

Hay and pasture and row crops are usually fertilized differently. The latest recommendations can be obtained from the county agent or from the local soil conservation district. This mapping unit is in capability unit IIIe-12.

Lawrence and Colbert silty clay loams, eroded rolling phases (Pc).—This mapping unit consists of areas that have lost a considerable amount of soil through erosion. The 4- to 6-inch surface layer in most places is a brownish-yellow silty clay loam. In many spots, however, all the original surface soil is gone and the plow layer consists of yellowish-brown somewhat mottled plastic clay. A few shallow gullies have formed on some of the stronger slopes.

Use and suitability.—All of this mapping unit has been in cultivation, but only about 40 percent of it is now used for crops. The rest is mainly in unimproved pasture of low carrying capacity. A small acreage is in improved pasture. This mapping unit has about the same suitability for crops as the rolling phases of Lawrence and Colbert silt loams. However, because of the degree of erosion, Lawrence and Colbert silty clay loams, eroded rolling phases, are more difficult to work, have a low capacity to hold water that plants can use, and are more likely to erode further. This mapping unit is in capability unit IVe-12.

Lickdale Series

Lickdale silt loam (La).—This very poorly drained soil consists mainly of a thin layer of old local alluvium underlain by the residuum of acid sandstone and shale. It occupies slopes that seldom exceed 2 or 3 percent, and it occurs on small areas along the drainageways or gentle depressions on the uplands. Nearly all the acreage is on the broad ridgelands of Little Mountain at slightly lower positions than the associated Tilsit and Enders soils. In topographic position this soil is similar to the Barbourville and Cotaco soils. The Lickdale soil differs from those soils in having developed under poor drainage from older parent material.

Profile description:

0 to 3 inches, grayish-brown to dark grayish-brown silt loam.
3 to 12 inches, light-gray or gray silt loam splotched with yellow; friable.
12 to 20 inches, light-gray silty clay loam mottled with yellow; firm.
20 to 30 inches, gray or dark-gray silty clay splotched with yellowish brown; very firm; hard when dry; breaks to rather large angular pieces.

Sandstone and shale bedrock is at depths ranging from 1½ to 3 feet.

In many areas the surface soil is gray or light gray. In forests the 1- to 4-inch surface layer is noticeably dark colored and is underlain by gray or light-gray silt loam. All tilled areas have a gray or light-gray plow layer, especially if they have been tilled for several years.

This soil is very low in plant nutrients and strongly to very strongly acid. There is not much organic matter below depths of 2 to 4 inches. This soil is waterlogged during the wet parts of the growing season, and it is hard during the drier parts. The upper 4 to 5 inches has fairly good tilth. The subsoil is very slowly permeable to moisture and roots, and when exposed or mixed with the plow layer, it is difficult to work to a good seedbed.

Use and suitability.—Most of this soil is still in cutover forest consisting of hickory, sweetgum, water-tolerant oaks, and other water-tolerant trees. The cleared acreage is mainly in unimproved pasture of fair quality. Pastures can be improved through proper seeding and fertilization. A small acreage is used for sorghum and lespedeza.

The poor drainage and slow permeability of the subsoil make this soil poorly suited to cultivation. If the soil is drained, adequately fertilized, and properly seeded, permanent pastures can be established by using the well-suited fescue and whiteclover as forage plants. Lickdale silt loam is in capability unit IVw-2.

Lindside Series

Lindside silty clay loam (Lb).—This somewhat poorly drained to moderately well drained soil has formed from alluvium originating chiefly from limestone. It is fairly similar to Hamblen fine sandy loam in color, but it resembles Huntington silt loam more closely in parent material. It differs from the Huntington soil in being less well drained. It occupies bottom lands that are subject to overflow. Areas of this soil are widely distributed throughout the Moulton Valley, chiefly along Town Creek and West Flint Creek. Some areas are in the Tennessee Valley.

Profile description:

0 to 14 inches, dark-brown to very dark grayish-brown silt loam or silty clay loam; friable.
14 to 20 inches, mottled dark-brown and gray moderately firm silty clay or silty clay loam; moderately firm.
20 to 34 inches +, gray clay loam or silty clay mottled with dark brown.

Bedrock limestone is at depths ranging from 5 feet to more than 15 feet.

In a few places the surface layer is uniformly a silt loam, and in other places it is mixed with a noticeable amount of sand. A few poorly drained small patches of Melvin silt loam too small to map separately are included with Lindside silty clay loam.

This soil is fertile and has a moderate amount of organic matter in the surface layer. It ranges from slightly alkaline to slightly acid, and to medium acid in a few places. The soil is moderately slowly permeable to roots and moisture, but it is permeable enough for crops that are suited to somewhat poorly

drained soils. The water table is within a foot of the surface during the wet parts of the growing season, but during most of the growing season it is 2 to 3 feet below the surface. The plow layer has fairly good tilth, though it is somewhat more difficult to work than that of the coarser textured soils.

Use and suitability.—More than half of this soil has been cleared and is used for corn and soybeans and for lespedeza as hay and pasture (fig. 6). About one-fourth of the acreage is in pasture, and a small acreage is still in forest. Much of the acreage is used continually for row crops. Not much fertilizer is used, but yields are moderately high.

Figure 6.—Pasture and corn on Lindside silty clay loam. Beef cattle are an important source of income.

This soil is well suited to intensive use, but its susceptibility to overflow and its slow internal drainage limit the kinds of crops that can be grown. It is well suited to such crops as corn, soybeans, grain sorghum, and many of the legumes and grasses grown for hay and pasture. It is not suitable for cotton and alfalfa. The susceptibility to overflow is a real hazard to the growing of nearly all crops. Lindside silty clay loam is in capability unit IIw-1.

Linker Series

Soils of the Linker series are well drained and permeable. They formed from material weathered from sandstone. Slopes range from undulating to hilly. Linker soils are on the uplands of Little Mountain and Sand Mountain in association with the Tilsit and the Hartsells soils and with other Linker soils. They differ from the Hartsells in having a reddish rather than a yellowish subsoil. They differ from the Tilsit in having a reddish rather than yellow subsoil and in lacking the fairly compact pan layer below the subsoil. Linker soils are much more extensive than the Hartsells, but they are less extensive and less widespread than the Tilsit.

Linker fine sandy loam, eroded undulating phase (Lf).—This soil has slopes ranging from about 2 to 5 percent. Most of the acreage has been eroded, and the plow layer now consists of original surface soil mixed with the upper subsoil.

Profile description:

0 to 5 inches, light-yellowish to yellowish-brown fine sandy loam.
5 to 12 inches, yellowish-brown to strong-brown clay loam or sandy clay loam; friable.
12 to 30 inches, yellowish-red or red fine sandy clay loam with some brownish-yellow splotches in the lower part; rather firm but friable; breaks easily to separate fragments ½ to 1½ inches in diameter.
30 to 42 inches, splotched red and brownish-yellow fine sandy clay loam or fine sandy loam; friable; small, partly disintegrated rock fragments common.

Sandstone bedrock or sandy shale is at depths of 3 to 6 feet.

Where nearly all the surface soil is gone, the plow layer is yellowish-brown or strong-brown, moderately firm fine sandy clay loam.

This soil is low in plant nutrients and organic matter, strongly to very strongly acid, and easily permeable to roots and moisture. The plow layer has good tilth.

Use and suitability.—All but a very small acreage has been cleared and cultivated. Much of it is now used mainly for cotton and corn, but lespedeza and other legumes and grasses are grown for hay. A small acreage is used for soybeans, cowpeas, winter legumes, and pasture. Much of the acreage is used almost continually for row crops. Cotton usually gets moderate amounts of mixed fertilizer. Little organic manure is added to the soil.

This soil is one of the most desirable for crops. It responds to adequate fertilization and is well suited to nearly all of the commonly grown crops. Legumes grown on this soil need lime and heavy fertilization to produce good stands of high-quality forage. This soil is in capability unit IIe-2.

Linker fine sandy loam, rolling phase (Lg).—This well-drained soil differs from the eroded undulating phase of Linker fine sandy loam mainly in slopes. Gradients range from 5 to 10 percent. Some of the acreage is on narrow ridges, but much of it lies below the undulating phase of the Linker soils and above the strong slopes of the Muskingum soils.

This soil has been extensively eroded. The 5-inch surface layer is light yellowish-brown fine sandy loam. The upper 1 or 2 inches are notably darker because they contain more organic matter. Below the 5-inch surface layer and to a depth of about 8 inches, the soil is yellowish-brown friable very fine sandy loam. From 8 to 14 inches is a brown to strong-brown clay loam or fine sandy clay loam. From 14 to about 28 inches is a yellowish-red or red friable fine sandy clay loam that is somewhat splotched with brownish yellow in the lower part. From 28 to about 38 inches is splotched red and brownish-yellow friable fine sandy clay loam or fine sandy loam mixed with small, partly weathered fragments of sandy rock. Sandstone bedrock or sandy shale is at depths ranging from 2½ to 5 feet.

This soil is low in plant nutrients and organic matter, medium to strongly acid, and permeable to roots and moisture. The surface soil is friable and has good tilth.

Use and suitability.—Practically all the acreage is still in cutover hardwood forest. The soil is suitable for cultivation and pasture because of its favorable tilth and good moisture relations. It is suited to many kinds of crops, including cotton, corn, and many of the legumes and grasses grown for pasture and hay. Legumes and grasses need large quantities of fertilizer. Runoff should be controlled on the strong slopes. This soil is in capability unit IIIe-2.

Linker fine sandy loam, eroded rolling phase (Le).—This well-drained soil differs from the rolling phase of Linker fine sandy loam chiefly in having lost a considerable part of the original surface soil through erosion. Slopes range from 5 to 10 percent. The plow layer in most places consists of the original surface soil mixed with subsoil; it is a yellowish-brown to red friable fine sandy clay loam. The lower part of the subsoil, to a depth of about 24 inches, is splotched red and brownish-yellow fine sandy clay loam containing numerous small fragments of sandy rock. Sandstone bedrock or sandy shale is at depths ranging from 2½ to 4 feet.

This soil is low in plant nutrients and organic matter and is strongly to very strongly acid. It is permeable to roots and moisture and has a moderately good capacity for holding moisture that plants can use. Tilth is not so good as for the less eroded Linker soils. The decline in tilth is particularly noticeable where the plow layer consists mostly of the clayey subsoil. Gullies have formed in some of the severely eroded areas.

Use and suitability.—All of this soil has been cleared and cultivated. Most of it is now used mainly for cotton, but corn and hay, usually lespedeza, are also grown. Some of the acreage is idle.

This soil is well suited to many kinds of crops, and it responds to management. Runoff should be controlled on the moderately strong slopes of this soil. Crops should be grown in moderately long rotations, and close-growing small grain, legumes, and grasses should predominate. This soil is in capability unit IIIe-2.

Linker fine sandy loam, eroded hilly phase (Ld).—This well-drained soil has lost much of its original surface soil through erosion. Slopes range from about 10 to 20 percent. The plow layer now consists of the original surface soil mixed with subsoil. It is a yellowish-brown fine sandy loam or fine sandy clay loam. The clay is in areas that have been most severely eroded. The subsoil is strong-brown to red friable fine sandy clay loam. Sandstone bedrock or shale is at depths ranging from 1½ to 4 feet. On the stronger slopes nearly all the original surface soil is gone and the reddish clayey subsoil is exposed. Small gullies have formed, but most of them can be filled by using heavy tillage implements.

The few areas still in forest have not lost much of the surface soil. The surface half inch is dark grayish-brown fine sandy loam, and below this to a depth of 4 or 5 inches the material is light yellowish-brown fine sandy loam.

This soil is low in plant nutrients and organic material and strongly to very strongly acid. It is very permeable and has a moderate capacity to hold moisture that plants can use. Tilth of the plow layer varies according to the amount of surface soil lost through erosion. The more severely eroded parts are high in clay and, consequently, are droughty and difficult to work.

Use and suitability.—About 15 percent of the acreage is in cutover forest. The rest has been cleared and cultivated. Nearly one-fourth of the cleared acreage is severely eroded or badly gullied. Little of the acreage has been developed for improved pasture, and probably less than half the acreage of this soil is used annually for crops. The main crops are cotton and corn, but small acreages are used for soybeans and lespedeza as hay and pasture.

This soil is suitable for many of the locally grown crops, but the strong slopes, erosion, and other unfavorable characteristics reduce its desirability for crops that require tillage. Row crops should be grown in long rotations with close-growing crops. Most of this acreage could be developed satisfactorily for improved pasture or used for forestry. This soil is in capability unit VIe-2.

Linker clay loam, severely eroded rolling phase (Lc).—This soil occupies small areas on the more exposed slopes. Gradients range from 5 to about 10 percent. This soil has lost nearly all its original surface soil through erosion. The 5-inch plow layer in most places consists of strong-brown to red fine sandy clay loam. Below this and to a depth of about 20 inches is a red friable fine sandy clay loam. At a depth of about 20 inches is splotched red and brownish-yellow friable fine sandy clay loam containing many small fragments of sandy rock. Sandstone bedrock or sandy shale is at depths ranging from 2 to 4 feet.

Small gullies have formed on the more exposed slopes. Most of these can be filled in by using heavy tillage implements. In places bedrock is at or near the surface.

This soil is low in plant nutrients and organic matter and strongly to very strongly acid. It is permeable to roots and moisture. The large amount of clay in the plow layer causes tilth to be unfavorable and the soil to be more droughty (fig. 7) than the less eroded phases of Linker soils.

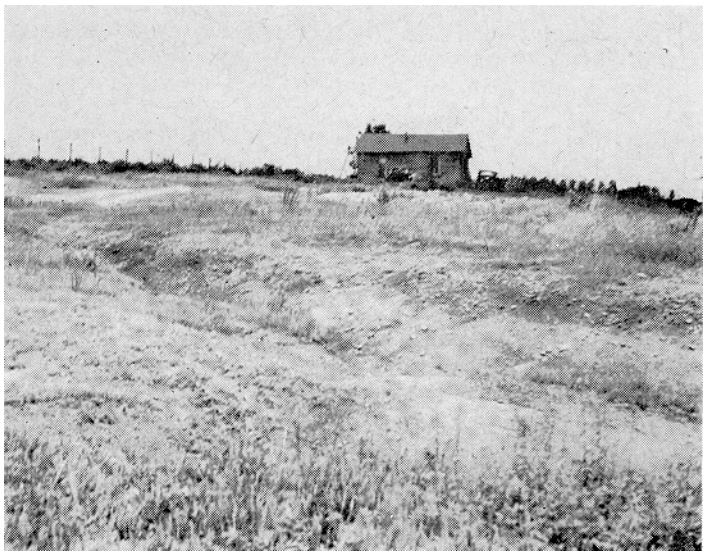

Figure 7.—Area of Linker clay loam, severely eroded rolling phase.

Use and suitability.—Most of this soil has been cleared and cultivated. It is now used mainly for cotton. Some of the acreage is idle or in pasture. Most of the acreage is now well managed.

Strong slopes and erosion limit the suitability and productivity of this soil. It is suited to many kinds of crops, including cotton, corn, small grains, and nearly all the legumes and grasses grown for hay and pasture. If carefully managed, conserved, and fertilized, the soil is capable of producing moderately high yields. It is in capability unit IVe-2.

Melvin Series

Melvin silt loam (Mo).—This poorly drained soil is on first bottoms and is forming from alluvium that originated chiefly from limestone. In most places the alluvium is mixed with material from shale and sandstone. The soil occurs along slow-flowing creeks flanked by broad smooth bottom lands. It is generally the first soil to be flooded. It occurs as fairly large areas in association with the Huntington and Lindside soils throughout the Tennessee and Moulton Valleys. It differs from the Prader soil in its uniform silty or silty clay loam texture.

Profile description:

0 to 3 inches, dark-brown silt loam.
3 to 12 inches, dark-brown silty clay loam mottled with gray and specks of reddish yellow.
12 to 36 inches, gray silty clay loam mottled with yellowish brown and specks of reddish yellow.

Limestone bedrock in most places is at depths of more than 5 feet. In a few places it is shallower and in some it is at the surface.

This soil is fairly high in plant nutrients and organic matter and neutral to slightly acid. A few areas may be slightly alkaline. The water table is at or above the surface during wet parts of the year, but it is within 1½ to 2 feet most of the time, especially during the dry season.

Use and suitability.—Parts of this soil have been cleared and used chiefly for pasture. Uncleared parts are in forest consisting mainly of gum, maple, elm, yellow-poplar, sycamore, beech, willow, and water-tolerant oaks. Surface drainage through ditches has improved a few areas, but only a very small acreage is dry enough for crops.

Poor drainage and the susceptibility to flooding make this soil poorly suited to cultivation. Most cleared areas yield a fair amount of pasture, but the quality of forage generally is not high until drainage is improved. If adequately drained, this soil is suitable for crops and pasture. Corn, soybeans, and sorghum can be grown, and grasses and legumes can be established and maintained as pasture or cut for hay. This soil is in capability unit IIIw-1.

Monongahela and Holston Soils

The Monongahela and the Holston soils have developed on high stream terraces, and they are strongly acid. Their parent materials were old alluvial silts and fine sands that washed from soils underlain mainly by acid sandstone and shale.

The Holston soils accupy nearly level to strongly sloping areas, and they are well drained. They lack the strong mottling and the compact or cemented fragipan characteristics in the B horizon of the moderately well drained Monongahela soils.

In this county soils of the Holston and Monongahela series occur in close association, are difficult to map separately, and were mapped together as undifferentiated units. These soils occur with the Etowah and Tyler soils. Holston and Monongahela soils are widely distributed over much of the Tennessee and the Moulton Valleys.

Monongahela and Holston fine sandy loams, undulating phases (Hh).—This mapping unit occupies gentle slopes. From 70 to 80 percent of the acreage has the moderately well drained profile of the Monongahela series, and the rest is Holston soil.

Profile description of Monongahela fine sandy loam:

0 to 5 inches, light yellowish-brown to pale-brown fine sandy loam.
5 to 20 inches, yellowish-brown to light yellowish-brown friable silt loam to fine sandy clay; friable.
20 to 34 inches, light yellowish-brown clay loam or silty clay loam (pan) mottled with gray and red; compact; breaks easily to angular fragments.
34 inches +, mottled, as layer above, but less compact.

Limestone bedrock is at depths ranging from 4 to 15 feet or more.

Profile description of Holston fine sandy loam:

0 to 6 inches, light yellowish-brown fine sandy loam.
6 to 30 inches, yellowish-brown fine sandy clay loam; friable.
30 to 42 inches +, yellowish-brown fine sandy clay loam or fine sandy clay mottled with gray and red; friable to firm.

Limestone bedrock is at depths ranging from 4 to 15 feet or more.

The surface layers of both the Monongahela and the Holston soils are from 10 to 12 inches thick, and their texture ranges to silt loam. The depth to the mottled layer in the Monongahela is a little less than 20 inches, and in the Holston it is more than 30 inches. The pan in the Monongahela varies in compactness. In some places the pan greatly retards percolation, but in others it is moderately permeable. All the areas of Holston soils are moderately permeable.

These soils are low in plant nutrients and organic matter. They have a moderate capacity to hold moisture that plants can use. Tilth is good and surface runoff is not a hazard.

Use and suitability.—Eighty to ninety percent of this mapping unit has been cleared, and much of it is now used for pasture and crops. The main crops are corn, grain sorghum, soybeans, and lespedeza. Cotton is the main crop on the better drained areas. Row crops usually are fertilized moderately.

The slow surface drainage combined with retarded internal drainage somewhat limit the suitability of the predominant Monongahela soil for crops. Nevertheless, good tilth, nearly level relief, and good response to heavy fertilization make possible the intensive use

of this mapping unit. Corn, small grains, grain sorghum, soybeans, and many kinds of legumes and grasses grown for hay and pasture are well suited. The areas of Monongahela soil are not well suited to alfalfa, cotton, and some winter legumes, but drainage would improve them. This mapping unit is in capability unit IIw-2.

Monongahela and Holston fine sandy loams, eroded undulating phases (Hf).—This mapping unit has lost considerable surface soil through erosion. Slopes are as much as 6 percent but are commonly in the range of 2 to 4 percent. The mapping unit occurs with the Robertsville, Etowah, and Tyler soils and in places with the Colbert and Talbott soils.

The 4- to 5-inch surface layer in most places consists of original surface soil mixed with subsoil; it is a light yellowish-brown to yellowish-brown clay loam to fine sandy loam. The subsoil is similar to that of the undulating phases of Monongahela and Holston fine sandy loams.

This mapping unit is low in plant nutrients and organic matter and medium to strongly acid. Infiltration of moisture is moderately rapid, and the soil has a moderate capacity to hold moisture that plants can use. The plow layer has fairly good tilth, although it is somewhat less favorable than for the plow layer of the uneroded phases of Monongahela and Holston fine sandy loams. Percolation is retarded by the pan in the Monongahela soil but is adequate in the Holston soil.

Use and suitability.—All of this mapping unit has been cleared and cultivated, and most of it is now used for crops. Cotton is an important crop, but there is a large acreage in corn, soybeans, and lespedeza. Cotton is fertilized moderately heavily; corn receives less fertilizer. A great part of the acreage is kept in crops several years in succession.

This mapping unit is good for crops and pasture. It is suited to many kinds of crops, including cotton, corn, vegetables, small grains, and many of the legumes and grasses grown for hay and pasture. The soil responds to fertilizers. On this soil much larger quantities of fertilizer and lime are needed to develop and maintain good stands of the more desirable legumes and grasses than are needed on the Cumberland, Decatur, Etowah, and Abernathy soils. Runoff is not difficult to control, although on the more sloping parts it is a definite hazard. This soil is in capability unit IIw-2.

Monongahela and Holston fine sandy loams, level phases (Hg).—This mapping unit differs from the undulating phases of Monongahela and Holston fine sandy loams chiefly in slope. Gradients do not exceed 2 percent. The surface layer is somewhat thicker and more uniform in thickness, and the depth to the mottled layer is somewhat less than in the undulating phases of Monongahela and Holston fine sandy loams. The mapping unit occurs with other Holston and Monongahela soils and with the Robertsville and Etowah soils.

The 10- or 12-inch surface layer is pale-brown to light yellowish-brown fine sandy loam or loam. In places it is a little darker, and the texture may range to loam or coarse silt loam. The subsoil is similar to that described for the undulating phases.

This soil is low in plant nutrients and organic matter but contains more organic matter than the undulating phases. The plow layer has good tilth. The Monongahela soil is inadequately drained for alfalfa and cotton.

Use and suitability.—Some of this soil is still in cutover hardwood forest, but a large part is used for crops and pasture. Corn is the main crop, but cotton, lespedeza, soybeans, and cowpeas are also grown to some extent. Much of the acreage in cultivation is used many years continuously for row crops. Cotton usually receives moderate amounts of fertilizer.

This soil is well suited to intensive cultivation because it is easily worked, responds well to fertilizer, and is not subject to erosion. Its adequate supplies of moisture favor it for midsummer pasture, as forage is then dry on the well-drained associated soils. This soil is in capability unit IIw-2.

Muskingum Series

Soils of the Muskingum series are strongly acid, excessively drained, and shallow to sandstone bedrock. They have formed on the steeper slopes of uplands in material weathered from acid sandstone and some shale. They differ from the Pottsville soils in that they have developed over sandstone. The Pottsville have developed over shaly rock.

Muskingum fine sandy loam, hilly phase (Me).—This soil has slopes ranging from 10 to 20 percent. Nearly all of it occurs as small areas widely distributed over Little Mountain. Much of it is at the heads of steep draws in association with the less sloping Hartsells and Linker soils and, in places, with the higher lying Tilsit soils.

Profile description:

0 to 4 inches, grayish-brown stony fine sandy loam.
4 to 18 inches, yellowish-brown or brownish-yellow heavy fine sandy loam or very friable fine sandy clay loam; variable amounts of weak and partly disintegrated sandstone fragments.
18 inches +, brownish-yellow fine sandy loam; many small fragments of sandstone.

Sandstone bedrock is at depths ranging from 1 to 2½ feet. It is exposed where the surface soil is a yellowish-brown fine sandy loam or a fine sandy clay loam.

This soil is permeable to roots and moisture but somewhat excessively drained. It is low in plant nutrients and organic matter and very strongly acid.

Use and suitability.—About one-third of this soil has been cleared and cultivated. The rest is in cutover hardwoods mixed with pine. A small percentage of the cleared area is now in cultivation, but most of it is in unimproved pasture or is reseeding to forest, mainly to pine.

Strong slopes and shallowness to bedrock make this soil poorly suited to cultivation (fig. 8). Much of it can be improved for permanent pasture, but droughtiness limits its carrying capacity. This soil is in capability unit VIe-2.

Muskingum stony fine sandy loam, hilly phase (Mf).—This soil differs from Muskingum fine sandy loam, hilly phase, chiefly in containing stones in numbers that interfere with tillage. Slopes range from 10 to 20 percent. The soil is widely distributed throughout the tracts occupied by Little Mountain and Sand Mountain. It occurs with the undulating and rolling Hartsells and Linker soils, with the Tilsit soils on ridgetops, and with

the steeper Muskingum soils on adjacent lower slopes.

The 4- or 5-inch surface layer is a grayish-brown stony fine sandy loam. This is underlain by a brownish-yellow, heavier fine sandy loam or coarse fine sandy clay loam that breaks easily to weak subangular fragments ½ to 1¼ inches in diameter. Below the depth of 18 inches is a brownish-yellow or light-yellow fine sandy loam or loamy fine sand containing many partly disintegrated fragments of sandstone. Bedrock is at depths ranging from less than 1 foot to 2 feet.

Figure 8.—**Muskingum fine sandy loam, hilly phase, occupies strong slopes on the ridges of Little Mountain.**

This soil is low in plant nutrients and organic matter and medium acid to strongly acid. It is permeable, but shallowness and sandiness make it droughty.

Use and suitability.—About 15 percent of this soil has been cleared. The rest is in cutover hardwoods mixed with some pine. The cleared acreage is in cultivation or is idle.

Strong slopes and shallowness to bedrock make this soil poorly suited to cultivation. If adequately fertilized and properly seeded, much of the acreage will support good stands of grasses and legumes for pasture. The best use of the strongly exposed, droughty, shallow areas is forestry. This soil is in capability unit VIIe-1.

Muskingum stony fine sandy loam, steep phase (Mg).—This excessively drained soil occurs as large areas on Sand Mountain and as smaller areas on Little Mountain.

The 3- to 5-inch surface layer is grayish-brown stony fine sandy loam. This is underlain by a brownish-yellow fine sandy loam or very friable fine sandy clay loam. Stone in large quantities occurs throughout the profile. Sandstone bedrock is exposed in many places, and its maximum depth is about 1½ feet.

This soil is low in plant nutrients and organic matter and strongly acid to very strongly acid. It is permeable, but shallowness and sandiness greatly limit its capacity to hold moisture that plants can use. Consequently, the soil is droughty.

Use and suitability.—Nearly all of this soil is in cutover forest made up of hardwoods mixed with pine. A very small acreage has been cleared, and it is now idle. This soil is poorly suited to crops or to pasture. It is in capability unit VIIe-1.

Nolichucky Series

Soils of the Nolichucky series are loamy and well drained. They have formed on high stream terraces from a fairly uniformly thick old general alluvium that originated from sandstone, limestone, and shale. All of the acreage is in the northern one-third of the Tennessee Valley. The Nolichucky soils differ from the associated Etowah soils in having a lighter colored surface layer and a somewhat sandier subsoil. They differ from the associated Cumberland soils in having a much lighter colored surface layer and in containing much more sand in the surface and subsurface layers.

Nolichucky fine sandy loam, eroded undulating phase (Nb).—This well-drained soil has slopes of as much as 6 percent. It is in areas containing 5 to 15 acres or more and occurs with the Etowah, Waynesboro, Cumberland, Decatur, Abernathy, and Ooltewah soils.

Profile description:

0 to 5 inches, light yellowish-brown to yellowish-brown fine sandy loam to fine sandy clay loam; loose.

5 to 16 inches, brownish-yellow to yellowish-red clay loam or fine sandy clay; friable; breaks easily to moderately firm subangular fragments ½ to 1 inch in diameter.

16 to 36 inches, yellowish-red to dark-red fine sandy clay loam variably streaked with a yellowish color; friable; texture is coarser as depth increases.

Limestone bedrock is at depths ranging from 10 feet to more than 20 feet.

The small acreage still in cutover hardwood forest has a 7-inch surface layer consisting of light yellowish-brown loose fine sandy loam. The surface inch of this layer is much darker than the rest because it contains considerable organic matter. The layer at depths of 7 to 12 inches is a brownish-yellow moderately loose fine sandy loam. From 12 to 20 inches is yellowish-red friable fine sandy clay or fine sandy clay loam that breaks easily to subangular fragments ½ inch to about 1 inch in diameter. At depths between 20 and 42 inches is reddish-brown or dark-red friable fine sandy clay loam streaked with yellowish red or yellow. This layer becomes more sandy with depth. Limestone bedrock is at depths ranging from 10 feet to more than 20 feet.

This soil is low in plant nutrients and organic matter and medium to strongly acid. It is permeable to roots and moisture and has a moderate capacity to hold moisture that plants can use. The plow layer has good tilth.

Use and suitability.—About 90 percent of this soil has been cleared and cultivated. Most of it is now used mainly for cotton, but a small acreage is in other crops. Some winter cover crops are grown, but this is not a common practice. Cotton is fertilized at a moderate rate, and yields are fairly good.

This soil is well suited to moderately intensive use. It responds well to management but needs large quantities of fertilizer for high yields. It is one of the better soils for cotton and is suited to nearly all the commonly

grown crops, including alfalfa. It is in capability unit IIe-2.

Nolichucky fine sandy loam, eroded rolling phase (Nα).—This soil differs from the eroded undulating phase of Nolichucky fine sandy loam chiefly in slope. It occupies slopes that range from 6 to 12 percent. It occurs with the other Nolichucky soils and with the smoother Etowah, Cumberland, and Waynesboro soils. Some areas of this soil are adjacent to the nearly level Abernathy and Ooltewah soils that are along some drainageways and in the sinks.

Nearly all of this soil has been eroded. The plow layer in most places consists of the original surface soil mixed with subsoil; its color and texture differ according to the severity of erosion. In the parts that have been eroded least, the 5-inch surface layer is light yellowish-brown fine sandy loam, whereas in the more severely eroded parts it is brownish-yellow to reddish-yellow fine sandy clay loam. The subsoil is yellowish-red to red friable fine sandy clay loam that breaks easily to subangular fragments ½ inch to 1 inch in diameter. Below a depth of about 18 inches is a yellowish-red to dark-red fine sandy clay loam streaked with light yellow. Coarseness increases with depth. Limestone bedrock is at depths ranging from 8 feet to more than 16 feet.

Shallow gullies have formed on some of the more sloping eroded areas, but most of them can be filled in with heavy tillage implements. Rounded quartz gravel is common in the deep subsoil and in places on the surface, particularly in the vicinity of Red Bank.

This soil is low in plant nutrients and organic matter and medium to strongly acid. It has moderate capacity to hold moisture that plants can use. It is probably somewhat more droughty than Nolichucky fine sandy loam, eroded undulating phase, or some of the smoother Etowah, Waynesboro, and Cumberland soils.

Use and suitability.—Nearly all of this soil has been cleared and cultivated. Most of it is now used mainly for cotton, but a small acreage may lie idle for several years in succession. On part of the acreage, winter legumes are grown to provide cover in winter. Cotton is fertilized regularly at a moderate rate.

This soil is suited to many kinds of crops, including cotton and alfalfa. It responds well to management and needs large quantities of fertilizer for good yields. Runoff should be controlled on the strong slopes. This soil is in capability unit IIIe-2.

Ooltewah Series

Soils of the Ooltewah series are nearly level and somewhat poorly drained to moderately well drained. They are forming from young local alluvium or colluvium that has washed from soils developed over limestone. Ooltewah soils occupy gentle depressions, most of which have no outlets for surface drainage. Consequently, they pond during heavy rains. Internal drainage, however, is sufficient to make them suitable for some crops and for pasture.

Ooltewah silt loam (Ob).—This soil occurs on nearly level areas containing 10 acres or less. Most of it is in gentle depressions. The soil is widely distributed throughout the Tennessee and Moulton Valleys in association with the Cumberland, Decatur, and Etowah soils.

Profile description:

0 to 6 inches, brown to reddish-brown silt loam.
6 to 14 inches, reddish-brown or dark reddish-brown heavy silt loam or silty clay loam.
14 to 30 inches +, mottled gray, brown, and yellowish-brown silty clay loam.

Limestone bedrock is at depths ranging from 5 feet to more than 12 feet.

In places the soil is mottled within 10 to 12 inches of the surface. The lower subsoil, below depths of 24 to 30 inches, is silty clay or clay. These variations occur where Ooltewah silt loam is in association with the Talbott and Colbert soils.

This soil is moderately high in plant nutrients and organic matter and medium acid to neutral in reaction. It is permeable, but the high water table limits the penetration of roots. Most of the time the water table is within 2 or 3 feet of the surface, but during the wet seasons it is at or near the surface.

Use and suitability.—Most of this soil has been cleared and drained. It is now used mainly for corn. Other commonly grown crops are sorghum, soybeans, and legumes, mainly lespedeza, and grasses for hay and pasture. Cotton is grown on the better drained areas. Much of the acreage is in row crops for many years in succession. Fertilizers are not extensively used, as moderate yields are obtained without them.

The favorable characteristics of this soil make it suitable for intensive use. Nevertheless, the somewhat impaired drainage interferes considerably with tillage and limits the kinds of crops that can be grown. The soil is slow to dry out, and crops are occasionally lost because of temporary ponding during the growing season. Alfalfa is not suited to this soil, and small grains frequently lodge. Most of the acreage is too wet for cotton because it matures too late in the season and grows too tall for good yields. This soil is especially good for corn, hay, and midsummer pasture, as the supply of moisture is generally good enough for plants in the dry part of the growing season. This soil is in capability unit IIw-1.

Ooltewah fine sandy loam (Oa).—This soil differs from the Ooltewah silt loam chiefly in containing more sand. The parent material was sandy alluvium that washed from adjacent sandy soils or from weathered sandstone and limestone. Most of the soil occurs as small areas at the heads of draws and in small depressions. It occurs with the somewhat sandy Nolichucky and Waynesboro soils in the Tennessee and Moulton Valleys.

Profile description:

0 to 6 inches, light-brown to light reddish-brown or reddish-yellow fine sandy loam.
6 to 14 inches, reddish-brown or yellowish-red fine sandy loam or loam.
14 inches +, mottled gray, yellow, and brown fine sandy clay loam or silty clay loam.

Limestone bedrock is at depths ranging from 5 feet to more than 12 feet. The subsoil ranges from fine sandy loam to dark reddish-brown mellow silt loam or silty clay loam.

This soil is moderately fertile, but its supply of plant nutrients and organic matter is somewhat less than that of Ooltewah silt loam. It is permeable to roots and

moisture. The water table is within 2 or 3 feet of the surface most of the year, but during the wet season it is at or near the surface. Internal drainage is good enough to allow the growing of crops that will tolerate some wetness. Corn is the chief crop, but cotton, soybeans, sorghum, and lespedeza are grown on some of the acreage. Small amounts of fertilizer are applied to cotton and, to some extent, to corn.

This soil is suitable for intensive use, but its slow drainage makes it unsuitable for alfalfa and usually for cotton. Its ample supply of moisture favors it for lespedeza and for legumes and grasses grown for pasture. It responds well to fertilization. Ooltewah fine sandy loam is in capability unit IIw-1.

Philo Series

Philo fine sandy loam (Pe).—This light-colored, moderately well drained soil is forming from general alluvium that washed from soils derived from acid sandstone and shale. Slopes are as much as 2 percent. The soil mainly occupies narrow bottom lands along streams on the edges of Little Mountain, but a few areas are along streams flowing from Sand Mountain. Philo soil differs from Hamblen soil in that it is strongly to very strongly acid. The Hamblen soil is medium to slightly acid and in places nearly neutral or mildly alkaline.

The native vegetation consists mainly of water and post oaks, hickory, maple, poplar, sycamore, willow, elm, gum, and pine.

Profile description:

0 to 5 inches, light brownish-gray (10YR 6/2)[3] to grayish-brown (10R 5/2) fine sandy loam to very fine sandy loam; layer splotched by organic stains, particularly in the upper part in the virgin soil; very friable.

5 to 14 inches, light yellowish-brown (10YR 6/4) light fine sandy loam; contains considerable quantities of very fine sand but relatively small amounts of clay; very friable.

14 to 30 inches, pale-brown (10YR 6/3) fine sandy loam to light fine or very fine sandy clay loam faintly mottled with yellowish brown, reddish yellow, and gray; in places texture is very fine sandy clay; friable.

The surface soil ranges from light fine sandy loam to very fine sandy loam or loam, and the subsoil from fine sandy loam to very fine sandy clay or silty clay. The depth to mottlings ranges from about 10 to 20 inches. The texture of the alluvium in narrow bottoms differs considerably within short distances.

This soil is moderately low in plant nutrients and organic matter. It has excellent tilth, very good capacity to absorb moisture, and a good capacity to hold moisture that plants can use. The favorable supply of moisture is caused by the moderately high water table which is usually within 4 or 5 feet of the surface. In wet seasons the entire profile is saturated. Runoff is moderately slow, but internal drainage is fairly rapid except when the water table is high. Flash floods damage freshly plowed fields in the narrow bottom lands, but they are less likely to be destructive in the few wide bottoms on which Philo soils occur. The nearly level surface favors the conservation of soil and moisture.

Use and suitability.—This soil is well suited to corn, hay, and pasture, but it is not suited to cotton, alfalfa, and other crops that require good drainage. The narrow bottom lands, subject to flash floods, are more suitable for improved pasture, woodland pasture, or forestry than for tilled crops. Fescue and ladino clover are good pasture plants if they are properly seeded and the soil is limed and adequately fertilized. This soil is in capability unit IIw-1.

Pottsville Series

The Pottsville series consists of light-colored skeletal soils that are shallow to bedrock. They have formed mainly in residuum from acid clay shale, acid sandy shale, or a mixture of these.

The sandy shale may have contained very thinly bedded, varicolored strata from 2 to 4 feet thick of indurated or partly indurated very fine sandstone, siltstone, and shale. This type of shale was faintly or plainly mottled or streaked with pale yellow or strong brown throughout the entire bed.

The clay shale was interbedded at different levels with gray or dark-gray very fine grained sandstone, the surface of which was ripply, and the faces irregularly parallel. The individual layers of sandstone were less than 1 inch thick to 8 inches thick, but the ordinary thickness was less than 4 inches. The total thickness of the sandstone layer ranged from less than 3 feet to about 30 feet, but the combined thickness of the shale and the interbedded sandstone was much more. In some places the interbedded sandstone was coarse grained, loose in structure, massive in bedding, and pinkish in color. The clay shale usually was gray or dark gray when only slightly weathered, but it was gray streaked with yellow, brown, and strong brown when partly weathered.

The slopes of this soil range from about 10 percent to more than 35 percent. Runoff is moderately rapid under forest vegetation, and it is very rapid if the land is cleared and cultivated. The internal drainage is medium to rapid in the upper part of the weathered profile but slow to very slow in the lower subsoil and unweathered parent shale and interbedded sandstone. Pottsville soils occur on the hilly and steep slopes of Sand Mountain in the southern part of the county in the William B. Bankhead National Forest.

The natural vegetation consisted largely of hardwoods mixed with pine. The present cutover forest probably contains more pine than the virgin forest because pine tends to reseed and grow more rapidly than most of the hardwoods.

Pottsville shaly silt loam, hilly phase (Pf).—This soil has slopes of 10 to 20 percent. It is shallow, or generally no deeper than 15 inches to the nearly unweathered shale or interbedded sandstone. In places it may exceed a depth of 24 inches.

Profile description:

0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam to very fine sandy loam; friable.

2 to 6 inches, strong-brown (7.5YR 5/6) shaly silty clay; friable.

[3] Symbols in parenthesis refer to Munsell notations (hue, value, and chroma) for color.

6 to 22 inches, reddish-yellow (7.5YR 6/6) shaly silty clay mottled with yellow, red, and gray; firm to moderately friable.

22 to 38 inches, pale-yellow (2.5Y 8/4) to very pale brown (10YR 7/3) partly weathered shaly silty clay or shaly clay mottled with red and gray; firm; very sticky and moderately plastic when wet, very hard when dry.

Pottsville shaly silt loam differs greatly from place to place because the various layers, colors, textures of the interbedded material in the parent rock may be near the surface or exposed at different levels on slopes. Shale predominates in the lower part of the weathered profile, however, and in the underlying parent material. The texture of the surface soil in a virgin profile ranges from fine sandy loam to silt loam, but usually this layer is fine textured. The thickness of the friable surface layer in virgin areas ranges from about 2 inches to as much as 8 inches, depending on the amount of sand and silt in the parent rock.

Where the thinly bedded varicolored layer of parent rock is exposed to weathering, small platy fragments about one-fourth inch thick and from less than one-half inch to about one and one-half inches in diameter usually occur on the surface and in the weathered profile of the soil. Where sandstone layers of the parent rock are exposed to weathering, hard, fine-grained fragments of sandstone ranging from angular cobbly (3 to 10 inches in diameter) to stony (more than 10 inches and usually less than 24 inches in diameter) are fairly common to very numerous on the surface and in the soil. Sandstone boulders more than 24 inches in diameter occur in places. Fragments from outcropping sandstone may occur on lower lying shaly slopes. These fragments give a stony surface to soils that formed from shaly parent material free of stones.

This soil is difficult to work because of the strong slopes, stony surface, and shaly profile. Tilth is moderately poor to poor where the surface is stony and cobbly. It is fair to moderately good where the surface is friable and thick enough to be the only layer disturbed in tillage. Implements usually go down into the shaly subsoil or to the parent material and mix them with the surface soil. The surface soil absorbs moisture moderately well where it is under forest, but not where it is in cultivation. The subsoil and parent material absorb moisture slowly. The capacity to hold available moisture is fairly good in forests but low in croplands. The soil is erosive, and it is difficult to conserve and maintain in good productivity. Most of the cleared acreage is severely eroded, and the rest is moderately eroded.

Use and suitability.—About 85 percent of the acreage is in cutover forest. The rest has been in cultivation. Corn and cotton have been the main crops, but soybeans, cowpeas, potatoes, sweetpotatoes, tomatoes, cabbage, and other truck crops also have been grown. Less than half of the cleared acreage is now used for crops. Many areas are idle or are reseeding to trees, mainly to pine. Some areas are used as unimproved pasture, but little if any of the acreage is in improved pasture. Yields of crops are generally low. The best use for this soil is forestry, but suitably located areas should be improved for pasture and planted mainly to lespedeza sericea. This soil is in capability unit VIe-2.

Pottsville shaly silt loam, steep phase (Pg).—This soil differs from the hilly phase mainly in slopes. Gradients range from 20 to more than 35 percent.

Use and suitability.—Nearly all the acreage is in cutover forest. Little of it has been cleared for cultivation. The best use of this soil is forestry. The percentage of pine in the forest can be increased by planting pine seedlings or by leaving more pine seed trees to reseed the cutover areas. Improved pastures have not been developed on any of the cleared acreage. This soil is in capability unit VIIe-1.

Prader Series

Prader silt loam (Ph).—This soil has formed from alluvium that washed from soils derived mainly from interbedded sandstone and shale, but also from sandstone, shale, and limestone. Prader silt loam occupies slopes that range from 0 to 2 percent. It occurs on fairly wide first bottoms, mainly in the limestone valleys and along streams that flow from the plateaus of Sand and Little Mountains or that receive runoff from colluvial slopes near the base of the mountains. The largest acreage is in the Tennessee Valley, mainly along Mallard and Fox Creeks; a small acreage is in the Moulton Valley.

In the Moulton Valley, Prader silt loam occurs in association with the Hamblen, Huntington, Staser, Lindside, and Melvin soils on the first bottoms. In the neighborhood of Little Mountain, Prader silt loam occurs on first bottoms with the Atkins and Philo soils but usually below the level of the limestone bedrock. The Melvin and Lindside soils are still farther downstream on first bottoms.

In the Tennessee Valley, Prader silt loam is bordered by the Sequatchie, Holston, Monongahela, Etowah, and Cumberland soils. Near the bases of Sand and Little Mountains, it is bordered by Lawrence and Colbert silt loams, by the Allen and Jefferson soils, and occasionally by Tilsit and Linker soils. Prader and Atkins soils are similar in many characteristics. The Prader differs from the Atkins in being medium or slightly acid to nearly neutral. The Atkins is strongly to very strongly acid.

Profile description:

0 to 5 inches, grayish-brown to yellowish-brown silt loam; friable; somewhat sticky when wet; medium acid to slightly acid; the 2- to 3-inch surface layer in virgin and grassland areas is moderately high in organic matter.

5 to 9 inches, brown silty clay loam mottled with gray and yellowish brown; when dry, very pale brown (10YR 7/3) faintly specked with pale yellow and reddish yellow; friable; sticky and plastic when wet, moderately hard when dry; breaks to irregular fine subangular blocky structure.

9 to 36 inches, gray silty clay mottled with yellow and brown; when dry, mottled light gray or nearly white and reddish yellow; firm; very sticky and plastic when wet, hard when dry; breaks to irregular medium to fine subangular blocks.

The texture of the surface soil ranges from a fine sandy loam to a silt loam. The subsoil normally is a silty clay to silty clay loam, but in places it may be a sandy clay loam.

This soil is medium to strongly acid. It is difficult to work under natural conditions. However, in areas that are high enough to allow good outlets for surface drainage, the workability and tilth are usually fair to good. Moisture is easily absorbed. The capacity to hold available moisture improves as the soil is artificially drained. Erosion is not a hazard in tilled fields unless they are subject to flash floods.

The soil is subject to flooding, and it may be under water during winter and spring and in wet periods at other times of the year. Surface drainage is slow in forests. Internal drainage is slow because the water table is usually near the surface. In prolonged dry spells, however, the water table may drop several feet below the surface. Artificial drainage could improve many areas, but suitable outlets are hard to find, especially near Wheeler Reservoir.

Use and suitability.—Most of this soil is in cutover forest consisting of water-tolerant hardwoods and scattered pine and cedar. If adequately drained, the soil is well suited to corn, soybeans and to other legumes and grasses grown for hay or pasture. Most areas are generally well suited to improved pasture. Those at or near the level of Wheeler Reservoir, or in other locations where surface drainage is inadequate, are not suitable for pasture. Drainage for improved pasture need not be as thorough as for tilled crops. Prader silt loam is in capability unit IIIw-1.

Robertsville Series

Robertsville silt loam (Ro).—This soil has developed from old or moderately old alluvium that washed mainly from soils derived from limestone residuum but which was modified by materials derived from sandstone and shale. It occupies nearly level low positions on broad stream terraces along the larger streams. Slopes range from 0 to 2 percent but seldom exceed 1 percent except on short abrupt slopes toward drainage channels or toward lower positions on the first bottoms.

Robertsville silt loam is closely associated with the Tupelo and Dowellton soils and other soils of limestone valleys. In many places it borders the Melvin soil on first bottoms.

Robertsville silt loam is similar to Tyler fine sandy loam in color, relief, and topographic position but differs from it in parent material. It resembles Melvin silt loam in color, texture, and source of parent material but differs from it in occuping low terraces above the level of normal overflow. The Melvin soil is on present flood plains and are medium to slightly acid. In contrast, this Robertsville soil is strongly to very strongly acid.

Profile in a virgin area:

0 to ½ inch, dark grayish-brown (10YR 4/2) silt loam; friable; high in leaf mold and partly decomposed organic matter; medium to strongly acid.

½ to 4 inches, grayish-brown (10YR 5/2) heavy silt loam material, which is mottled with gray and yellow or yellowish brown and somewhat splotched with organic matter; breaks to fine firm granules and fine subangular blocks; fairly hard when dry, sticky and plastic when wet; strongly acid.

4 to 26 inches, gray to dark-gray silty clay loam mottled with yellowish brown and brownish yellow; gradual transition to a stiff clay in the lower part; clay breaks to subangular fine blocks; hard when dry, sticky and plastic when wet; entire layer very strongly acid to strongly acid.

The surface soil ranges from a silt loam to a silty clay loam, and in places it contains variable quantities of fine and very fine sand. The subsoil is mainly a silty clay to clay, but sandy strata may occur throughout the profile or in some places in the parent material. The soil is predominantly gray where it is poorly drained; mottles are common. The surface soil in drained and cultivated areas is very light gray, very pale brown, or nearly white.

Under natural conditions, the entire profile is saturated most of the winter, early in spring, and in prolonged wet periods at other times of the year. In droughty periods the soil may become very dry. External and internal drainage are slow to very slow most of the time. Artificial drainage is difficult because the soil has level or slightly depressed relief. Most of it, however, occurs with other poorly drained soils that are at an elevation permitting drainage by large open ditches built on a community basis. Internal drainage is not easily improved, because the subsoil is fine textured. If fairly well drained, this soil has good tilth and is fairly easy to work. Erosion is seldom a problem.

Use and suitability.—Most of the undrained areas are forested. Adequately drained areas are generally well suited to improved pasture, and frequently to corn, soybeans, and annual lespedeza or other hay crops. Fescue and whiteclover are desirable plants for improved pasture (fig. 9). The practices for improving pastures can be obtained from the county agricultural agent or from people representing the Soil Conservation Service. This soil is in capability unit IVw-2.

Figure 9.—**Robertsville silt loam, recently cleared, now supports a fescue and whiteclover pasture.**

Rockland

Rockland, limestone, rolling (Rb).—Generally 75 to 80 percent of the surface of this land type is covered by exposed rock, but in places 50 percent or more of the surface is occupied by Talbott and Colbert soil materials. The relief ranges from 6 to 12 percent, but some of the included ridgetops, narrow benches, and gentle slopes have gradients of 3 percent or less. The percentage of surface covered by exposed limestone rock increases with the gradient. The nearly rock free surfaces usually consist of narrow benches just above relatively steep limestone ledges. The ridgetops, although nearly level, usually are very stony, and some are cherty.

This land type occupies irregularly shaped areas containing from less than 5 acres to more than 60 acres. It occurs with other rockland and stony land types in the Moulton Valley and near the bases of Sand and Little Mountains. The soil material is similar to that of Stony rolling land, Talbott and Colbert soil materials. It is moderately productive when there is ample moisture, but it is droughty in summer and early in fall.

Use and suitability.—This land type is mostly in forest consisting of redcedar, redbud, black locust, plum, and briers, but in places the growth consists of hardwoods mixed with cedar and pine. The soil is nearly unsuitable for cultivation or improved pasture. Some of the less stony areas can be partly improved for pasture by clearing trees, underbrush, and briers to allow grasses and legumes a better chance. This land type is in capability unit VIIe-2.

Rockland, limestone, steep (Rc).—This miscellaneous land type consists of steep and rough rocky land not uniform in composition or relief. In places it consists almost entirely of large limestone boulders and exposures of limestone bedrock. It occurs as moderately low limestone bluffs, or as more or less regularly spaced ledges on slopes, or as ledges encircling limestone sinks. This land type is on the steep rocky slopes of Sand and Little Mountains and on the hilly and steep knobs in Moulton Valley.

The spaces, cracks, and crevices between the rocks and the holes in the rocks are filled or nearly filled by soil material accumulated through residual and colluvial action. This material weathered from limestone and shale and, in places, partly from sandstone. About 75 percent of the surface is exposed rock. Nevertheless, in many places, including those on fairly steep slopes, the surface layer consists of fairly deep deposits of colluvial or residual material derived mainly from limestone but modified by materials derived from shale, sandstone, or both.

Runoff is rapid and usually excessive, even in areas under forest. Internal drainage and aeration normally are slow because the material is shallow to bedrock and of fine texture. Seepage is fairly common near the bases of the stronger slopes.

Use and suitability.—This land type is mostly in cutover forest consisting of cedar, oak, hickory, locust, gum, and other hardwoods. Scattered pines occur where the soil is fairly deep. The soil is practically unsuitable for cultivation, and it is of little use for improved pasture. It is suited best to forestry. A few areas covered more deeply with soil are fairly well suited to pine, but this land type generally is not good for pine. Some areas can be used as woodland pasture if they are partly cleared to allow grasses and legumes to grow. This land type is in capability unit VIIe-2.

Ruston Series

Soils of the Ruston series are sandy, well drained, and light colored. They occupy slopes ranging from 2 to about 16 percent but are mainly in the range of 5 to 10 percent. They have formed from unconsolidated sands and sandy clay loams in the upper part of the Coastal Plain formation. These sands and sandy clay loams range from less than 24 inches to about 60 inches in thickness; they cover the interbedded sandstone and shale of the Pottsville formation. The Coastal Plain formation caps the narrow ridges of Sand Mountain in the southwestern corner of the county, and, in that area, its total thickness is 8 or 9 feet in some places. These ridge crests covered by Coastal Plain materials are seldom more than a quarter of a mile wide and commonly only an eighth.

The parent material ranges in texture from gravel or coarse loamy sand to sandy clay loam; it usually contains quartzite gravel or coarse sand. The quartzite pebbles seldom exceed one-half inch in diameter.

All the Ruston soils are in the William B. Bankhead National Forest. They occur mainly with the Muskingum soils that were derived from the exposed interbedded sandstone and shale of the Pottsville formation that is exposed on lower slopes not covered by the Coastal Plain mantle.

Ruston soils have developed under forest consisting of red, white, post, and chestnut oaks, hickory, poplar, and shortleaf pine.

Ruston sandy loam, undulating phase (Rf).—This well drained to excessively drained soil occupies the wider ridge crests on which the mantle of Coastal Plain material is thicker than average. This soil is somewhat more typical of the Ruston soils that have developed in other counties from deep beds of unconsolidated sands and sandy clay loams of the Coastal Plain formation.

Profile in a virgin area:

0 to 8 inches, light yellowish-brown (10YR 6/4) to yellowish-brown (10YR 5/6) light sandy loam; very friable; material in lower part slightly sticky when wet; very strongly acid.

8 to 36 inches, yellowish-red (5YR 4/6 to 5/6) light sandy clay loam that is finer textured with depth; friable; moderately cohesive when moist, somewhat sticky when wet; very strongly acid.

36 to 48 inches, red sandy loam to loose loamy sand or sand, somewhat splotched or streaked with yellow and yellowish brown; very friable; slightly cemented when dry.

Coarse sand and small quartzite pebbles half an inch or less in diameter are fairly common throughout the profile. The surface soil ranges from loamy sand to light sandy loam. A dry surface in a cultivated area is very pale brown to pale brown. The subsoil is light yellowish-brown to red loose sandy loam to sandy clay loam. Where the sandy surface layer is underlain by

a clay shale at depths of 36 inches or less, the internal drainage in the lower subsoil is slow.

This soil is low in plant nutrients and organic matter and very strongly acid. It has good tilth and is easily worked. Moisture is readily absorbed. The soil is not especially erosive, but the prevention of erosion on some of the fairly shallow areas is somewhat more difficult than usual. The soil responds to management, but less than Hartsells fine sandy loam. It also loses plant nutrients more rapidly than Hartsells fine sandy loam.

Use and suitability.—About 40 percent of this soil has been cleared and cultivated. The rest is mainly in cutover forest. Slightly less than half the cleared acreage is now cultivated, mainly for cotton, corn, and minor crops used on the farm. The rest of the once-cleared area is reseeding mainly to pine.

This soil is suitable for the truck crops and general farm crops commonly grown in the county. Areas of this soil are small and are accessible only by traveling crooked roads to the ridge crests. Satisfactory yields can be obtained by use of fairly large quantities of complete fertilizer. The soil is in capability unit IIe-2.

Ruston sandy loam, rolling phase (Re).—This soil differs from the undulating phase of Ruston sandy loam in degree of slope and in having developed from a somewhat thinner mantle of unconsolidated sandy Coastal Plain material. The mantle on the slopes thins out until the underlying Pottsville formation is exposed, usually on the sides of ridges at the break from rolling to hilly relief. This Ruston soil occupies most slopes covered by a mantle of Coastal Plain material 22 inches or more in thickness. Slopes are short, but they range from 5 to 10 percent. A few areas have slopes of as much as 16 percent. Most areas are on very gently rounded and undulating ridge crests that average about one-eighth of a mile in width. This soil occurs with hilly and steep Muskingum and Pottsville soils, which are fairly inconvenient to reach with farm equipment.

External drainage is medium under forest and moderately rapid on some of the stronger slopes. Internal drainage generally is medium to moderately rapid where the sandy mantle is 36 inches or more in thickness. It is moderately slow in the lower subsoil in places where the shale is less than 36 inches below the surface. In wet periods seepage is fairly common on the lower slopes, particularly where the sandy mantle is shallow over shale.

Use and suitability.—Nearly all this soil is in cutover forest. It is suitable for most of the locally grown truck crops and general farm crops. Yields are fairly good if the soil is properly managed and adequately fertilized. The topography is rough, and the entire area is in the William B. Bankhead National Forest. The best use for this soil is forestry, particularly the production of shortleaf pine. This soil is in capability unit IIIe-2.

Ruston sandy loam, eroded rolling phase (Rd).—This soil differs from the undulating and rolling phases of Ruston sandy loam in having lost from 50 to about 75 percent of the original surface soil through erosion. Slopes range from 5 to 10 percent, but in a few areas they are as much as 16 percent. This soil occurs with other rolling and hilly soils or land types that are forested. In places parts of the subsoil are gone and shallow gullies have formed.

The 4- to 5-inch surface layer consists of the remaining original surface layer, which has been mixed with the upper subsoil during tillage. It is more brown or reddish yellow and slightly finer in texture than the original surface soil.

Runoff from most tilled areas is moderately rapid unless it is controlled. Internal drainage is generally medium to moderately rapid, and in places it may be very rapid.

Use and suitability.—Nearly all this soil has been in cultivation. Only a small percentage is now used for crops, mainly cotton and crops used on the farm. Many areas are idle or are reseeding to pine. Some have been planted to pine. Enclosed areas used as unimproved and woodland pasture are fairly common. Little of the acreage is in improved pasture.

This soil is fairly well suited to crops, but for good yields it needs additional organic matter and fairly large quantities of complete mineral fertilizer. If used for row crops, this shallow and steep soil needs good management to prevent erosion and to maintain productivity. If management is good, winter legumes can be grown successfully.

This soil is best used for forestry on account of its strong slopes. It is in capability unit IIIe-2.

Sequatchie Series

Soils of the Sequatchie series are sandy and well drained and have weakly to moderately well developed texture profiles. They have formed from fairly young to moderately old general alluvium that washed from uplands underlain by sandstone and acid shale and modified by materials from limestone and calcareous shale. The alluvial deposits ranged from 6 to 15 feet in thickness.

Sequatchie soils occur most commonly as small to moderately large areas on low stream terraces, mainly along big Nance and Town Creeks, in the Tennessee Valley. Some of the acreage is also along smaller streams in the Tennessee and Moulton Valleys. Slopes range from 0 to 12 percent but commonly are from 1 to 5 percent.

Sequatchie soils are closely associated with the Waynesboro, Nolichucky, Holston, and Monongahela soils and, in places, with the Etowah and Cumberland loams and the Abernathy and Hamblen fine sandy loams. The native vegetation consisted of hardwoods mixed with shortleaf pine.

Sequatchie fine sandy loam, undulating phase (Sb).—This soil has not been damaged through erosion, even though it has been used mainly for row crops. Slopes range from about 1 to 3 percent, but in a few areas they are as much as 6 percent. The stronger slopes have been in forest or used for hay or improved pasture.

Profile in a cultivated area:

0 to 15 inches, light-brown fine sandy loam; moderately loose; low in organic matter; strongly acid.

15 to 32 inches, reddish-brown fine sandy loam that grades to light fine sandy clay loam in the lower part; strongly acid.

32 to 42 inches, yellowish-red loamy fine sand to

very fine sand streaked or mottled with gray; moderately loose; medium to strongly acid.

The surface soil is loam to loamy fine sand, and the subsoil is fine sandy loam to fine sandy clay loam or light fine sandy clay that frequently grades to more sandy material at depths of 3 to 5 feet.

This soil is moderately low in plant nutrients and medium acid to strongly acid. It has good tilth, is easily worked, and absorbs moisture very well. The capacity to hold available moisture is moderate. It is lowest where the subsoil is loose and sandy. The soil is well drained and easily conserved. Erosion is normally not a problem, but some areas require control of runoff.

Use and suitability.—Practically all of this soil has been cleared and is used mainly for row crops. Some of the acreage is in improved pasture, and a small acreage is in cutover forest. In the Tennessee Valley, the soil is used mainly for cotton and to a less extent for corn, soybeans, lespedeza, and other crops used on the farm. In the Moulton Valley it is used mainly for cotton and corn and to a less extent for minor crops.

This soil is very good for most of the locally grown field and truck crops and for the grasses and legumes desirable as hay or pasture. If continuously cropped, it needs organic matter and complete mineral fertilizer in fairly large quantities. Under good management, yields are satisfactory. Winter legumes grow well on most of the acreage and can be used as green manure. Fescue and ladino clover grow satisfactorily in improved pasture, particularly in the nearly level areas. The suitability of most nearly level areas for pasture is improved by artificial drainage. This soil is in capability unit IIe-2.

Sequatchie fine sandy loam, eroded undulating phase (Sa).—This soil differs from the undulating phase of Sequatchie fine sandy loam in texture of the surface soil. Slopes range from 2 to 6 percent, but in a small included acreage they are as much as 12 percent. The more eroded areas have slopes of 3 percent or more.

About half of the original surface soil has been lost through erosion. The 5- to 6-inch surface layer now consists of the original surface soil that was mixed with subsoil during tillage. It is more brown or reddish brown and finer in texture than the original surface layer.

This soil is moderately low in plant nutrients. Tilth, workability, the capacity to absorb moisture, and the content of organic matter have been reduced because of erosion. The soil responds to management and is easily reclaimed. It needs protection from erosion, additional organic matter, control of runoff, and adequate quantities of fertilizer. The favorable soil characteristics lost through erosion can be restored through management.

Runoff is rapid enough that many slopes of 3 percent or more will erode if the soil is not protected. Internal drainage is medium in most areas; moderately slow on some nearly level terraces; and moderately rapid, particularly on rolling and strongly undulating slopes where the subsoil and underlying materials are sandy.

Use and suitability.—Nearly all of this soil has been used for crops. Cotton has predominated in the Tennessee Valley, and corn and cotton were the main crops in the Moulton Valley. Minor crops are grown in both valleys. Numerous small areas closely associated with soils on first bottoms or with other low lying soils have been used as improved pasture.

This soil is suitable for most of the locally grown field crops, including alfalfa, market vegetables, and the grasses and legumes desirable for hay and pasture. Yields usually are satisfactory if management is good. This soil is in capability unit IIe-2.

Staser Series

Staser fine sandy loam (Sc).—This well-drained soil is forming from young general alluvium washed mainly from soils derived from acid sandstone and shale, but partly from materials derived from weathered limestone and calcareous shale. It occupies slopes ranging from 0 to 2 percent. It occurs along the larger streams, mainly Big Nance and Town Creeks, in close association with the Bruno, Hamblen, Prader, Lindside, Huntington, and Sequatchie soils and other first-bottom and low-terrace soils.

The Staser soil differs from the Huntington in having slightly more acidity because of the source of its parent material and in being lighter, or more grayish brown, in the surface soil and subsoil. It is slightly less fertile than the Huntington soils.

Profile description:

0 to 10 inches, brown fine sandy loam containing much very fine sand; very friable; slightly acid.
10 to 24 inches, brown very fine sandy loam; friable; slightly acid to medium acid.
24 to 40 inches, brown to dark yellowish-brown fine sandy loam to light very fine sandy loam; very friable; medium acid.

The surface soil ranges from a moderately dark brown to yellowish brown and dries to a pale brown or light grayish brown. The subsoil is light yellowish brown in places. The texture of these layers ranges from light fine sandy loam to a heavy very fine sandy loam or loam. Most areas contain considerable very fine sand but only small amounts of clay.

This soil is fairly high in plant nutrients and ranges from medium acid to slightly alkaline in reaction. It is easy to work, has good tilth, and absorbs moisture fairly rapidly. The capacity to hold available moisture is moderately high. Erosion control is not difficult. The soil responds to fertilizer. Fields used continually for row crops need complete fertilizer for good yields.

Use and suitability.—Most areas of this soil have been cleared and are used mainly for corn, soybeans, grain sorghum, and legumes and grasses for hay and pasture. Use of complete mineral fertilizer has not been a common practice. The soil is well suited to improved pasture. Lime generally is not needed. Ladino clover and fescue are the most satisfactory plants for pasture, but other mixtures of grass and clover have also been satisfactory. The latest suggestions for improving pasture can be obtained from the county agricultural agent or from people representing the Soil Conservation Service. This soil is capability unit I-1.

Stony rolling land

Stony rolling land, Talbott and Colbert soil materials (Sd).—This miscellaneous land type is mainly in the Moulton Valley. It is near the bases of Sand and Little Mountains in association with limestone rocklands and with the Colbert, Hollywood, and Talbott soils. The mapping unit consists of limestone bedrock, large limestone boulders on the surface, and Talbott and Colbert soils or soil materials in the intervening spaces. The soil material ranges in thickness from 1 inch or less to 36 inches or more. It generally is shallow, except where it fills deep holes, cracks, and crevices in the limestone. Usually it thins near the ledges of bedrock, but it is deeper below the outcropping. There is little uniformity in the depth to bedrock or in the extent of its exposure at the surface. The relief is mainly rolling, but there are some gently rounded ridgetops, undulating flats, and very gentle slopes. Gradients range from 2 to 12 percent, but they are mainly 6 to 12 percent. The native vegetation consisted of pure stands of cedar in some places, and of cedar mixed with hardwoods in others.

Many stony slopes have been more deeply covered by Talbott and Colbert soils. However, erosion has removed the surface soil and part of the upper subsoil and exposed the underlying limestone bedrock. The remaining soil material resembles that in the lower subsoils and underlying soil materials of the Talbott and Colbert soils. Areas in native forest have lost very little soil through accelerated erosion, but the soil material is shallow because normal or geologic erosion has kept pace with soil formation.

Because of the outcropping bedrock and boulders, this land is difficult if not impossible to work. Tilth generally is poor. Moisture is slowly absorbed. The capacity to hold available moisture is low because of shallowness. Runoff is rapid to moderately rapid in most areas, including those in forest. Internal drainage is slow because the soils and soil materials between the exposed limestone are clayey and shallow.

Use and suitability.—Most of this land type is in cutover forest, and some is used for woodland pasture. This land type is poorly suited to crops that require tillage. It is fairly well suited to spring and early summer pastures, but trees and brush should be cleared to allow grasses and legumes to grow. The practices needed to establish improved or partly improved pastures range from simply clearing away the brush to disking, fertilizing, and seeding of desirable legumes and grasses. The land is droughty, and the carrying capacity is very low during hot dry periods. Small patches of this land type are used occasionally for corn, potatoes, cabbage, tomatoes, and other crops for use on the farm. This land type is in capability unit VIIe-2.

Stony steep land

Stony steep land, Muskingum soil material (Se).—This land type has the roughest, most broken relief and the most complex composition of parent rocks of any land type in the county. The relief ranges from nearly vertical for the sandstone bluffs to nearly level for the narrow ridgetops and benches. The more typical areas consist mainly of sandstone and shale, but most of the sandstone is in relatively thin layers that alternate with thin and thick beds of shale. The sandstone overlies beds of limestone, but to great extent the overlying sandstone and shale materials have broken away. The boundaries shown on the map between this land type and Rockland, limestone, steep, are only approximately accurate.

This land type occurs on the steep slopes and bluffs of Sand and Little Mountains. It is associated closely with Muskingum and Pottsville soils and with Rockland, limestone, steep, which frequently borders it on the lower side.

The runoff is very rapid in all areas, including those forested. The internal drainage ranges from moderately rapid to very rapid in most areas, but it may be fairly slow in places, especially on the benches where seepage keeps the water table fairly high. The native vegetation consists of hardwoods and pine mixed in places with cedar.

Use and suitability.—Nearly all of this land type is in forest. It is not suitable for cultivation or improved pasture because it has a stony surface, steep slopes, and a shallow covering of soil material. Some of the acreage is used as woodland pasture, but the carrying capacity is very low. The best use is forestry. This land is in capability unit VIIe-1.

Talbott Series

Soils of the Talbott series have formed in material weathered from argillaceous limestone that contains some material from shale. The parent material is similar to that of the Colbert soils. Most of the Talbott soils occur in Moulton Valley in close association with the Colbert, Decatur, and Cumberland soils. Talbott soils differ from the Colbert chiefly in having a browner surface soil and a less plastic reddish subsoil. Talbott soils differ from Dewey soils in being stiffer, more compact, and more plastic. In addition, bedrock is at depths ranging from less than 2½ feet to more than 5 feet, and in places limestone bedrock is exposed.

Talbott silt loam, undulating phase (Tc).—This well-drained soil occupies small irregularly shaped areas near the base of limestone slopes, mainly in the Moulton Valley. Slopes range from about 2 to 6 percent. The soil has developed under forest vegetation consisting mainly of hardwoods mixed with pine and in places with cedar.

Profile description:

0 to 6 inches, dark yellowish-brown to yellowish-red silt loam to silty clay loam; friable when moist, moderately hard when dry; strongly acid.

6 to 21 inches, red to reddish-brown silty clay; moderately friable when moist, hard when dry, and sticky and plastic when wet; contains small, brown concretions and scattered small, angular fragments of chert; strongly to very strongly acid.

21 to 38 inches, mottled red, reddish-brown, and gray heavy clay; moderately friable when moist, sticky and plastic when wet, and very hard when dry; small fragments of chert in places; strongly to very strongly acid.

The texture and friability of the surface soil depend on the source of the parent material. Soils formed

from argillaceous limestone and shale usually are more uniform and finer in texture than soils derived from parent material that was modified by cherty or sandy materials. Talbott soils usually are free of chert or limestone fragments, but scattered chert is fairly common in some areas, and there are some very cherty spots. Limestone boulders and bedrock are exposed in places, especially in the eroded areas.

Talbott silt loam is moderately high in natural fertility and strongly acid. It is fairly easy to work, has good tilth, and has a moderate to low capacity to hold moisture that plants can use. Internal drainage is medium in the surface and upper subsoil and moderately slow in the lower subsoil. The soil responds to management but less so as the damage from erosion becomes more severe.

Use and suitability.—Nearly all of this soil is in cutover forest and has been damaged little through accelerated erosion. The soil is suitable for most of the farm crops commonly grown. The virgin soil is fairly productive, but it needs mineral fertilizer for satisfactory yields if cropped continuously. This soil is in capability unit IIIe-12.

Talbott silty clay loam, eroded undulating phase (Tf).—This soil, the most extensive of the Talbott soils, differs from the undulating phase of Talbott silt loam in erosion. It occupies slopes that range from 2 to 6 percent and occurs as areas containing from a few to more than 100 acres. It is mainly in the Moulton Valley, but a few areas are in the Tennessee Valley.

From about 50 to more than 75 percent of the original surface soil and subsurface materials have been lost through erosion. In places part of the upper subsoil has also been lost. The 4- or 5-inch surface layer consists of the remaining friable original surface soil and the upper subsoil that has been mixed with it during tillage. The present surface layer is finer in texture and redder in color than the original surface soil.

The runoff from cropland ranges from medium to moderately rapid, but it is very rapid if not controlled. The internal drainage is medium in the surface soil and upper subsoil and generally moderately slow to slow in the lower subsoil and underlying parent material. In areas shallow to bedrock, internal drainage in the subsoil is moderately slow to slow.

Erosion has reduced the workability and tilth of this soil and its capacity to absorb moisture. The capacity to hold available moisture is low. Erosion has increased the difficulty of tillage and conservation and the tendency of the soil to erode. The soil responds to management, but it must be used with practices that will conserve enough moisture for crops during the summer growing season.

Use and suitability.—Nearly all of this soil is used for row crops. It is desirable for most crops but less suitable than the better soils. The more severely eroded areas are less suited to corn than to cotton, hay, or pasture. The soil is well suited to winter legumes if runoff and erosion are adequately controlled. For cotton, the better farmers apply complete fertilizer before planting and then commonly apply ammonium nitrate or nitrogen as a side dressing about 30 days after planting. If cotton is planted in a field where a good crop of winter legumes has been plowed under, the side dressing of nitrogen is omitted. This soil is in capability unit IIIe-12.

Talbott silty clay loam, eroded rolling phase (Te).—This soil differs from the eroded undulating phase of Talbott silty clay loam in slope, shallowness, and erosion. Slopes range from 6 to 12 percent. The 4- or 5-inch surface layer is somewhat more red because a greater percentage of subsoil has been mixed with it in tillage.

A small acreage has more chert on the surface and in the soil than the typical soil. The chert somewhat interferes with tillage but does not prevent it. In places limestone boulders and bedrock are on the surface.

The stronger slopes and greater loss of surface soil have made workability, tilth, and the capacity to absorb moisture somewhat less favorable than for the undulating phase of Talbott silt loam. Erosion has made conservation and reclamation of this soil more difficult and has increased its tendency to erode. The light, stiff clay subsoil, now part of the plow layer, is not easily improved to the point where it is good surface soil.

This soil responds fairly well to management if runoff is adequately controlled and winter legumes are turned under as green manure. Conservation was more easily accomplished before the friable surface soil was lost.

Use and suitability.—Nearly all of this soil has been used for row crops, mainly cotton or corn. Less than 10 percent is in forest. This soil is suitable for row crops grown in long rotations. It is also good for sericea lespedeza grown for hay or pasture. If the soil is used mainly for row crops, strict conservation practices must be applied if productivity is maintained. This soil is in capability unit IVe-12.

Talbott silty clay, severely eroded undulating phase (Td).—This soil differs from the eroded undulating phase of Talbott silty clay loam in having lost nearly all of the original surface soil and subsurface layer through erosion. It occupies slopes that range from 2 to 6 percent, but most of the severely eroded areas have slopes of 3½ to 6 percent. The soil occurs in small scattered areas.

The plow layer consists almost entirely of subsoil. It is reddish yellow and yellowish red and mainly a silty clay. In places there are spots that contain enough of the more friable, original surface and subsurface materials to make the texture a silty clay loam. Some areas have been so severely eroded that they differ only slightly from the gullied phases of the Decatur and Cumberland silty clays.

The workability, tilth, and the capacity to absorb moisture have been greatly reduced by erosion. The loss of soil in some places has been so severe that the areas need special treatment. The less severely eroded areas can be reclaimed by building terraces and using other practices that control erosion, conserve moisture, and add organic matter to the soil. Runoff is rapid to very rapid, particularly from heavy summer showers. Internal drainage generally is medium in the surface soil and upper subsoil but moderately slow in the lower subsoil.

Use and suitability.—Most of the acreage is idle or is used as pasture. In its present eroded condition,

most of the acreage is not suitable for crops and is of limited value as pasture. If reclaimed, the soil can be used for improved pasture and later cultivated. The soil is suited better to cotton than to corn. It is in capability unit IVe-12.

Talbott silty clay, severely eroded rolling phase (Tg). This soil differs from Talbott silty clay loam, eroded rolling phase, in amount of erosion. It has lost nearly all the original surface soil and subsurface soil, as well as part of the subsoil, through sheet and gully erosion. Slopes range from 6 to 12 percent. Most of the acreage, however, is in the range of 8 to 12 percent. Included with this soil is a very small acreage of the severely eroded hilly phase, which has slopes of as much as 16 percent.

Most of the soil is in fairly narrow, strongly rolling or sloping strips. It occurs with other Talbott soils and with the lower lying Abernathy and Ooltewah soils and other soils on the first bottoms.

The present surface layer consists mainly of subsoil; it is considerably finer in texture and redder in color than the uneroded soil. Outcrops of bedrock and limestone boulders are fairly numerous. Bedrock is at depths that range from less than 2 feet to about 4 feet. The more severely eroded areas containing a large gully or several fairly deep gullies are shown on the soil map by appropriate symbols.

Workability is difficult because of the strong to moderately strong slopes and poor tilth. Infiltration of moisture is very slow, especially from heavy summer showers, and the capacity to hold available moisture is low. Runoff is rapid, the soil is easily eroded, and, consequently, soil and moisture are difficult to conserve.

Use and suitability.—Nearly all of this soil has been used for crops, but less than half the acreage is now regularly cultivated. The rest is idle, in unimproved pasture, or reseeding to forest trees, mainly to pine. The tilled areas are used mainly for cotton and to a less extent for corn, soybeans, annual lespedeza, and other locally grown crops.

This soil is fairly well suited to sericea lespedeza pasture, especially areas that have the less droughty, northerly or easterly exposures. The soil is generally droughty during long, hot, dry periods, and the carrying capacity of pastures is relatively low. The best use for the least eroded areas is pasture or meadow planted to sericea lespedeza. The most eroded areas should be in pine. This soil is in capability unit IVe-12.

Talbott loam, eroded undulating phase (Tb).—This soil differs from the Talbott silt loam in that the surface layer contains more sand. The weathered clayey limestone residuum from which this soil has formed was covered by a thin layer of sandy alluvium or colluvium. The parent material is similar to that of the Colbert loams.

This soil occupies slopes that range from less than 2 to about 6 percent; it is near the bases of Sand and Little Mountains. A small acreage has slopes stronger than 12 percent. The soil occurs as small areas in association with the Colbert loams, the Jefferson fine sandy loams, the Cumberland loams, the Decatur and Cumberland silt loams and silty clay loams, with other Talbott soils, and with other limestone-valley soils in the Moulton and Tennessee Valleys. This soil developed under a forest similar to that of the Talbott silt loam, but the amount of pine probably was a little larger.

Profile in an uneroded area:

0 to 6 inches, light-brown to light yellowish-brown fine sandy loam to loam; friable; low in organic matter; strongly to very strongly acid.

6 to 10 inches, light reddish-brown to yellowish-red fine sandy clay loam to silty clay loam; firm but moderately friable; very strongly acid.

10 to 25 inches, yellowish-red silty clay; firm; moderately friable when moist, fairly plastic when wet, and hard when dry; very strongly acid.

25 to 40 inches, yellowish-red to red silty clay or clay mottled or splotched with shades of yellow and yellowish brown; tough, plastic; very strongly acid.

From 50 to about 75 percent of the original surface soil has been lost through erosion. The surface layer now consists of the remaining friable original surface soil, which was mixed with the upper subsoil during tillage. It is browner than the original surface soil, and it ranges from friable fine sandy loam to sandy clay loam. The subsoil does not differ greatly from that of the Talbott silt loam, except that in places it contains sandy material.

Under forest vegetation, this soil is well drained. It has somewhat better internal drainage than the silt loam because it has a sandier surface soil and in places has a slightly more friable upper subsoil. The uneroded soil is moderately high to moderately low in plant nutrients and ordinarily low in organic matter. If cultivated, the soil needs moderately large quantities of complete mineral fertilizer. It must be properly managed to prevent loss of the surface soil and its inherently good characteristics.

The eroded soil has lost most of its surface soil and, consequently, most of its desirable characteristics. Workability, tilth, and the capacity to absorb moisture have all been reduced. The heavy and tight subsoil that is now mixed with the plow layer does not develop readily into a new and friable surface soil.

Use and suitability.—About 95 percent of this soil has been cleared and is now used for row crops, mainly cotton and corn. The rest is in cutover forest. The soil can be used intensively for row crops, but the strong slopes must be protected. Winter legumes used in rotation with cotton and corn will improve tilth, add organic matter, reduce erosion, and furnish grazing. The soil is suitable for close-growing crops, including small grains, and lespedeza, whiteclover, fescue, alfalfa and other hay and pasture plants. It is in capability unit IIIe-12.

Talbott loam, eroded rolling phase (Ta).—This soil differs from Talbott loam, eroded undulating phase, in slope, color, and texture. Also, the 4- to 5-inch surface layer is redder and somewhat finer in texture, and accelerated erosion has damaged more of the area. Slopes range from 6 to 12 percent; a small acreage with slopes as much as 16 percent has been included.

Runoff is rapid to excessive on croplands unless practices are used to control it and to prevent erosion. Internal drainage is normally medium in the surface soil and subsoil, but in some places it may be somewhat slow in the lower subsoil.

Use and suitability.—Nearly all of this soil is used each year for row crops or as unimproved pasture. Little of the acreage has been put in improved permanent pasture. Winter legumes, Italian ryegrass, and small grains seeded late in summer or early in fall furnish some grazing. This soil is suitable for nearly all of the crops commonly grown in the county. The soil is fairly erosive, however, and must be protected by practices that conserve moisture and soil material. For satisfactory yields, fairly liberal quantities of complete mineral fertilizer and additional organic matter are needed. This soil is in capability unit IVe-12.

Tilsit Series

Soils of the Tilsit series are very light colored and moderately well drained. They have developed from parent materials derived from fine-grained sandstone, siltstone, and shale. Tilsit soils differ from the Enders soils in having a fairly definite, semihard siltpan or a partly cemented mottled zone at depths of 20 to 30 inches.

Tilsit soils occupy relatively broad, undulating to rolling ridgetops and plateaus where slopes range from less than 2 to about 10 percent. The more typical areas of Tilsit soils are characteristically nearly level, gently undulating, or gently sloping. Tilsit soils are one of the largest groups of agricultural soils in the county. They occur with the Linker, Cumberland, and Muskingum soils, with Lawrence and Colbert silt loams, and in places with the Johnsburg, Lickdale, and Atkins soils.

Tilsit silt loam, undulating phase (Tm).—This soil is the most representative of the Tilsit series in the county. It occupies slopes that range from less than 2 to about 5 percent. It occurs with other Tilsit soils.

Profile description:

0 to 7 inches, brown (10YR 5/3) silt loam; smooth, friable; upper 1 to 2 inches contains organic matter and is a dark to very dark grayish brown (10YR 3/2); very strongly acid.

7 to 24 inches, light yellowish-brown (10YR 6/4) friable silt loam, with gradual transition to dark yellowish-brown (10YR 4/4) clay loam as depth increases; clay loam is friable when moist, somewhat sticky and plastic when wet, and moderately hard when dry; range in optimum moisture for entire layer is moderately wide; layer is very strongly acid.

24 to 46 inches, strong-brown to light yellowish-brown silty clay loam to very fine sandy clay; soil material mottled with shades of red and grayish brown; gray color increases with depth; very strongly acid.

The surface soil ranges from silt loam to very fine sandy loam. The mottlings in the subsoil range from dominantly reddish to yellowish brown, brownish yellow, or gray. Very light gray or whitish splotches are common in the mottled zone of many profiles. The content of very fine sand is high or moderately high in most profiles. Depths to interbedded sandstone and shale bedrock or partly weathered rock range from about 2 to 4 feet.

This soil is low in plant nutrients and organic matter and very strongly acid. It is strongly leached of all soluble carbonates. When in cultivation, it is easy to work and has excellent tilth. Moisture is readily absorbed whether the soil is in forest or in cultivation. The capacity to hold available moisture is moderate. Crops respond well to complete mineral fertilizer and to additions of organic matter.

Use and suitability.—This soil is mainly in cutover forest. It is well suited to pine. The present forest consists largely of pine naturally reproduced from surrounding seed trees. For general farm crops, this soil compares favorably with Tilsit silt loam, eroded undulating phase. Tilsit silt loam, undulating phase, is in capability unit IIe-3.

Tilsit silt loam, eroded undulating phase (Tk).—This soil differs from Tilsit silt loam, undulating phase, in color and texture of the surface soil. This is probably the most extensive cultivated soil in Lawrence County. It is in irregularly shaped, moderately small to large areas. It occurs with Tilsit silt loam, eroded rolling phase, and with the eroded phases of Linker soils. This soil and its associates are so nearly alike in use suitability that they can be worked in fairly large units suitable for tractor farming.

Tilsit silt loam, eroded undulating phase, has been in cultivation for many years. In most areas it has lost 50 to 75 percent of the loose, very friable, original surface layer. The present 5- to 6-inch surface layer consists of the remaining original surface and subsurface layers, mixed with the upper subsoil during tillage. The present surface layer is less gray and more yellowish brown than the original, and its texture is somewhat finer. In included small spots on fairly sharp breaks, the subsoil is exposed. In these spots, the surface layer consisting almost entirely of subsoil is reddish-gray to reddish-yellow silty clay loam to very fine sandy clay loam.

This soil is low in plant nutrients and organic matter and strongly leached of soluble carbonates. The workability is fairly easy, and tilth is very good. The capacity to hold available moisture is moderately good. The capacity, however, is not so favorable as in the well-drained Hartsells and Linker soils on sandy plateaus, nor as in the well-drained Decatur and Cumberland soils in limestone valleys. The gently undulating to nearly level areas of this Tilsit soil are somewhat slow to warm up in spring or to dry out after heavy rains. This characteristic may cause from 5 to 10 days delay in spring planting and from 1 to 3 days in working the soil following heavy or prolonged summer rains.

Use and suitability.—Nearly all of this soil is used annually for row crops, mainly corn and cotton. It responds to management and needs moderately heavy applications of complete fertilizer and additional organic matter for satisfactory yields. The soil is suitable for nearly all general farm crops commonly grown in the county, if management is good. Winter cover crops can be grown on most areas. Winter legumes are not suited to the nearly level or the very gentle undulating areas unless excessive surface moisture that accumulates in winter and early in spring is artificially drained.

The soil is fairly well suited to improved pasture. Methods for establishing improved pastures differ according to the lay of the land and should be obtained from the county agricultural agent or from people

representing the Soil Conservation Service. This soil is in capability unit IIe-3.

Tilsit silt loam, rolling phase (Tl).—This soil differs from the undulating phase of Tilsit silt loam mainly in slopes. In addition, its semihard mottled zone is less definitely developed. The soil occupies slopes ranging from 5 to about 10 percent on Little Mountain. Bedrock or partly weathered interstratified sandstone and shale is at depths ranging from 18 to about 48 inches. The deepest soil commonly occurs near the base of slopes and contains some colluvium.

This soil is not difficult to work, but it is harder to work on these stronger slopes than on the undulating phase. The soil is more erosive than the undulating phase, particularly as cropland, and requires more strict practices for tillage and for the conservation of soil and moisture.

Runoff in forests is medium to moderately rapid. It becomes moderately rapid to rapid on cropland, unless adequate conservation of soil and moisture is practiced. Internal drainage is medium in the surface soil and upper subsoil and normally slow in the lower subsoil and the parent material.

Use and suitability.—Most of this soil is in cutover forest consisting of hardwoods and pine. The percentage of pine is probably greater than that in virgin forests because pine generally reseeds better and grows more rapidly than the hardwoods. If the soil is cleared and improved as cropland, the use suitability is about the same as for Tilsit silt loam, eroded rolling phase. Tilsit silt loam, rolling phase, is in capability unit IIIe-3.

Tilsit silt loam, eroded rolling phase (Th).—This eroded silt loam is less gray and more brown in color and somewhat finer in texture than the uneroded phases of Tilsit silt loam. Erosion has removed 50 to 75 percent of the original surface soil and subsurface layer. The present surface layer consists of the materials remaining from the original surface layer mixed with subsoil brought up during tillage. Some areas are more severely eroded, particularly the sharp breaks where the subsoil is exposed. In these spots, the surface soil is reddish-gray to reddish-yellow silty clay loam or very fine sandy clay loam to clay loam.

This soil occurs in irregularly shaped, narrow areas on the slopes of Little Mountain. It is below larger areas of Tilsit silt loam, eroded undulating phase.

Runoff is generally moderately rapid to rapid and is very rapid unless practices are used to control it. Internal drainage is medium in the surface soil and upper subsoil and moderately slow in the lower subsoil and parent material.

Workability, tilth, and the capacity to absorb moisture have been impaired by erosion. However, the soil is moderately easily reclaimed if soil and moisture conservation are practiced.

Use and suitability.—Nearly all of this soil has been used for row crops, mainly corn and cotton. Most of the acreage is now used every year for general farm crops, including hay and pasture. A small acreage is severely eroded. Some areas are idle or have reseeded to forest trees, mainly to pine. The soil is suitable for most of the crops commonly grown in the county. It can be used for row crops if soil and moisture conservation is practiced. Most of the row crops should be grown in long or moderately long rotations that include close-growing crops. Lespedeza sericea is the most suitable close-growing plant for hay and pasture. This soil is in capability unit IIIe-3.

Tupelo Series

Soils of the Tupelo series are light colored and poorly to somewhat poorly drained. They are forming from old alluvium that washed from soils derived mainly from clayey limestone or alluvium that washed from weathered exposed limestone and shale and was modified in places by material from sandstone.

Tupelo soils occupy low terraces and are scattered widely throughout the Moulton and Tennessee Valleys. Slopes range from 0 to more than 2 percent but seldom exceed 1 percent. Near the margin of terraces or the border of swales, however, the gradients are stronger. Tupelo soils occur with Colbert, Talbott, Hollywood, Robertsville, Dunning, and Melvin soils and with other soils of the limestone valleys.

The natural vegetation consists mainly of post, water, and white oaks, hickory, persimmon, sweetgum, blackgum, elm, dogwood, and a few scattered pines and cedars. In cutover areas pine and cedar are more common.

Tupelo silt loam (To).—This soil is slightly better drained than other Tupelo soils.

Profile in a virgin area:

0 to 5 inches, light yellowish-brown silt loam to silty clay loam faintly splotched with yellow and brown; upper ½ to 1 inch contains organic matter and is a dark grayish brown to brown; friable to moderately firm; numerous small, fairly hard, round, brown concretions; strongly acid.

5 to 20 inches, brownish-yellow silty clay mottled with gray and brown; organic-matter content is very low; numerous small, moderately hard, brown concretions; strongly acid.

20 to 34 inches, light-gray silty clay to clay mottled with yellowish red; heavy, sticky, and plastic; contains brown concretions; strongly acid.

The number, size, and distribution of the brown concretions differ greatly. The concretions are numerous in some places and nearly absent in others. Their size ranges from nearly half an inch to less than a sixteenth of an inch in diameter, but they are mostly less than a quarter of an inch. Some concretions are nearly black or very dark brown; the large ones are soft.

In places the surface layer contains a fairly high percentage of very fine sand. The friable surface layer in virgin areas ranges from less than 4 inches to more than 10 inches in thickness. The more common range is from 5 to 7 inches. Limestone bedrock is at depths ranging from 3 to about 7 feet.

This soil is inherently fairly fertile and productive and strongly acid. Tilth is good to excellent if the friable surface layer is thick to moderately thick, but it is poor if the layer measures less than 4 inches. The surface layer absorbs moisture fairly well, but the amount absorbed is limited by the tight, slowly permeable subsoil. The capacity to hold available moisture

is moderate to low, but it is reduced by the lack of a friable subsoil.

Runoff is slow to moderately slow in most areas, but it is good in some. Freshly plowed or clean-cultivated fields tend to erode easily because the surface layer becomes saturated and cannot drain. Internal drainage is moderately slow in the surface soil and upper subsoil and slow to very slow in the lower subsoil and underlying material. The water table is high in winter, early in spring, and in wet periods. Most areas are benefited if they are drained by easily maintained, shallow, V-shaped ditches.

Use and suitability.—Most of this soil has been cleared and used for crops or pasture. Less than 10 percent of the acreage is in cutover forest consisting mainly of hardwoods mixed in places with scattered pine and cedar. The cutover areas are commonly used as woodland pasture. The cultivated acreage is used mainly for corn, though soybeans, grain sorghum, cowpeas, and annual lespedeza and other hay crops are also grown. The soil is better suited to corn and hay crops than to cotton, but better drained areas are often used for cotton. The soil responds to management. It needs drainage and moderately large applications of complete mineral fertilizer for satisfactory yields. Green-manure crops should be grown and soil-conserving practices applied.

The soil is very well suited to improved pasture, particularly if excessive surface moisture can be drained. Many areas have been developed into improved pasture, and various mixtures of grasses and legumes have proved satisfactory. A mixture of ladino clover and Kentucky fescue is suggested. This soil is in capability unit IIIw-2.

Tupelo loam (Tn).—This soil has a slope range of 0 to 2 percent, but few slopes exceed 1 percent. It occupies moderately low terraces. It occurs with Tupelo silt loam and the Robertsville, Tyler, and Monongahela soils on the terraces and border areas, as well as with the Colbert, Jefferson, Melvin, and Prader soils and other soils in the limestone valleys.

Profile in a virgin area:

0 to 5 inches, light brownish-gray loam; friable; 1-inch surface layer contains enough organic matter to color it a dark grayish brown; strongly acid.

5 to 8 inches, grayish-brown to brownish-yellow loam to silty clay loam or very fine sandy clay; moderately friable; strongly acid.

8 to 30 inches, faintly to strongly mottled clay; stiff and massive; breaks to weak angular to subangular medium blocky structure when moderately dry to dry; strongly acid.

Bedrock is at depths ranging from 4 to 7 feet.

The loamy surface layer ranges from less than 4 inches to more than 8 inches in thickness, and the moderately friable layer may extend as much as 12 inches below the surface. Fine and very fine sand may extend to the upper subsoil. The sand gives the surface layer a friable consistence and a texture that ranges from very fine sandy loam to fine sandy clay loam. Over the acreage as a whole, the average texture is a loam. The sand was deposited as alluvium similar to that on the Talbott loams or Colbert loams.

The surface soil and, in places, the upper subsoil are moderately well drained. Over the acreage as a whole, drainage is moderately slow in the upper subsoil and very slow in the lower subsoil and underlying light clayey material.

Tupelo loam is moderately low in plant nutrients, low in organic matter, and strongly acid. It is more easily worked than Tupelo silt loam because it is more friable. Tilth is good. Moisture is absorbed by the surface soil and transitional layer slightly more rapidly than the Tupelo silt loam, but in the lower subsoil and underlying material absorption is about the same for the two soils. Erosion is not a problem. The relief favors the application of soil conserving practices.

Use and suitability.—More than 80 percent of this soil has been cleared and used for crops or pasture. The balance is in cutover forest consisting of hardwoods mixed with pine and cedar. Some cutover areas and abandoned fields have reseeded to forest, mainly to pine. The cleared land has been used mainly for corn, but soybeans, grain sorghum, cowpeas, and, in places, cotton are also grown. This loam is better suited to cotton than the silt loam under similar drainage, because the loam tends to warm up faster in spring.

This soil is better suited to corn, sorghum, and many kinds of hay and pasture than to cotton. It is well suited to improved pasture. It responds fairly well to treatment, and artificial drainage improves all parts of this soil. Most areas are not suitable for winter cover crops unless they are adequately drained of excess surface moisture. The soil is in capability unit IIIw-2.

Tyler Series

Soils of the Tyler series are on low terraces and are somewhat poorly drained. They have formed from old alluvium derived mainly from sandstone and shale mixed with limestone material. The alluvium is similar to that of the associated Monongahela and Holston soils. Tyler soils are less well drained than Monongahela soils.

Internal drainage in Tyler soils is moderately slow in the surface soil and upper subsoil and slow to very slow in the lower subsoil and underlying material. The water table is near the surface during long wet periods, but it may recede to several feet below the surface in long dry periods. Road ditches and other outlets have improved the drainage of many areas so that the upper 8 to 15 inches of soil are moderately well drained. The lower subsoil remains poorly drained.

Tyler fine sandy loam (Tp).—This soil is level or nearly level; gradients seldom exceed 1 percent. Most of it is in the vicinities of Hillsboro and Town Creek.

Profile of Tyler fine sandy loam in a native area:

0 to 3 inches, dark grayish-brown (10YR 4/2) fine sandy loam; moderate amount of organic matter; strongly acid.

3 to 9 inches, light yellowish-brown (2.5Y 6/4) heavy fine sandy loam to loam; strongly to very strongly acid.

9 to 15 inches, light yellowish-brown (2.5Y 6/4) clay loam to silty clay loam moderately mottled with gray.

15 to 32 inches, light brownish-gray (10YR 6/2)

clay loam to silty clay loam mottled with brownish yellow and gray; strongly acid.

Bedrock is at depths of 4 to 20 feet.

The texture of the surface soil ranges from fine sandy loam to silt loam. Depths to the mottled layer range from 8 to 15 inches. Large amounts of very fine sand are common, and in places large amounts of silt are in the soil.

Use and suitability.—A large part of this soil is in forest consisting of hardwoods mixed with pine. The cleared acreage has been used mainly for corn, soybeans, grain sorghum, hay, and pasture. Artificial drainage is needed for crops and pasture. The soil is suited best to grain sorghum, soybeans, and corn, and it is well suited to improved pasture. The soil is easily tilled and the response to fertilizer is good. It is in capability unit IIIw-2.

Tyler and Monongahela Soils

Tyler and Monongahela fine sandy loams occurring as irregular and indefinite mixtures are mapped together as undifferentiated units. The two soils resemble and blend with each other, and mapping them separately was not practical. The Monongahela soils are moderately well drained, and the Tyler are somewhat poorly drained.

Tyler and Monongahela fine sandy loams, level phases (Mc).—In this mapping unit, each soil occupies about the same acreage. However, some areas are predominantly of Tyler soil, and others consist mainly of the Monongahela soil. This mapping unit occurs on broad, smooth landscapes in association with the Holston and Hollywood soils and with other Tyler and Monongahela soils.

Profile description of Tyler fine sandy loam:

0 to 3 inches, dark grayish-brown fine sandy loam.
3 to 9 inches, light yellowish-brown fine sandy loam to loam.
9 to 15 inches, light yellowish-brown clay loam or silty clay loam mottled with gray; friable; breaks to subangular blocky pieces.
15 to 32 inches, light brownish-gray clay loam or silty clay loam mottled with yellow and gray; this layer is a firm, compact pan.

Limestone bedrock is at depths ranging from 4 to 20 feet or more.

In places the texture of the surface layer ranges to silt loam. Depths to mottling range from 8 to about 22 inches.

Profile description of Monongahela fine sandy loam:

0 to 5 inches, light yellowish-brown to pale-brown fine sandy loam.
5 to 20 inches, yellowish-brown to light yellowish-brown silt loam to fine sandy clay; friable.
20 to 34 inches, light yellowish-brown clay loam or silty clay loam; mottled with gray and red; compact; breaks easily to angular fragments.
34 inches +, mottled, as in layer above, but less compact.

Limestone bedrock is at depths ranging from 4 to 15 feet or more.

The texture of the surface layer is silt loam in places. The depth to mottling, which indicates inadequate drainage, ranges from 8 inches to about 22 inches.

This mapping unit of Tyler and Monongahela soils is low in organic matter and plant nutrients and is strongly acid. It has a moderate capacity to hold moisture available for plants. The surface soil and upper subsoil are permeable, but, in much of the acreage, the pan is sufficiently developed to interfere materially with percolation of water and growth of roots. Areas that have a strongly developed pan tend to be droughty late in the growing season because plant roots do not penetrate the pan to obtain the moisture available deeper in the soil. The plow layer in most places has good tilth, but preparation of seedbeds and the planting of crops in spring are commonly delayed by prolonged wetness.

Use and suitability.—About 90 percent of this mapping unit has been cleared. Much of it is used for pasture, but part is used mainly for corn, grain sorghum, soybeans, and common lespedeza. A small part of the better drained acreage is used for cotton. A small acreage of winter cover crops is turned under as green manure. Moderate quantities of fertilizer are used, mainly on row crops.

These soils respond to fertilizers and can be used intensively. Nevertheless, runoff and slow internal drainage reduce yields, interfere with fieldwork, and limit the crops that can be grown. Artificial drainage could improve the soils for crops and pasture. The soils in this mapping unit are in capability unit IIIw-2.

Tyler and Monogahela fine sandy loams, undulating phases (Md).—This mapping unit differs from the level phases of Tyler and Monongahela fine sandy loams chiefly in slopes. Gradients are as much as 6 percent. The percentage of the Monongahela soil in this mapping unit may be somewhat greater than that in the level phases. There is more surface runoff from this mapping unit, and the drainage generally is better for most crops and for tillage.

This mapping unit is widely distributed throughout the central and southern parts of the Tennessee Valley and throughout most of the Moulton Valley. It occurs with the Monongahela and Holston mapping units, with the other Tyler and Monongahela mapping units, and with soils of the Tupelo and Hollywood series.

Use and suitability.—The cleared acreage is used chiefly for corn, sorghum, soybeans, lespedeza hay, and pasture. Row crops receive moderate quantities of fertilizer.

This unit is suitable for cultivation, but poor drainage somewhat limits the kinds of crops that can be grown. Corn, sorghum, soybeans, and many legumes and grasses for hay and pasture are well suited. Alfalfa and cotton are not well suited. The soils in this mapping unit are in capability unit IIIw-2.

Tyler and Monongahela fine sandy loams, eroded undulating phases (Mb).—This mapping unit differs from the undulating phases of Tyler and Monongahela fine sandy loams in having lost much of the surface soil through erosion. It occurs with the Holston, Hollywood, and Tupelo soils and with other undifferentiated Tyler and Monongahela mapping units.

The plow layer, consisting of original surface soil mixed with subsoil, is dominantly a light yellowish-brown loam to fine sandy clay loam. The underlying material in the Monongahela is yellowish-brown silt

loam to fine sandy clay. In the Tyler the underlying material is mottled light yellowish-brown clay loam or silty clay loam. On the stronger slopes, subsoil is exposed in a few places.

These soils are low in plant nutrients and organic matter and medium to strongly acid. The plow layer has fairly good tilth, except on the more eroded slopes where the soils are somewhat plastic when wet and hard when dry. The soils are somewhat poorly drained to moderately well drained. Like the soils in other Tyler and Monongahela mapping units, these soils are cold and slow in drying out for cultivation in spring or following rains.

Use and suitability.—All of this mapping unit has been cleared and cultivated. Much of it is now used for crops or permanent pasture. Corn, sorghum, soybeans, and lespedeza are among the more common crops. Some of the better drained parts are in cotton. Crops are fertilized to some extent, but productivity is not high. A small acreage is used for winter cover crops.

This mapping unit is suitable for cultivation, but its poor drainage and low fertility limit the kinds of crops that can be grown. Some areas, especially the ones in lower positions, can be improved for cultivation through artificial drainage. On the stronger slopes, control of runoff is essential. Many legumes and grasses are suitable, and under good management productive stands for hay and pasture can be obtained. Alfalfa is not suited. The soils in this mapping unit are in capability unit IIIw-2.

Waynesboro Series

Soils of the Waynesboro series are well drained, and they occupy high terraces in limestone valleys. Slopes range from 2 to 12 percent. The soils have formed from old general alluvium that was washed mainly from soils derived from sandstone and modified by materials from limestone and shale. The alluvium ranges from 3 to more than 20 feet in thickness and is underlain by limestone, chert, or cherty limestone. Waynesboro soils occur with the Nolichucky, Sequatchie, Cumberland, Etowah, and Baxter soils in the northern part of the Tennessee Valley. Waynesboro soils differ from Cumberland soils in the source of the parent material. They differ from Nolichucky soils in color of the surface soil.

Waynesboro fine sandy loam, eroded undulating phase (Wb).—This soil has formed under a forest of hardwoods mixed with pine and scattered cedar. It occupies slopes ranging from 2 to 6 percent.

Profile in an old field:

0 to 4 inches, dark-brown (7.5YR 4/2) to dark reddish-brown (5YR 3/2) heavy fine sandy loam to fine sandy clay loam; friable; fairly high in organic matter; slightly acid to neutral.
4 to 12 inches, reddish-brown (5YR 4/3) to dark reddish-brown (5YR 3/2) clay loam; friable; low in organic matter; medium to strongly acid.
12 to 30 inches, red (2.5YR 4/6) silty clay loam to silty clay; moderately firm, but friable at optimum moisture content; strongly acid.
30 to 42 inches, dark-red (10R 3/6 to 2.5YR 3/6) silty clay to silty clay loam; firm but friable; very strongly acid.
42 to 54 inches, dark-red silty clay or heavy silty clay loam with splotches or streaks of yellowish red; friable; very strongly acid.

The surface soil ranges from very dark brown to brownish yellow. The combined thickness of the relatively loose, friable surface soil and subsurface layers depends somewhat on erosion losses, but it ranges from less than 4 inches to about 15 inches. Small fragments of chert and round quartz gravel are fairly common on the surface and in the soil. These fragments do not noticeably interfere with tillage.

This soil is slightly acid to neutral. Erosion has impaired its workability, tilth, and ability to absorb moisture. It has a friable to moderately friable subsoil and can be restored to good tilth and productivity through proper management. It needs additional organic matter, which can be supplied by growing winter legumes for green manure and applying large quantities of complete fertilizer. The soil is susceptible to erosion unless runoff is controlled. The internal drainage is medium; external drainage is medium to moderately rapid.

Use and suitability.—Practically all of this soil has been cleared and used for crops. Most of it is now continually used, mainly for cotton. A small acreage is in corn, soybeans, potatoes, lespedeza, and other minor crops grown for use on the farm. The soil responds to management and is suitable for most of the locally grown field and truck crops. It is also suitable for alfalfa if limed, fertilized, and properly seeded. Waynesboro fine sandy loam, eroded undulating phase, is in capability unit IIe-2.

Waynesboro clay loam, severely eroded rolling phase (Wa).—This soil had the same type of parent material as Waynesboro fine sandy loam, eroded undulating phase. Erosion, however, has removed nearly all of the friable original surface soil and some of the upper subsoil. The plow layer now consists mainly of subsoil. This soil is considerably redder than Waynesboro fine sandy loam, eroded undulating phase. Slopes range from 6 to 12 percent.

Erosion has greatly impaired the workability, tilth, and the capacity to absorb moisture. The capacity to hold moisture is moderate where the alluvium is as much as 5 feet or more in thickness, but the inability to absorb moisture makes the soil droughty. This soil must be carefully managed to prevent erosion and to improve moisture conditions.

Use and suitability.—Most of this soil is idle or is reforesting through natural reseeding of pine. Some of the idle acreage has been planted to pine. Some areas are used as unimproved and woodland pastures, but almost none of the acreage is in improved pasture.

The soil responds to management and is suitable for many of the crops commonly grown in the county. Row crops should be grown only in rotation with close-growing crops. The moderately friable subsoil favors the reclamation and improvement of this soil if organic matter is added and runoff and erosion are prevented.

The best use of this soil, with soil conserving practices, is for improved pasture consisting mainly of

468630—59——5

lespedeza sericea. The pasture can be rotated occasionally with cotton, corn, or other row crops.

Areas shallow to chert or other bedrock or areas where runoff and erosion cannot be prevented should be used for forestry. This soil is in capability unit IVe-2.

Genesis, Morphology, and Classification of Soils

The purpose of this section is to present the outstanding morphologic characteristics of the soils of Lawrence County and to relate 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 of the soils; the second, deals with specific soil series and the part environment has played in determining the morphology of soils of these series.

Factors of Soil Formation

Soil is produced by the action of soil-forming processes on materials deposited or accumulated through geologic agencies (*7, 8*). The characteristics of the soil at any given point are determined by: (1) The physical and mineralogic composition of the parent material, (2) the climate under which the soil material has accumulated and has existed since accumulation, (3) the plant and animal life in and on the soil, (4) the relief, or lay-of-the-land, and (5) the length of time the forces of soil development have acted on the soil material. The effects of climate on soil development depend not only on such factors as temperature, rainfall, and humidity, but also on the physical characteristics of the soil or soil material and on the relief, which in turn strongly influences drainage, aeration, runoff, erosion, and exposure to sun and wind.

Climate and vegetation are the active factors of soil genesis. They act on the parent material accumulated through the weathering of rocks and slowly change it into a natural body with genetically related horizons. The effects of climate and vegetation are conditioned by relief. The composition of the parent material also affects the kind of profile that can be formed and in extreme cases may dominate it. Finally, time is needed for the changing of the parent material into a soil profile. The time needed for horizon differentiation may be much or little, but some time is always required. Usually a long time is required for the development of distinct horizons.

The factors of soil genesis are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one unless conditions are specified for the other four. Many of the processes of soil development are unknown.

Parent materials

The parent materials of soils in Lawrence County are in two broad classes: (1) Material produced by the weathering of rocks in place and (2) material transported by water or gravity and laid down as unconsolidated deposits of clay, silt, sand, and large rock fragments.

The parent materials formed in place consist chiefly of residuum from the weathering of limestone, sandstone, and shale. The character of these materials is revealed by the properties of the soils that developed from them. The rock formations belong to the Pennsylvanian and Mississippian series of the Carboniferous System (*1*). These formations were laid down as unconsolidated sediments that gradually became consolidated rocks. This rocky stratum has not been folded or faulted by heat or pressure; it lies almost horizontal but has a slight dip to the south and southwest.

The Decatur and Dewey soils were formed chiefly from weathered high-grade limestone of the Warsaw and St. Louis or Tuscumbia (restricted) formations. The Talbott, Colbert, and Dowellton soils in the Tennessee and Moulton Valleys were formed from clayey limestone of the Pennington formation or from Bangor limestone (restricted). The Baxter soils were formed from cherty limestone of the Lauderdale or Keokuk group. The Galconda formation or Hartselle sandstone (restricted) on Little Mountain was the parent material for Tilsit and Linker soils. The undifferentiated Colbert and Lawrence soils formed from materials along the contact between the Hartselle and Bangor formations. Soils of the Hartsells and Enders series on Sand Mountain are derived from materials of the Pottsville formation. The Ruston soils formed from materials of the Tuscaloosa formation.

The kinds of transported parent materials are also reflected in some of the characteristics of the soils derived from them. In general, the Cumberland, Etowah, Robertsville, Tupelo, Hollywood, Abernathy, Ooltewah, Huntington, Lindside, Melvin, and Dunning soils have developed from alluvium strongly dominated by materials originating from limestone. Most of the other transported parent materials consist of mixed alluvium originating from sandstone, shale, and limestone.

A rather consistent relationship exists between the kinds of parent material and some of the characteristics of the soils. Other soil characteristics, especially those of regional significance to soil genesis, are not related to parent materials and must be attributed to other factors.

Climate

The climate of Lawrence County is characterized by long warm summers, short mild winters, and moderately high rainfall. Moderately high summer temperatures favor rapid chemical reactions in the moist soil most of the year. The high rainfall favors intense leaching of soluble and colloidal material. The shallow depths to which soil is frozen for only short periods in winter further intensifies the rate of weathering and the translocation of materials.

Climatic conditions vary slightly within the county, but not enough to contribute significantly to differences among the soils. Parent material, drainage, and age appear to have been the primary factors that caused the differences in the soils of the county.

Plant and animal life

Higher plants, micro-organisms, earthworms, insects, and other forms of life live on and in the soil and influence the direction and rate of soil genesis. Plants and animals largely determine the kinds of organic matter added to the soil and the way in which it is incorporated with the soil. They transfer nutrient elements and may shift soil materials from one horizon to another. Gains and losses in organic matter, nitrogen, and plant nutrients and the changes in porosity and structure may be due to activities of plants and animals. Although these general effects are well known, the specific influences of the various species or groups of related species in the formation of any one soil are not. More is known about the relation of vegetation than about the relation of micro-organisms and the larger animals to soil genesis.

Forests of chestnut and other hardwoods originally covered all the well-drained and well-developed soils in the limestone valleys. Forests of hardwoods and pine covered all the well-drained and well-developed soils on the sandstone plateaus. Stand densities, proportions of species, and the associated ground cover differed in the original forests. The vegetation of Sand Mountain and of the Tennessee Valley probably differed most, because of differences in climate and kind of soil.

Most of the native trees are deciduous, and they feed moderately deeply to deeply in the soil. The plant nutrients contained in the leaves of trees vary considerably among species, but generally the fallen leaves of deciduous trees supply more bases and phosphorus than thosee of evergreen trees. The annual shedding of leaves transfers essential plant nutrients to the upper part of the soil from the lower part, thereby reducing the effects of leaching.

Large quantities of organic matter are added to the soil in the form of dead leaves, roots, and entire plants. Most of this material is added to the soil surface, where it is acted on by micro-organisms, earthworms, and other forms of life and by chemical action.

Organic matter decomposes rapidly because moisture, temperature, and the micropopulation of the soil are all favorable. Organic material does not accumulate on well-drained sites in the valleys to the extent that it does under similar conditions in the cooler regions. Little is known of the effects of micro-organisms, earthworms, and other living organisms on soil formation.

Relief

Rocks have contributed to differences among soils through their effects on relief. The rocks of much of the county are very old formations. The present relief of the upland is largely a product of geologic weathering and erosion of these formations. The higher parts are capped by rocks that resist weather. Much of the lower lying parts are underlain by less resistant rocks.

Streams in the plateaus generally have steeper gradients than those in the valleys. As a result of faster stream cutting and greater relief from the stream floors to the dividing ridge crests, most of the soils of the mountains have steeper slopes than those of the valleys. In this way, the characteristics of the rocks have contributed indirectly to the character of some soils through relief.

The internal drainage of many soils of the nearly level and undulating areas underlain by limestone and sandstone is exceptionally good because the water drains through crevices and caverns and percolates through the rock itself. This underground drainage counteracts in part the usual effects of the nearly level relief on drainage. Thus, the parent rock is dominant in determining local differences among the well-drained soils derived from residual materials—soils that are subject to similar forces of climate and vegetation in this area.

Time

The development of soil profiles requires time, usually long periods. Differences in the length of time that geologic materials have been in place are therefore commonly reflected in the distinctness of horizons in the profiles.

Classification of Soils by Higher Categories

Soils are classified into categories that progressively become more inclusive. The lowest categories commonly used in the field—series, type, and phase—are discussed in the section Soil Survey Methods and Definitions. The higher categories of classification, called great soil groups and orders, are discussed in this section. The great soil groups consist of soil series that show the same general sort of profile. The great soil groups are classified into three soil orders—zonal, azonal, and intrazonal.

In areas where the parent materials have been in place a long time and have not been subject to extreme conditions of relief or of the parent material itself, the soils have the characteristics of zonal soils. Zonal soils are members of one of the classes of the highest category in soil classification and are defined as those great groups of soils having well-developed soil characteristics that reflect the influence of the active factors of soil genesis—climate and living organisms (*8*).

The well-drained, well-developed soils in the county have been formed under relatively similar conditions of climate and vegetation and are zonal soils. It is on these soils that climate and vegetation have had the most influence and relief and age the least. As a result, soils that developed from various kinds of parent materials have many properties that are common to all.

In virgin conditions, all of the well-drained, well-developed soils have a surface layer of organic debris in various stages of decomposition. 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 colored yellow, brown, or red and is finer textured than the A_1 or A_2. The C horizon varies in color and texture among the different soils, but it is usually red, brown, or yellow mottled with gray or brown. The amount of silica in the clay portion of these soils generally decreases with depth. The content of organic matter is moderate in the A_1 horizon, less in the A_2, and very low in the B and C horizons. The soils are low in bases and phosphorus within the solum. The generally low loss on ignition indicates a low content of very tightly held water. The reaction

is medium to strongly or very strongly acid throughout the solum. In general, the quantity of silt decreases and the content of clay increases with depth. The colloidal content of the B horizon is much higher than in the A_2.

In areas where the parent materials have been in place only a short time, as, for example, recently transported materials, the soils have poorly defined or no genetic horizons. Such soils are young and have few or none of the characteristics of zonal soils. They are, therefore, called azonal soils. Azonal soils are members of a second class of the highest category of soil classification. They are defined as a group of soils that do not have well-developed soil characteristics because their youth or condition of parent material or relief prevent the development of normal soil profile characteristics. (*8*).

The azonal soils are characterized by A_1 horizons that are moderately dark to very dark and apparently moderately to fairly high in amount of organic matter; by the absence of a zone of illuviation, or B horizon; and by parent material that is usually lighter than the A_1 horizon in color and similar to, lighter than, or heavier than the A_1 horizon in texture. They may be referred to as A–C soils because of the absence of a B horizon.

On some hilly and steep areas where a relatively small amount of water percolates through the soil and a large amount runs off rapidly, geologic erosion is relatively rapid and 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 A–C soils. These soils are also azonal soils.

In some nearly level areas where both internal and external drainage are restricted or where geologic erosion is very slow, soils whose materials 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. They are defined as soils with more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief, parent material, or age over the normal effects of climate and vegetation (*8*). The properties of such soils in this area 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 environment.

Soils of each of the three orders—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 kind of parent material. The thickness of soils over the rock from which they were derived is partly determined by the

TABLE 4.—*Soil series classified according to order and great soil group, and some factors that have contributed to their morphology*

ZONAL

Great soil groups and series	Parent material	Slope	Degree of horizon differentiation	Drainage
Red-Yellow Podzolic:				
Allen	Colluvium from sandstone and shale; some limestone	Undulating to hilly	High	Good.
Baxter	Weathered cherty limestone	Undulating to rolling	High	Good.
Dewey	Weathered high-grade limestone with some chert	Undulating to rolling	High	Good.
Etowah	General alluvium chiefly from limestone; some shale and sandstone.	Undulating to rolling	Medium	Good.
Linker	Weathered sandstone; some shale	Undulating to hilly	High	Good.
Nolichucky	General alluvium from sandstone and shale; some limestone.	Undulating to rolling	High	Good.
Ruston	Unconsolidated acid sandy Coastal Plain formation	Undulating to rolling	High	Somewhat excessive.
Sequatchie	General alluvium from sandstone and shale; some limestone.	Nearly level to undulating.	Low to medium	Somewhat excessive.
Talbott	Weathered argillaceous limestone; occasional chert	Undulating to hilly	High	Moderately good to good.
Waynesboro	General alluvium from sandstone and shale; some limestone.	Undulating to rolling	High	Good.
Colbert [1]	Weathered argillaceous limestone	Level to hilly	Medium	Moderately good.
Enders	Weathered interbedded acid sandstone and shale	Undulating to rolling	High	Moderately good to good.
Hartsells	Weathered interbedded sandstone and shale	Undulating to rolling	Medium	Good.
Holston	General alluvium from sandstone and shale; some limestone.	Undulating to rolling	High	Good.
Jefferson	Colluvium from sandstone and shale; some limestone	Undulating to hilly	High	Good.
Tilsit	Weathered interbedded fine-grained sandstone and shale.	Undulating to rolling	Very high	Moderately good.
Monongahela	General alluvium from sandstone and shale; some limestone.	Nearly level to undulating.	Very high	Moderately good.
Reddish-Brown Lateritic:				
Cumberland	General alluvium chiefly from limestone; some from shale and sandstone.	Undulating to rolling	High	Good.
Decatur	Weathered high-grade limestone [2]	Undulating to rolling	High	Good.

TABLE 4.—*Soil series classified according to order and great soil group, and some factors that have contributed to their morphology*—Continued

Great soil groups and series	Parent material	Slope	Degree of horizon differentiation	Drainage
INTRAZONAL				
Rendzina:				
Hollywood	Thin colluvium or alluvium from argillaceous limestone.	Nearly level to gently sloping.	Medium	Somewhat poor to moderately good.
Humic Gley:				
Dunning	Young general alluvium from agrillaceous limestone	Nearly level to gently sloping.	Medium	Poor to very poor.
Low-Humic Gley:				
Dowellton	Weathered argillaceous limestone	Nearly level to gently undulating.	Medium	Somewhat poor.
Melvin	General alluvium chiefly from limestone	Nearly level	Medium	Poor.
Prader	General alluvium from sandstone, shale, and limestone	Nearly level	Medium	Poor.
Atkins	General alluvium from acid sandstone and shale	Nearly level	Medium	Poor.
Planosol (fragipan):				
Lickdale	Weathered interbedded fine-grained acid sandstone and shale.	Nearly level to gently sloping.	High	Very poor.
Robertsville	Old general alluvium, chiefly from limestone	Nearly level	High	Poor.
Johnsburg	Weathered interbedded fine-grained acid sandstone and shale.	Gently sloping	High	Somewhat poor.
Lawrence	Weathered limestone	Nearly level to gently undulating.	High	Somewhat poor.
Tupelo	Old general alluvium, chiefly from argillaceous limestone; some shale and sandstone.	Nearly level to gently undulating.	High	Poor to somewhat poor.
Tyler	Old general alluvium, chiefly from sandstone and shale; some limestone.	Nearly level to gently undulating.	High	Somewhat poor.
AZONAL				
Lithosol: [3]				
Muskingum	Weathered acid sandstone; some shale	Undulating to steep	Low	Excessive.
Pottsville	Weathered acid shale	Hilly to steep	Low	Excessive.
Alluvial:				
Huntington	General alluvium chiefly from limestone; some shale and sandstone.	Nearly level	Low	Moderately good to good.
Lindside	General alluvium chiefly from limestone; some shale and sandstone.	Nearly level	Low	Somewhat poor to moderately good.
Staser	General alluvium chiefly from sandstone, shale, and limestone.	Nearly level	Low	Moderately good to good.
Hamblen	General alluvium chiefly from sandstone, shale, and limestone.	Nearly level	Low	Somewhat poor to moderately good.
Philo	General alluvium from acid sandstone and shale	Nearly level	Low	Somewhat poor to moderately good.
Bruno	Young alluvium from sandstone, shale, and limestone	Nearly level or gently undulating.	Low	Excessive.
Abernathy	Local alluvium derived chiefly from limestone	Nearly level to gently sloping.	Low	Moderately good to good
Ooltewah	Local alluvium derived chiefly from limestone	Nearly level	Low	Somewhat poor to moderately good.
Barbourville	Acid sandstone and shale	Nearly level	Low	Moderately good to good.
Cotaco	Acid sandstone and shale	Nearly level	Low	Somewhat poor to moderately good.

[1] The more sloping parts are within the range of Lithosol.

[2] Residuum from high-grade limestone is low in chert and gives rise to soil material relatively high in plant nutrients.

[3] The following miscellaneous land types also classify as Lithosols: Rockland, limestone, steep; Stony rolling land, Talbott and Colbert soil materials; and Stony steep land, Muskingum soil material.

resistance of rock to weathering, the volume of residue after weathering, and the rate of geologic erosion. The chemical and physical nature of the parent material 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 kind of vegetation that grows on the soil.

The soil series, classified according to order and great soil group, and the major factors that have contributed to their morphology are given in table 4. Study of this table will help the reader to understand the genetic relationship of soils in the county. Following the table, the great soil groups and the soil series in each great soil group are discussed.

Zonal soils

In this county, the zonal order is subdivided into the Red-Yellow Podzolic and the Reddish-Brown Lateritic great soil groups.

RED-YELLOW PODZOLIC SOILS

Red-Yellow Podzolic soils are a group of well-developed, well-drained acid soils having thin organic (A_0) and organic-mineral (A_1) horizons over a light-colored, bleached (A_2) horizon, over a red, yellowish-red, or yellow and more clayey (B) horizon. Parent materials are all more or less siliceous. Coarse reticulate streaks or mottles of red, yellow, brown, and light gray are characteristic of deep horizons of Red-Yellow Podzolic soils where parent materials are thick. Soils of this group developed under a deciduous or mixed forest in a warm-temperate moist climate (*7*, *8*). The soil-forming processes involved in their development are laterization and podzolization.

Members of this great soil group that have predominantly red subsoils are the Allen, Baxter, Dewey, Etowah, Linker, Nolichucky, Ruston, Sequatchie, Talbott, and Waynesboro series. Those having predominantly yellow subsoils are the Colbert, Enders, Hartsells, Holston, Jefferson, Monongahela, and Tilsit series.

In general, all series in this group have characteristics of the Red-Yellow Podzolic soils, and all have developed under relatively similar vegetative and climatic conditions. The Etowah, Hartsells, and Sequatchie series are probably more weakly developed than the other series of this group.

All the soils are low in plant nutrients and moderately well drained to somewhat excessively drained. They vary in degree of maturity, but they are all old enough to have at least a moderately well developed zonal profile. The marked differences in parent materials among the soil series can be correlated with differences in series characteristics.

Allen series

Soils of the Allen series have developed from colluvium that came from sandstone, shale, and some limestone. The colluvium commonly rests on limestone or is directly below slopes where limestone outcrops. They resemble the Waynesboro soils. They differ from them, however, in having developed from colluvium instead of alluvium, and from a thinner mantle of parent material.

A representative profile of Allen fine sandy loam:

- A_1 0 to 2 inches, dark grayish-brown (10YR 4/2) moderately loose fine sandy loam containing organic matter.
- A_2 2 to 6 inches, yellowish-red (5YR 5/6) moderately loose fine sandy loam.
- A_3 6 to 13 inches, red (2.5YR 5/8) fine sandy loam; friable.
- B_1 13 to 19 inches, red (2.5YR 4/8) sandy clay; friable.
- B_2 19 to 38 inches, red (10YR 4/6) fine sandy clay; friable.
- C 38 to 50 inches, red (2.5YR 4/8) fine sandy clay splotched or moderately mottled with yellow; friable.

Numerous small fragments of sandstone occur throughout the profile.

Baxter series

Soils of the Baxter series have developed from the residuum of weathered cherty limestone. They have a thin A_1, a prominent A_2, and a well-developed B horizon. Chert in amounts that interfere with cultivation is common throughout the profile. Baxter soils are medium to strongly acid and have a small amount of plant nutrients. There is less organic matter in the A horizon than in those of the Decatur or Cumberland soils.

A representative profile of Baxter cherty silt loam in a cultivated area:

- A_1 0 to 3 inches, yellowish-brown (10YR 5/4) cherty silt loam; a moderate amount of of organic matter; friable.
- A_2 3 to 10 inches, yellowish-brown (10YR 5/4) cherty silt loam; moderate medium crumb structure; friable.
- B_1 10 to 18 inches, yellowish-red (5YR 4/6) cherty silty clay loam; friable.
- B_2 18 to 27 inches, red (2.5YR 5/6) cherty silty clay loam to silty clay; friable; moderate medium subangular blocky structure.
- C 27 to 40 inches +, red (2.5YR 5/6) cherty silty clay moderately splotched or streaked with yellow; structure fragments are coarse and more angular than in the B_2 layer.

Bedrock is at depths ranging from 8 to about 36 feet.

Dewey series

Soils of the Dewey series have developed from limestone that contains more silica and chert than the rocks underlying the associated Decatur soils. Dewey soils have a moderate amount of organic matter and plant nutrients, and they are medium to strongly acid. All Dewey soils in Lawrence County contain considerable amounts of chert. They are somewhat lighter in color than the Decatur soils, and their B horizons are more friable. Both soils have developed under similar vegetation and climate.

A representative profile of a Dewey soil in an undisturbed area:

- A_1 0 to 3 inches, dark-brown (7.5YR 3/2) mellow cherty loam; large amount of organic matter.
- A_2 3 to 7 inches, reddish-brown (5YR 4/4) mellow cherty loam splotched with organic matter.
- B_1 7 to 12 inches, yellowish-red (5YR 4/6) cherty silty clay loam; weak moderate subangular blocky structure; friable.
- B_2 12 to 20 inches, dark-red (2.5YR 3/6) cherty silty clay loam to silty clay; moderate medium subangular and angular blocky structure; friable.
- B_3 20 to 50 inches, dark-red (2.5YR 3/6) cherty silty clay; numerous dark concretions; friable.

Etowah series

Soils of the Etowah series have formed from general alluvium that washed from high-grade limestone and was deposited on stream terraces. They are characteristically well drained, but as mapped in Lawrence County, they include much acreage that has a weak to moderate fragipan at a depth of about 26 inches. They are medium acid, have a moderately large amount of plant nutrients, and are permeable to roots and moisture. Their surfaces are nearly level to rolling.

The Etowah profile is not so strongly developed as that of the Cumberland soils. In addition, the colors of the A_2 and the B layers do not contrast so much as in the Cumberland, and the structure of the B layer is not as strong. The A layer of the Etowah soils is less brown than that of the Cumberland soils, and the B layer generally contains less clay. Etowah soils differ from the Waynesboro and Nolichucky soils in containing less sand. The surface layer of the Etowah is browner than that of the Nolichucky, and the subsoil generally is less red than that of the Waynesboro. The fragipan common in some of the Etowah soils is not so strongly developed as it is in the Captina soil (not mapped in Lawrence County), and the surface layer generally is browner.

Representative profile of Etowah silt loam:

- A_1 0 to 2 inches, very dark grayish brown (10YR 3/2) smooth silt loam; large amount of organic matter.
- A_2 2 to 6 inches, dark-brown (7.5YR 4/4) smooth silt loam; moderate in content or organic matter.
- B_1 6 to 22 inches, yellowish-red (5YR 4/6) to reddish-brown (5YR 4/4) silty clay loam; friable.
- B_2 22 to 46 inches, red (2.5YR 4/6) silty clay loam; friable; a few small chert fragments.
- C 46 to 54 inches, red (2.5YR 4/6) silty clay loam splotched or weakly mottled with yellowish red; friable.

Representative profile of Etowah silt loam in areas having a fragipan:

- A_p 0 to 6 inches, yellowish-brown to dark-brown silt loam.
- B_1 6 to 12 inches, strong-brown (7.5YR 5/6) silty clay loam; friable.
- B_2 12 to 25 inches, yellowish-red firm silty clay loam; friable; moderate medium subangular blocky structure.
- B_m 25 to 32 inches, mottled red, yellow, and gray silty clay loam; breaks easily to fine angular blocky fragments; some fine dark concretions.
- C 32 inches +, dark-red (10R 3/6) silty clay loam grading to silty clay; yellowish mottles few to common.

Linker series

Soils of the Linker series have developed from materials that weathered from sandstone and some shale, especially on Little Mountain. They occur on the sandstone plateau on undulating to hilly relief. They are strongly to very strongly acid and have a small supply of plant nutrients and organic matter. Linker soils differ from the Hartsells soils in having a more strongly developed and redder B horizon. The B horizon in the Hartsells soils is yellow.

Representative profile of Linker fine sandy loam:

- A_1 0 to ½ inch, very dark grayish-brown (10YR 3/2) fine sandy loam; large amount of organic matter.
- A_2 ½ to 5 inches, light yellowish-brown (10YR 6/4) fine sandy loam splotched with organic matter.
- B_1 5 to 8 inches, yellowish-brown (10YR 5/6) very fine sandy loam to silt loam; friable.
- B_2 8 to 14 inches, brown to strong-brown (7.5YR 5/4 to 5/6) fine sandy clay loam to clay loam; friable.
- B_3 14 to 30 inches, yellowish-red to red (5YR 5/6 to 2..5YR 4/6) fine sandy clay loam or fine sandy clay; friable.
- C 30 to 42 inches, red (2.5YR 4/6) and brownish-yellow (10YR 6/6) partly weathered sandstone parent material that ranges in texture from sandy clay loam to fine sandy loam.

Nolichucky series

Soils of the Nolichucky series have developed from parent materials that are similar to those of the Waynesboro soils, except that the influence of limestone was less. In addition, they have weathered under the same type of climate and on similar relief. The A horizon was lighter in color and was thicker in virgin areas than that of the Waynesboro soils. These characteristics indicate that Nolichucky soils are more mature as a result of the lower base status of the parent material.

Representative profile of the Nolichucky fine sandy loam in an undisturbed area:

- A_1 0 to 1 inch, dark grayish-brown (10YR 4/2) fine sandy loam; moderate amounts of organic matter.
- A_2 1 to 7 inches, light yellowish-brown (10YR 6/4) fine sandy loam; friable; little or no organic matter.
- A_3 7 to 12 inches, brownish-yellow (10YR 6/6) fine sandy loam; friable.
- B_1 12 to 20 inches, yellowish-red (5YR 5/8) fine sandy clay loam; friable.
- B_2 20 to 28 inches, reddish-brown (5YR 5/4) fine sandy clay loam to clay loam; friable.
- C or B_3 28 to 42 inches, dark-red (10YR 4/6) fine sandy clay loam; splotched or weakly mottled with yellowish red in lower part of layer; moderately firm in place but friable.

Ruston series

Soils of the Ruston series have developed from unconsolidated acid sands and clays of the upper Coastal Plain. This material ranges in thickness from approximately 5 feet in the extreme southwestern part of the county to less than 12 inches in areas 2 to 4 miles to the east. Ruston soils are well drained. The profile in an undisturbed area has a light-colored A_2 horizon that is very low in organic matter and bases. This

horizon has a clear boundary with the distinctly reddish, strongly acid, finer textured B horizon. The base-exchange capacity of the B horizon is not high, and base saturation is low.

The original forest on the Ruston soils was less luxuriant than on Cumberland, Dewey, and similar soils. It probably resembled the present forest of red and chestnut oaks, hickory, and Virginia pine. The total area of Ruston soils is small, and all of it is on the uplands in the extreme southwestern part of the county.

Profile of Ruston sandy loam in an undisturbed area:

- A_1 0 to 1 inch, light brownish-gray (10YR 6/2) sandy loam; loose organic matter in moderate amounts.
- A_2 1 to 8 inches, light yellowish-brown (10YR 6/4) sandy loam; loose.
- B_1 8 to 15 inches, yellowish-red (5YR 5/8) fine sandy loam; friable.
- B_2 15 to 42 inches, yellowish-red (5YR 5/8) sandy clay; friable; weak medium blocky structure.
- C 42 to 50 inches, yellowish-red (5YR 5/8) fine sand to loamy sand splotched or streaked with yellow; semicemented.

Quartzite pebbles are common throughout the profile, and acid shale is at a depth of about 5 feet.

Sequatchie series

Soils of the Sequatchie series have formed on low stream terraces, mainly from the residue of weathered sandstone and shale and probably from some limestone material. The soils are sandy and permeable. The parent material was low in bases. Climate, vegetation, relief, and parent material were not significantly different from those contributing to the development of the Waynesboro and Nolichucky soils. However, the material of Sequatchie soils has been in place for less time than that of the Waynesboro and Nolichucky soils. Consequently, the Sequatchie profile is only weakly developed, as is shown by the low contrast in color, texture, and structure of the A and B horizons.

Representative profile of Sequatchie fine sandy loam:

- A_1 0 to 6 inches, light-brown (7.5YR 6/4) fine sandy loam; loose; moderately low in organic matter.
- A_2 6 to 15 inches, light-brown (7.5YR 6/4) fine sandy loam streaked with pinkish gray (7.5YR 6/2); loose.
- B_1 15 to 24 inches, reddish-brown (5YR 5/4) fine sandy loam to fine sandy clay; friable.
- B_2 24 to 32 inches, reddish-brown (5YR 5/4) loamy fine sand to fine sandy loam; moderately loose.
- C 32 to 42 inches, yellowish-red (5YR 5/8) loamy fine sand streaked or weakly mottled with gray.

Talbott series

Soils of the Talbott series have formed from clayey limestone that in some places contained chert. Depths to bedrock range from 24 to 60 inches; outcrops are not uncommon. The surfaces of most Talbott soils are undulating to rolling, but some are hilly. Talbott soils are medium to strongly acid and contain a moderate amount of organic matter and plant nutrients. The solum is not so deep as those of Decatur and Dewey soils, but the subsoil is more plastic and sticky.

Representative profile of Talbott silt loam:

- A_1 0 to 2 inches, grayish-brown (10YR 5/2) silt loam; smooth; organic matter in moderate amounts.
- A_2 2 to 6 inches, yellowish-red (5YR 5/6) silt loam splotched with organic matter; friable.
- B_1 6 to 13 inches, red (2.5YR 4/8) silty clay loam to silty clay; moderately friable.
- B_2 13 to 21 inches, red (2.5YR 4/6) heavy silty clay to clay; plastic and sticky when wet; moderately friable when moist.
- C 21 to 38 inches +, mottled red (2.5YR 4/8), reddish-brown (10YR 5/8), and gray (10YR 6.1) clay; sticky and plastic; small fragments of chert throughout.

Waynesboro series

Soils of the Waynesboro series have developed from old deposits of general alluvium consisting mainly of weathered sandstone and shale. The alluvium, however, contained some limestone material. The B horizon of these soils is not so fine textured nor so plastic when wet as the B horizon in Red-Yellow Podzolic soils that developed from weathered limestone. The Waynesboro soils are more permeable and retard leaching less than soils having finer textured subsoils and substrata. The parent material of Waynesboro soils contained less clay, bases, and plant nutrients than that of the Cumberland soils. The native vegetation on the Waynesboro soils probably was less luxuriant than that on the Cumberland and Etowah soils.

Representative profile of Waynesboro fine sandy loam in a cultivated area:

- A_1 0 to 4 inches, dark-brown (10YR 4/3) fine sandy loam; moderately loose; some organic matter.
- A_2 4 to 12 inches, yellowish-red (5YR 5/6) fine sandy loam.
- B_1 12 to 20 inches, yellowish-red (5YR 4/6) silt loam; friable.
- B_2 20 to 30 inches, red (2.5YR 4/6) fine sandy clay; friable.
- B_3 30 to 42 inches, red (2.5YR 4/6) clay loam; friable.
- C 42 to 54 inches, dark-red (2.5YR 3/6) clay loam to silty clay loam splotched and streaked with yellowish red; friable.

Colbert series

Soils of the Colbert series have developed from the residuum of weathered argillaceous limestone. They are moderately shallow and characterized by heavy plastic B and C horizons. Bedrock of limestone is at a maximum depth of about 4 feet. Colbert soils are somewhat mature, but they are not so strongly nor so uniformly developed as the Talbott, Dewey, and Noli-

chucky soils. Colbert soils lack strong profile development because of extremely fine texture, slow permeability, and geologic erosion that keeps pace with the weathering of the parent rock. The profiles are very nearly skeletal on the stronger slopes. Colbert soils are predominantly medium to strongly acid and low in bases. The base-exchange capacity is thought to be fairly high.

Representative profile of Colbert silt loam, undulating phase, in an undisturbed area:

- A_1 0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; moderate amount of organic matter.
- A_2 2 to 6 inches, light yellowish-brown (10YR 6/4) silt loam splotched with organic matter; friable.
- B_1 6 to 12 inches, brownish-yellow (10YR 6/6) silty clay loam; friable; moderate medium subangular blocky structure.
- B_2 12 to 22 inches, brownish-yellow (10YR 6/6) clay weakly mottled with gray (10YR 5/1) and brown (7.5YR 5/4); sticky and plastic when wet, hard when dry; fragments are large and angular.
- C 22 to 40 inches +, mottled gray (10YR 5/1), yellowish-brown (10YR 5/8), and brown (7.5YR 5/4) clay; very sticky and plastic when wet; breaks to angular fragments under pressure.

Areas of Colbert soils along the north edge of Moulton Valley have a pan in the lower subsoil. In these areas the 9- to 21-inch subsoil layer is brown (10YR 5/3) to yellowish-brown (10YR 5/4) silty clay loam. It is faintly mottled with pale yellow and has strong medium subangular blocky structure. Below this layer is the silty claypan that is mottled gray (2.5Y 5/0) and dark yellowish brown (10YR 4/4). It has strong angular blocky structure grading to coarse angular blocky. Peds are coated with light gray (5Y 7/0).

Enders series

Soils of the Enders series have developed in residuum from acid interbedded sandstone and shale. They are well drained and are associated with the Hartsells soils. Relief is undulating to rolling. Enders soils contain more clay than Hartsells soils. In addition the marked contrast between the A and B horizons in color and texture and the stronger structure of the B horizon indicate that Enders soils are more mature than the Hartsells. Enders soils are moderately shallow and medium to strongly acid. The base-exchange capacity is greater than that of the Hartsells soils; base saturation, however, can be expected to be low.

Representative profile of Enders loam:

- A_1 0 to 1 inch, dark grayish-brown (10YR 4/2) loam; large supply of organic matter.
- A_2 1 to 4 inches, light yellowish-brown (10YR 6/4) smooth loam.
- B_1 4 to 11 inches, yellowish-brown (10YR 6/6) silty clay loam; friable.
- B_2 11 to 20 inches, strong-brown (7.5YR 5/8) dense silty clay; strong medium subangular blocky structure.
- C_1 20 to 36 inches, strong-brown (7.5YR 5/8), tough, dense silty clay to clay mottled with pale yellow (2.5Y 7/4) and red (2.5YR 5/8); structure weaker than in B_2 layer and fragments are larger and more angular.
- C_2 36 to 46 inches, mottled red (2.5YR 5/6), gray (7.5YR 5/0), and pale-yellow (2.5Y 7/4) clay, partly weathered shale, and thinly interbedded sandstone materials.

Small platy sandstone fragments occur throughout the profile.

Hartsells series

Soils of the Hartsells series have developed from residuum of acid sandstone and interbedded sandstone and shale. The soils are strongly acid and low in plant nutrients, organic matter, and bases. The genetic horizons do not show strong contrasts in color and texture, and the structure has not been strongly developed. Hartsells soils are not extensive. They occupy a few undulating to rolling areas on the broader parts of narrow ridges in the southern part of the county.

Representative profile of Hartsells fine sandy loam:

- A_1 0 to 2 inches, yellowish-brown (10YR 5/4) fine sandy loam splotched or stained with organic matter; moderately loose.
- A_2 2 to 12 inches, light yellowish-brown (10YR 6/4) fine sandy loam; moderate crumb structure.
- B_1 12 to 20 inches, yellowish-brown (10YR 5/6) fine sandy loam to very fine sandy loam; weak medium subangular blocky structure; friable.
- B_2 20 to 32 inches, strong-brown (7.5YR 5/6) fine sandy clay loam; weak medium subangular blocky structure; friable.
- C 32 to 38 inches, strong-brown (7.5YR 5/6) fine sandy loam splotched or weakly mottled with reddish brown (5YR 5/4); friable; rests on sandstone bedrock.

Holston series

Soils of the Holston series have developed in old general alluvium that came chiefly from sandstone and shale and to some extent from limestone. They are a member of the drainage catena that includes the Waynesboro, Nolichucky, Holston, Monongahela, and Tyler soils. Although Holston soils are well drained, mottlings are nearer the surface than in Nolichucky soils. They have a moderately well developed profile, but their A and B horizons do not have as marked contrasts in color and texture as the Nolichucky soils. Holston soils are medium to strongly acid and low in supply of plant nutrients and organic matter. The base-exchange capacity is moderate, but the percentage saturation of bases is low. The small and inextensive areas of Holston soils in the county are so intricately mixed with Monongahela soils that they were mapped with this soil as an undifferentiated unit.

Representative profile of Holston fine sandy loam in an undisturbed area:

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A_1 0 to 1 inch, very dark grayish-brown (10YR 3/2) fine sandy loam; high content of organic matter.
A_2 1 to 11 inches, brown (10YR 5/3) to yellowish-brown (10YR 5/6) fine sandy loam.
B_1 11 to 22 inches, strong-brown (7.5YR 5/6) fine sandy clay loam; weak to moderate medium subangular blocky structure; friable.
B_2 22 to 34 inches, yellowish-brown (10YR 5/8) fine sandy clay; moderate medium subangular blocky structure; friable.
C 34 to 42 inches, yellowish-brown (10YR 5/8) moderately compact fine sandy clay mottled with gray (10YR 5/1) and red (2.5YR 4/6); friable.

Limestone bedrock is generally at depths ranging from 3 to 15 feet.

Jefferson series

Soils of the Jefferson series were developed in colluvium chiefly from acid sandstone and shale. Limestone commonly outcrops on the lower slopes, so it appears likely that the Jefferson soils have been influenced by limestone residuum or at least by lime-bearing water. Most areas of Jefferson soils are underlain by limestone, generally at a depth of 3 to 8 feet. Jefferson soils are morphologically like the Holston soils and have about the same genetic background as the Allen soils. The Allen soils, however, have been more strongly influenced by limestone, and some areas have developed under better drainage conditions.

Representative profile of Jefferson fine sandy loam in an undisturbed area:

A_1 0 to ½ inch, dark-gray (10YR 4/1) fine sandy loam; large amount of organic matter.
A_2 ½ to 6 inches, pale-brown (10YR 6/3) fine sandy loam splotched with organic matter; loose.
A_3 6 to 15 inches, light yellowish-brown (10YR 6/4) fine sandy loam; weak medium subangular blocky structure; friable.
B_1 15 to 26 inches, yellowish-brown (10YR 5/8) fine sandy clay; moderate medium subangular blocky structure; friable.
B_2 26 to 36 inches, reddish-yellow (7.5YR 6/8) fine sandy clay; friable.
C 36 to 45 inches, reddish-yellow (7.5YR 6/8) fine sandy clay mottled with reddish brown (2.5YR 4/4) and gray (10YR 6/1); friable.

Tilsit series

Soils of the Tilsit series are an intergrade from the Red-Yellow Podzolic toward the fragipan subdivision of the Planosol group. They have developed from residuum of interbedded fine-grained sandstone and shale. The Tilsit soils have A and B horizons characteristic of Red-Yellow Podzolic soils, but below the B_2 layer is a compact, brittle, finely mottled fragipan. This layer in Tilsit soils is distinguished from a claypan by having a silty or loamy rather than a clay texture. In addition the fragipan lies below the B_2 layer, whereas the commonly known claypan generally is the B_2 layer.

Tilsit soils occupy the less sloping broad ridge lands. They are medium to strongly acid and low in supply of organic matter and bases. The B_2 layer is permeable, but the fragipan is hard and resists penetration of roots and moisture until thoroughly moistened.

Representative profile of Tilsit silt loam in an undisturbed area:

A_1 0 to 1 inch, dark grayish-brown (10YR 4/2), mellow, smooth silt loam; amount of organic matter moderate.
A_2 1 to 7 inches, yellowish-brown (10YR 5/4), smooth silt loam splotched with organic matter; moderate medium crumb structure.
B_1 7 to 15 inches, yellowish-brown (10YR 5/6) fine sandy clay loam; weak to moderate medium subangular blocky structure; friable.
B_2 15 to 24 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable.
C_1 24 to 34 inches, yellowish-brown (10YR 5/4) silty clay to silty clay loam mottled with gray (10YR 5/1) and red (2.5YR 4/6); crumbles to fine angular fragments; firm in place, and hard and brittle when dry.
C_2 34 to 46 inches, mottled gray (10YR 5/1) and yellowish-brown (10YR 5/4) silty clay splotched with red (2.5YR 4/6); breaks into angular fragments under pressure; very hard and compact.

Bedrock shale is at a depth of 46 inches.

Monongahela series

Monongahela soils resemble the Tilsit soils, except that generally the fragipan is a little more strongly developed. They have developed from moderately old to old general alluvium that washed mainly from sandstone and shale and to some extent from limestone. They are associated with the less well-drained Tyler and Tupelo soils and with small areas of the better drained Holston soils. All Monongahela soils in the county were mapped with Holston and with Tyler soils as undifferentiated units.

Representative profile of Monongahela fine sandy loam:

A_1 0 to 1 inch, very dark grayish-brown (10YR 3/2) fine sandy loam; moderate amount of organic matter.
A_2 1 to 5 inches, grayish-brown (10YR 5/2) to pale-brown (10YR 6/3) fine sandy loam; moderate medium crumb structure; friable.
B_1 5 to 11 inches, yellowish-brown (10YR 5/4) silt loam; friable.
B_2 11 to 20 inches, light yellowish-brown (10YR 6/4) fine sandy clay; a few gray splotches in lower part; friable.
C 20 to 34 inches, light yellowish-brown (10YR 6/4) compact silty clay loam mottled with gray (10YR 6/1) and red (2.5YR 4/6); compact to firm in place.

Bedrock limestone is at depths ranging from 4 to 15 feet.

REDDISH-BROWN LATERITIC SOILS

Reddish-Brown Lateritic soils have a dark reddish-brown granular surface soil, a red friable clay B horizon, and red or reticulately mottled lateritic parent material. They have developed under humid tropical and subtropical climates with wet-dry seasons *(7, 8)*.

Members of this great soil group are the Decatur and Cumberland series. Their content of iron and aluminum oxides is not noticeably greater than that of the reddish members of the Red-Yellow Podzolic group. They do, however, lack the strongly leached A_2 layer characteristic of the Red-Yellow Podzolic soils. In its place they have a dark reddish-brown surface layer. The material below depths of 3 or 4 feet has uniform reticulate mottlings, but this is also common in some of the Red-Yellow Podzolic soils in Lawrence County.

The Dewey, Talbott, Etowah, and Waynesboro series, which were placed in the Red-Yellow Podzolic group, have weak A_2 layers that indicate these soils grade toward the Reddish-Brown Lateritic group.

The thick, dark reddish-brown A_1 horizon, the lack of a definite A_2 horizon, the uniformly thick, dark-red solum, and the abundance of very dark brown manganese concretions distinguish the Decatur and Cumberland from the Red-Yellow Podzolic soils. Analysis of the clay minerals does not show definite evidence that Decatur and Cumberland soils have a greater degree of laterization than the Red-Yellow Podzolic soils. Chemical analysis of the clay fraction of Norfolk (not mapped in Lawrence County) and Hartsells soils (Red-Yellow Podzolic) and a Decatur soil indicates little significant difference in the content of free Fe_2O_3 and hydrated Al_2O_3. A summary of the pertinent data from this investigation *(3)* is given in table 5.

TABLE 5.—*Chemical analysis of the clay separates in Norfolk, Decatur, and Hartsells soils*

Soil series	Depth sampled	Free Fe_2O_3	Mineralogical composition of treated clay fraction			
			Hydrated Al_2O_3	Kaolinite	Montmorillonite	Quartz
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Norfolk	0–8	16.5	8	23	0	45
	18–24	16.5	18	30	0	25
	66–72	17.0	25	35	0	20
Decatur	0–6	18.5	0	48	0	30
	6–18	14.0	0	60	0	20
	36–48	12.0	0	65	0	10
Hartsells	0–7	11.0	0	15	0	60
	12–18	16.5	0	21	0	45
	33–45	15.0	0	23	0	45

Cumberland series

Soils of the Cumberland series have developed from materials that washed chiefly from soils underlain by limestone. They occupy the older and higher well-drained undulating to rolling stream terraces in the limestone valleys. They are medium to strongly acid and have a moderately large amount of organic matter and plant nutrients. The Cumberland soils have profiles similar to those of the Decatur and Dewey soils in many respects; they differ mainly in the origin of the parent material and in having a somewhat more friable subsoil. Because of the similarities in the Cumberland and Decatur soils and of their close association in Lawrence County, they are mapped together as undifferentiated units.

Representative profile of a Cumberland silt loam:

- A_1 0 to 5 inches, dark reddish-brown (5YR 3/3) silt loam; mellow, friable.
- A_2 5 to 9 inches, reddish-brown (2.5YR 5/4) silt loam to silty clay loam; friable.
- B_1 9 to 20 inches, red (10R 4/6) silty clay loam; some dark concretions; moderately firm but friable.
- B_2 20 to 33 inches, dark-red (10R 3/6) silty clay; numerous dark concretions; moderately firm, but friable when moist.
- B_3 33 to 50 inches, dark-red (10R 3/6) silty clay weakly splotched with brown and yellow; some dark concretions; dense and firm, but moderately friable when moist.

Decatur series

Soils of the Decatur series have developed from weathered high-grade limestone. They have predominantly undulating to rolling relief and are deep to bedrock. They are medium to strongly acid. The 8- to 10-inch surface layer contains a moderate amount of organic matter. The soils have a larger amount of clay. They are, however, moderately permeable to roots and moisture. This is indicated by the depth to which the soils are well oxidized, and by their suitability to alfalfa and other deep-rooted crops. When moist, the subsoil can be separated easily into small pieces, and it is friable or crumbly until kneaded. With additional kneading it becomes increasingly plastic and waxy. The predominant clay is kaolinite. Although Decatur soils contain much clay, they show little tendency to crack when dry. The clay content of Decatur soils increases with depth. This is a common characteristic of the Red-Yellow Podzolic and the Reddish-Brown Lateritic soils where they have developed from thick beds of weathered limestone.

Representative profile of the Decatur silty clay loam:

- A_p 0 to 3 inches, dark reddish-brown (2.5YR 3/4) silty clay loam; moderate to strong crumb or granular structure; friable.
- B_1 3 to 8 inches, weak-red (10R 4/3) silty clay loam; weak medium subangular blocky structure; moderately friable.
- B_{21} 8 to 20 inches, weak-red (10R 4/3) to dark-red (10R 3/6) silty clay; moderate subangular blocky structure firm and friable in place but kneads to a plastic consistence.
- B_{22} 20 to 48 inches, dark-red (10R 3/6) silty clay; moderate medium subangular blocky structure grading to angular blocky with increase in depth; firm.
- B_3 48 to 60 inches, dark-red (10R 3/6) silty clay;

structure less pronounced than in B_{22} layer; firm.

C 60 inches +, lighter red clay; some yellowish splotches; firm to very firm.

Bedrock limestone is at depths ranging from 5 to 20 feet.

Intrazonal soils

In this county the intrazonal order consists of the Rendzina, Humic Gley, Low-Humic Gley, and Planosols great soil groups.

RENDZINA SOILS

Rendzina soils are an intrazonal group of soils, usually with brown or black friable surface horizons underlain by light-gray or yellowish calcareous material. They have developed under grass vegetation, or mixed grasses and forest, in humid and semiarid regions, and from relatively soft, highly calcareous parent materials *(8)*. Rendzina soils have formed where there is excessive water part of the time. Poor aeration and the lack of an acid condition are probably responsible for the higher content of organic matter than is common to the associated soils.

Hollywood series

Soils of the Hollywood series have developed in a thin layer of colluvium or local alluvium originating from argillaceous limestone. They occupy nearly level to gentle valley slopes and are underlain by plastic clay residuum from limestone. Bedrock limestone is at depths ranging from 1 to 5 feet. Although the soil is classed as a Rendzina, its underlying bedrock is not soft, and its drainage is somewhat better than poor. The soil is slightly acid to alkaline. Soil structure is not well developed. The base-exchange capacity is high, and the degree of saturation with bases is probably high.

A representative profile of a Hollywood silty clay follows:

A_1 0 to 5 inches, very dark gray (2.5YR 3/0) to black (2.5YR 2/0) silty clay; sticky and plastic when wet but cracks upon drying.

A_2 5 to 20 inches, black (2.5YR 2/0) clay; mass breaks into angular fragments; sticky and plastic when wet, hard when dry.

B_2 20 to 28 inches, dark-gray (2.5YR 4/0) clay; some reddish-yellow (7.5YR 6/6) mottlings; heavy and plastic.

C 28 inches +, brown (10YR 5/3) to yellowish-brown (10YR 5/4) clay mottled with dark gray (10YR 4/1); heavy, sticky, and plastic.

HUMIC GLEY SOILS

Humic Gley soils are an intrazonal group of poorly to very poorly drained hydromorphic soils with dark-colored organic-mineral horizons of moderate thickness underlain by mineral gley horizons. They occur naturally under either swamp-forest or herbaceous marsh vegetation, mostly in humid and subhumid climates of greatly varying thermal efficiency. A large proportion of Humic Gley soils range from medium acid to mildly alkaline. Few are strongly acid *(7)*.

Dunning series

Soils of the Dunning series have developed in young general alluvium that originated mainly from argillaceous limestone. They are poorly to very poorly drained. These soils are slightly acid to alkaline. They are high in clay, noticeably dark in the upper part, and gray or mottled in the lower part at depths ranging from 6 to 20 inches. They have developed little structure. The chief soil-forming processes evident in the profile are the accumulation of organic matter in the upper part and gleization in the lower part. The base-exchange capacity is high, and apparently the degree of saturation with bases is also high.

Representative profile of Dunning silty clay:

A_{11} 0 to 4 inches, dark-gray (10YR 4/1) silty clay; sticky and plastic.

A_{12} 4 to 10 inches, very dark gray (10YR 3/1) silty clay to clay; little soil structure evident; dense, extremely plastic.

A_{1g} 10 to 15 inches, very dark gray (10YR 3/1) clay mottled with yellowish brown (10YR 5/6); little soil structure evident; heavy, sticky, and plastic.

C_g 15 to 36 inches, gray (10YR 5/1) clay mottled with yellowish brown (10YR 5/6); heavy and waxy; numerous brown concretions throughout the profile.

Bedrock limestone is at depths ranging from 3 to 6 feet.

LOW-HUMIC GLEY SOILS

Low-Humic Gley soils are an intrazonal group of imperfectly to poorly drained soils with very thin surface horizons, moderately high in organic matter, over mottled gray and brown gleylike mineral horizons with a low degree of textural differentiation. They range in texture from sand to clay. The parent materials vary widely in physical and chemical properties. A large proportion of them range from medium to strongly acid *(7)*.

Dowellton series

Soils of the Dowellton series have developed from weathered, highly argillaceous limestone. The A_1 horizon is thin and weakly developed, the A_2 is absent, and the B is very weakly developed. Argillaceous limestone bedrock is at a maximum depth of 3½ feet; there are occasional outcrops. Slopes range from nearly level to gently sloping. The soils are strongly acid. The base-exchange capacity is high, and apparently the degree of saturation with bases is low.

Representative profile of Dowellton silty clay loam:

A_1 0 to 3 inches, brown (10YR 5/3) silty clay loam mottled with dark gray (10YR 4/1); moderate amount of organic matter.

B_1 3 to 8 inches, yellowish-brown (10YR 5/6) clay mottled with light gray (10YR 7/2); tough, plastic.

C_1 8 to 20 inches, brownish-yellow clay highly mottled with light gray (10YR 7/1) and red (10YR 4/6); heavy and dense.

C_2 20 to 36 inches, light-gray (10YR 7/1) clay mottled with yellowish red (5YR 5/6); heavy, dense, and plastic.

Melvin, Prader, and Atkins series

Soils of these three series have developed in young general alluvium that is subject to overflow. They are alike in having small to moderate amounts of organic matter in the surface layer, no B horizon, and strong gleization below the surface layer.

Melvin soils consist of material that originated chiefly from limestone. They range in texture principally from silt loam to silty clay loam, and they are mainly slightly acid to neutral. Prader soils consist of mixed material that originated from sandstone, shale, and limestone. They are mainly slightly acid, and they have a surface layer that is generally not so dark brown as that of the Melvin soils. Atkins soils consist of material that originated chiefly from acid sandstone and shale. They are strongly to very strongly acid.

The profiles of these soils are described in the section Descriptions of the Soils.

PLANOSOLS

Planosols are an intrazonal group of soils with eluviated surface horizons (A_2) underlain by B horizons more strongly illuviated, cemented, or compact than those of associated normal soils. They developed on nearly flat upland under grass or forest vegetation in a humid or subhumid climate *(8)*.

In Lawrence County, Planosols are poorly to somewhat poorly drained, and they generally are on more nearly level and somewhat more depressed positions than the associated zonal soils. They are medium to strongly acid. The poorly drained Planosols have a gleyed subsoil and they resemble the Low-Humic Gley soils. However, they differ from Low-Humic Gley soils in having a uniformly small amount of organic matter in the surface soil, a definitely compact pan, and a strong contrast in texture between the surface soil and the pan. The somewhat poorly drained Planosols have some of the color and structural characteristics of Red-Yellow Podzolic soils, and they are therefore thought to be Planosols intergrading toward Red-Yellow Podzolic soils.

Lickdale series

Soils of the Lickdale series have developed from weathered, interbedded, fine-grained sandstone and shale. They are strongly acid and poorly drained. In Lawrence County most Lickdale soils are covered by a thin layer of local alluvium. They occupy gentle depressions in association with the Tilsit and Johnsburg soils. The degree of saturation with bases is probably low.

Representative profile of Lickdale silt loam:

- A_1 0 to 3 inches, gray (10YR 5/1) to grayish-brown (10YR 5/2) silt loam; in places the color is dark grayish brown (10YR 4/2); moderate amount of organic matter.
- A_2 3 to 12 inches, light-gray (10YR 7/1) silt loam splotched with yellow (10YR 7/6); small amount of organic matter.
- B_{2m} 12 to 20 inches, light-gray (10YR 7/1) silty clay loam mottled with yellow or yellowish brown (10YR 5/6); massive structure; moderately compact, especially when dry.
- C 20 to 36 inches, dark-gray (10YR 4/1) silty clay splotched or mottled with yellowish brown (10YR 5/4); compact and hard.

Robertsville series

Soils of the Robertsville series have developed in old general alluvium derived chiefly from limestone. They are on broad, nearly level areas that are slightly lower than the areas occupied by the associated better drained Monongahela, Tyler, Holston, and Etowah soils on stream terraces. In general, Robertsville soils have the most strongly developed Planosol profile in this group. They are low in supply of organic matter and medium to strongly acid. They probably have a low degree of saturation with bases.

Representative profile of Robertsville silt loam:

- A_1 0 to ½ inch, grayish-brown (10YR 5/2) silt loam; large amount of partly decomposed organic matter and leaf mold.
- A_2 ½ to 4 inches, gray (10YR 5/1) silt loam mottled with grayish brown (10YR 5/2); friable.
- B_2 4 to 16 inches, gray (10YR 6/1) silty clay loam mottled with yellowish brown (10YR 5/6); moderately friable when moist, hard and compact when dry.
- C 16 to 36 inches, dark-gray (10YR 4/1) silty clay to clay mottled with yellowish brown (10YR 5/8); heavy and compact; breaks to angular pieces under pressure.

Johnsburg series

Soils of the Johnsburg series have developed from the same type of parent material as the Lickdale and Tilsit soils. Johnsburg soils are on slightly higher positions and have a little more slope than the Lickdale. In addition, they have a little better drainage and have some of the profile characteristics of Red-Yellow Podzolic soils. Johnsburg soils are strongly to very strongly acid, and the degree of saturation of the clay with bases is low.

Representative profile of Johnsburg loam:

- A_1 0 to 4 inches, grayish-brown (10YR 5/2) loam; moderately low in organic matter.
- A_2 4 to 10 inches, yellowish-brown (10YR 5/4) silt loam.
- B_2 10 to 16 inches, yellowish-brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; friable and moderately firm in place when dry.
- C 16 to 36 inches, mottled gray (10YR 6/1) and dark yellowish-brown (10YR 4/4) clay loam; compact to very firm in place.

Lawrence series

Soils of the Lawrence series developed from weathered limestone. They are somewhat poorly drained and strongly acid. Except in the surface inch or so, they have little organic matter. Structure in the B horizon is weakly to moderately developed. The subsoil and substratum contain plastic clay. The base-exchange capacity can be expected to be high, and the degree of saturation with bases is low.

In this county Lawrence soils are mapped as undifferentiated units with Colbert soils. The pan that is characteristic of the Lawrence soils is not uniformly well developed in the Colbert soils. The heavy clay subsoil and somewhat poor drainage distinguish the Lawrence soils from the Colbert.

Representative profile of Lawrence silt loam:

A_1 0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; moderate medium crumb or granular structure; very friable; contains a noticeable quantity of very fine sand.

A_2 3 to 8 inches, light yellowish-brown (10YR 6/4) to very pale brown (10YR 7/4) silt loam; weak to moderate crumb structure; very friable; strongly acid; contains a noticeable quantity of very fine sand.

B_2 8 to 13 inches, brownish-yellow (10YR 6/6) silty clay loam; weak to moderate fine angular and subangular fragments; friable; sticky when wet, hard when dry.

B_3 13 to 34 inches, yellowish-brown silty clay; medium mottles of red, reddish brown, and gray are common; mottles increase with depth; moderate to weak medium blocky structure; plastic when wet, hard when dry; strongly acid.

C 34 to 48 inches mottled yellowish-brown, gray, and red silty clay or clay; gray increases with depth; breaks under pressure to angular pieces; very plastic when wet, very hard when dry; strongly acid.

Tupelo series

Soils of the Tupelo series have developed from a thin layer of alluvium that originated chiefly from argillaceous limestone. Beneath this layer is weathered residuum from argillaceous limestone. Tupelo soils are somewhat poorly drained and strongly acid throughout. The B horizon is weakly developed in the alluvium, and in most places it lies directly over the mottled very plastic residuum. The pan characteristics may have been inherited rather than developed in place.

Representative profile of Tupelo silt loam:

A_1 0 to ½ inch, grayish-brown (10YR 5/2) silt loam; considerable leaf mold and partially decomposed organic matter.

A_2 ½ to 5 inches, brownish-yellow (10YR 6/6) silt loam splotched with brown (10YR 5/3); friable.

B_1 5 to 8 inches, brownish-yellow (10YR 6/6) silty clay loam splotched with yellowish-brown (10YR 5/8); friable; numerous brown concretions.

B_2 8 to 20 inches, yellowish-brown (10YR 5/6) clay mottled or splotched with gray (10YR 5/1); heavy and plastic; a few brown concretions.

C 20 to 34 inches +, light-gray (7.5YR 7/0) silty clay to clay mottled with yellowish red (5YR 4/8); heavy, sticky, and plastic; a few brown concretions.

Tyler series

Soils of the Tyler series have formed from about the same type of parent material as the Holston and Monongahela soils. They have a small amount of organic matter and plant nutrients and are strongly acid. The color and structure of the lower subsoil is weakly developed in the Tyler soils. Tyler soils have a moderately well developed fragipan. They occur near the moderately well drained Monongahela soils.

Representative profile of Tyler fine sandy loam:

0 to 3 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak crumb structure.

3 to 9 inches, light yellowish-brown (2.5Y 6/4) fine sandy loam to loam; weak medium blocky structure.

9 to 15 inches, light yellowish-brown (2.5Y 6/4) clay loam or silty clay loam; common medium mottles of gray; moderate medium blocky structure; friable.

15 to 32 inches, light brownish-gray (10YR 6/2) clay loam or silty clay loam; brownish-yellow and gray mottles; breaks easily to fine medium angular fragments; firm and compact.

Azonal soils

In this county, the soils of the azonal order are members of the Lithosol and Alluvial great soil groups.

LITHOSOLS

Lithosols are an azonal group of soils having no clearly expressed soil morphology and consisting of a freshly and imperfectly weathered mass of rock fragments. They are mainly on steeply sloping land *(8)*. Lithosols occupy positions that are subject to relatively rapid geologic erosion. The soil materials generally are easily eroded. They are therefore removed from the surface or are mixed to such an extent that the soil-forming processes have not had time to produce well-defined, genetic soil properties.

Lithosols are young compared to zonal soils, but the profiles have developed to some extent. Where not subjected to accelerated erosion, most Lithosols in Lawrence County contain a thin A_1 horizon and a B horizon that is weak in color and texture development. In places the structure of the B horizon is also weak. Lithosols are shallow to bedrock in most places, and they are medium acid.

Muskingum series

Soils of the Muskingum series have developed in a thin layer of weathered acid sandstone intermixed in places with shale. They occupy strongly sloping to steep areas, but there is a small acreage having slopes of less than 12 percent. The soil is medium acid, and fragments of rock are common throughout the profile.

Representative profile of Muskingum stony fine sandy loam:

0 to 1 inch, dark grayish-brown stony fine sandy loam.

1 to 4 inches, grayish-brown stony fine sandy loam; weak medium crumb structure.

4 to 18 inches, yellowish-brown or brownish-yellow fine sandy loam or fine sandy clay loam; con-

tains partly disintegrated sandstone fragments; weak fine to medium subangular blocky structure; friable.

18 inches +, brownish-yellow fine sandy loam; as depth increases, grades toward loamy fine sand that has little or no structure; partly disintegrated sandstone fragments common; very friable.

Bedrock acid sandstone is at depths ranging from 1 to 2½ feet; in places it outcrops.

Pottsville series

Soils of the Pottsville series have developed from weathered acid shale. They are skeletal soils and have weakly developed profiles. The profile ranges from one that has a thin A_1 and a thin A_2 horizon directly over a matrix of shale fragments and silt to one that has a thin, weak but plainly evident B_2 horizon.

Representative profile of Pottsville shaly silt loam:

0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam to very fine sandy loam; partly decomposed leaf mold, twigs, and fine roots unevenly distributed; friable, very strongly acid; when dry, color is light gray (10R 7/2).

2 to 6 inches, strong-brown (7.5YR 5/6) shaly silty clay; fine to medium blocky structure; friable when moderately moist, sticky and moderately plastic when wet, and hard when dry; very strongly acid; color when dry is reddish yellow (7.5YR 7/6) faintly streaked with yellow and red.

6 to 22 inches, reddish-yellow (7.5YR 6/6) shaly silty clay mottled with yellow, red, and gray; irregular, sharply angular fine to medium blocky structure; firm to moderately friable; very strongly acid.

22 to 38 inches, pale-yellow (2.5Y 8/4) to very pale brown (10YR 7/3) partially weathered shaly silty clay or shaly clay mottled or specked with red and gray; very sticky and moderately plastic when wet, very hard when dry; very strongly acid.

ALLUVIAL SOILS

Alluvial soils are an azonal group of soils developed from transported and relatively recently deposited material (alluvium) characterized by a weak modification (or none) of the material by soil-forming processes *(8)*. These soils are on first bottoms along streams, in depressions or shallow sinks, and on foot slopes. Surfaces are depressed, nearly level, or gently sloping. Internal drainage is rapid to very slow. The characteristics of the soils are closely related to those of the alluvial deposits.

Alluvial soils derived from similar parent material but developed under different degrees of drainage will have some differences in characteristics.

Huntington and Lindside series

The Huntington and Lindside series, together with the Melvin, make up a catena of soils consisting of general alluvium derived mainly from weathered limestone. These soils are predominant on the bottom lands along the Tennessee River and its tributaries.

Huntington and Lindside soils are described in the section Descriptions of the Soils. Compared with the other Alluvial soils in the county, these soils generally are browner in the top 10 or 12 inches, have a higher pH value, and contain a better supply of plant nutrients. They also have a somewhat higher percentage of base saturation.

Weakly developed, buried profiles are common in areas of these soils. In these areas the top 6 to 12 inches is brown to dark-brown silt loam with a weak crumb structure. Under this material is a very dark brown layer of silt loam or silty clay loam that has a fairly well-developed subangular structure. This dark, buried layer is from 5 to 12 inches thick, and it appears to have been the surface layer before the uplands were placed in cultivation. It grades to a lighter colored, mottled material. The dark, buried layer is more common to the Lindside series.

In many places, most commonly in the higher parts of bottom lands along large streams, Huntington soils show a slight degree of profile development. In these locations they are a little darker brown to depths of 10 to 20 inches and have some soil structure.

Staser and Hamblen series

Soils of the Staser and Hamblen series differ from those of the Huntington and Lindside series mainly in consisting of mixed alluvium originating from shale, sandstone, and limestone. In addition, they are generally lighter brown and contain more sand. They mainly occupy bottom lands of streams tributary to the Tennessee River. They are medium acid to slightly alkaline.

The Staser and Hamblen soils are described in the section Descriptions of the Soils. Some areas of Hamblen soils have a dark sublayer, which probably is a buried former surface soil.

Philo series

Soils of the Philo series consist of alluvium originating mainly from acid sandstone and shale. They occur on bottom lands along small streams, and they are somewhat poorly drained to moderately well drained. They occur mainly on Little Mountain in association with Tilsit and Muskingum soils. Other areas are in the hilly and steep southern part of the county in association chiefly with Muskingum and Pottsville soils.

Philo soils are described in the section Descriptions of the Soils. They differ from Hamblen soils mainly in having more sand, a lighter color, and a reaction that is consistently strongly acid to medium acid.

Bruno series

The parent material of the Bruno series is young general alluvium that consists of the sandy components derived from weathered sandstone, shale, and limestone. Most areas of Bruno soils are small, and they occupy the natural levees along the larger streams. They occur in association with the Huntington, Lindside, Staser, and Hamblen soils. Slopes are gently undulating. Bruno soils are excessively drained and low in organic matter, plant nutrients, and clay. The base-exchange capacity is very low.

Bruno soils are described in the section Descriptions of the Soils. Their profiles have not developed textural or structural horizonation. However, in most areas a weak color profile has been developed. In these areas the upper 6- to 10-inch layer is darker brown than the underlying material.

Abernathy and Ooltewah series

Soils of the Abernathy and Ooltewah series consist of local alluvium that originated chiefly from limestone. These soils are subject only to inundation from local runoff, and the period of flooding is short for much of the acreage. They are somewhat poorly drained to well drained.

Abernathy and Ooltewah soils are described in the section Descriptions of the Soils. They resemble the Huntington and Lindside soils, but they vary more in color and texture. In general the color, particularly of the Abernathy soils, is more reddish.

Barbourville and Cotaco series

Soils of the Barbourville and Cotaco series are developing in young local alluvium that originated chiefly from acid sandstone and shale. They are medium to strongly acid. The Barbourville soils show little profile development, except that the upper 6- to 10-inch layer is a little darker brown than the underlying material. Cotaco soils show the effects of gleization in the sublayer, and in many places the color, texture, and structure of the subsoil indicate a weakly developed B horizon.

Barbourville and Cotaco soils are described in the section Descriptions of the Soils. They are coarser textured than Abernathy and Ooltewah soils. In addition, they generally contain less organic matter and have a lower base-exchange capacity and percentage of saturation.

Agriculture in Lawrence County

Agriculture is the main occupation in Lawrence County. Little year-long industrial employment is available in the county. Farm practices vary within the county, depending on the kind of soil and the size of the farm. Cotton is the main crop, but corn, hay, potatoes, and sweetpotatoes are also important. Most farms have electricity, and many have tractors and automobiles. Telephones, running water, and freezers are less common.

Size of farm and tenure

The 1954 census reported an estimated 3,280 farms in the county. The average farm contained 90.2 acres. The largest farms and highest percentage of tenant-operated farms are in the Tennessee Valley. Owners and managers operated 53.9 percent of all farms in 1954; tenants and croppers the rest.

Farms by type, in 1954, were as follows:

	Number
Cash grain	10
Cotton	1,970
Dairy	27
Poultry	5
Livestock other than dairy and poultry	121
General	16
Miscellaneous unclassified	1,131

The 1954 United States census classified as cotton farms 60.1 percent of all farms reporting. In one of the more commonly used tenant systems in cotton farming, the owner furnishes the land, tenant house, work animals or tractors, and half of the fertilizer. The tenant furnishes the labor and half the fertilizer. The crop is divided equally between owner and tenant.

If the tenant furnishes labor, power equipment, machinery, and two-thirds of the fertilizer and seed, he gets two-thirds of the cotton and three-fourths of the hay and grain. Many farms in the Tennessee Valley are rented by tenants for a specified number of pounds of lint cotton per acre of open farmland. Under this system the tenant furnishes all labor, power machinery, fertilizer, and seed.

Land use

About 68.5 percent, or 300,757 acres of the county is in farms. Most of the rest is in national forests.

Land in farms was distributed as follows:

	Acres
Cropland, total	181,266
Cropland harvested	122,913
Cropland used only for pasture	36,346
Cropland not harvested and not pastured	22,007
Woodland, total	85,648
Woodland pastured	30,986
Woodland not pastured	54,662
Other pasture (not cropland and not woodland)	22,667
Other land (houses, lots, roads, wasteland, etc.)	11,176

A survey by the Tennessee Valley Authority *(2)* reported 195,400 acres of forest in Lawrence County. About 48 percent of this was owned by the United States Government. The United States census of 1954 reports 85,648 acres in farm woodland. The rest is in private nonfarm ownership.

According to the United States census, 64 farms reported income from the sale of forest products in 1954. Forest products were cut on the following number of farms: Firewood and fuelwood, 773 farms; fence posts, 331 farms; saw logs and veneer logs, 138 farms; pulpwood, 11 farms.

According to a study by the Tennessee Valley Authority *(5)*, 35 sawmills in the county furnished outside employment to farmers.

Farm Crops and Practices

Farming in Lawrence County is based on the production of cotton as a cash crop. Other common crops are corn, hay, pasture, potatoes, and sweetpotatoes. The

less important crops are small grain, peanuts, sorghum for sirup, vegetables, and fruits. The acreage of the principal crops, as reported by the United States census, is given for stated years in table 6.

Cotton is planted on nearly every farm in the county. The cotton acreage has not changed much over the years, but the average yield per acre has increased steadily. The use of large quantities of fertilizer, winter cover crops, and improved varieties of cotton has been responsible for the increased yields. Cotton usually gets from 400 to 600 pounds of mixed fertilizer per acre. It is planted in April or early in May; it is grown mostly on well-drained upland or high stream-terrace soils. In some localities it is practically the only crop grown.

Corn is the most extensively grown crop. The total acreage and average yield have not changed much in the past 65 years. The average yield is about 20 bushels per acre. The crop is planted from March 15 to June 1 and is grown on practically all of the soils. Most of it, however, is grown on soils of the bottom lands and on colluvial or local alluvial soils. Much of the corn is grown in Moulton Valley and on Little Mountain. The better farmers apply 200 to 400 pounds of mixed fertilizer per acre at planting time and side dress with 30 to 60 pounds of nitrogen. Most of the corn is fed to livestock on the farm where it is raised. Some is sold to markets in Decatur and Florence.

TABLE 6.—*Acreage of the principal crops and number of fruit and nut trees and grapevines of bearing age*

Crop	1939	1949	1954
	Acres	*Acres*	*Acres*
Corn for all purposes	59,704	50,694	52,525
Sorghum for all purposes except sirup	801	1,839	1,623
Oats, threshed or combined	124	716	2,817
Other grain, threshed or combined	37	67	923
Soybeans for all purposes grown alone	6,151	2,231	1,561
Cowpeas, for all purposes except fresh market or processing, grown alone	1,793	311	376
Peanuts for all purposes grown alone	228	25	21
Hay crops, total	19,281	11,437	14,366
Alfalfa cut for hay	27	1,440	418
Lespedeza cut for hay	13,431	5,016	6,785
Small grains cut for hay	231	325	1,831
Clover, timothy, and mixtures of clover and grasses cut for hay	895	1,414	837
Other hay cut	4,697	3,242	4,495
Cotton	47,452	77,896	49,011
Sorghum for sirup	345	80	106
Irish potatoes for home use or sale	553	[1] 170	[2] 124
Sweetpotatoes for home use or sale	407	[1] 62	[2] 9
	Number [3]	*Number* [3]	*Number*
Apple trees	11,316	8,887	3,541
Peach trees	20,319	12,922	5,402
Grapevines	3,785	3,357	1,372

[1] In 1949, does not include acreage for farms with less than 15 bushels harvested.

[2] In 1954, does not include acreage for farms with less than 20 bushels harvested.

[3] One year later than year at head of column.

Soybeans, cowpeas, and lespedeza are most extensively grown for hay, and they need the least fertilizer. Annual lespedeza is widely grown because it is suited to many soils. It will produce hay on soils that are too infertile for the more exacting legumes and grasses. Practically all hay harvested in the county is fed to livestock on the farms where it is grown.

Farmers getting better yields improve the quality of their hay by planting more alfalfa. This plant requires well-drained soils that are moderately high in fertility. Yields from the second, third, and fourth cuttings of alfalfa can be increased in most years by irrigation. Irrigation, however, is greatly limited by lack of water and by cost. The fourth cutting of alfalfa should be omitted unless the crop is irrigated or rainfall has been abundant.

Small grains are not of great importance from the standpoint of acreage and quantity harvested. Oats are the most commonly grown small grain. Wheat has been grown more in recent years because of the flour and feed mill established in Decatur. The use of small grains for winter cover and pasture has increased the acreage used for these crops. Average yields, especially of oats, have increased much for several years. Small grains usually get 100 to 200 pounds of sodium nitrate or an equivalent nitrogen fertilizer in spring. They are planted in fall on the better drained, more productive soils and harvested in May or June.

Grain sorghum is a fairly new crop, and it is grown on many soils for grain and for forage. Interest in grain sorghum has decreased somewhat, however, because of insect damage and the lack of harvesting machinery on the smaller farms. Sorghum for sirup is grown in small patches, chiefly for home use. The better quality sirup is made from sorghum that has grown on the more sandy soils. The juice is extracted and processed by the growers or by local sirup mills.

Peanuts are grown mainly for home use, but some are sold. Yields average about 550 pounds an acre. Highest yields are obtained from open, well-drained soils; fair yields are obtained from soils moderately low in fertility. Peanuts usually get from 200 to 300 pounds an acre of mixed commercial fertilizer.

Peaches, pears, apples, grapes, cherries, and pecans are grown mostly in small home orchards or vineyards. In general, the trees and vines are not well cared for, and the fruit varies considerably in quality.

Modern farm machinery is used on farms in the Tennessee and Moulton Valleys. However, 1-horse implements are used for cultivation on many farms. Cotton and corn are chiefly harvested by hand, but a few mechanical cottonpickers and cornpickers are in use. Practically all small grains, including sorghum and soybeans grown for grain, are harvested with power-driven combines. Much grain sorghum is harvested in the fields by livestock.

Cotton and corn are generally planted from 5 to 10 days earlier in the Tennessee Valley than in other parts of the county. The Little Mountain section has the latest planting dates.

Cotton, corn, and hay are grown by some farmers in a systematic rotation. Cotton is grown year after year on about 80 to 90 percent of the cropland in the Tennessee Valley. Some of it is rotated with a legume winter cover crop. In other sections of the county, more corn, hay, and small grains are grown and crops are more commonly rotated. A rotation consisting of

cotton, winter legumes, and corn is used on many farms on Little Mountain and on some farms in Moulton Valley.

Nitrogen, phosphate, and potash are used for cotton and for corn on uplands. Fertilizer is generally not applied to corn planted on areas that are subject to flooding. Potash, phosphate, and lime are used on hay and pasture, particularly alfalfa. The use of lime has increased greatly in recent years.

Permanent Pasture

The acreage in permanent pasture has increased much in recent years. Most of it is on imperfectly or poorly drained soils. Temporary pastures, which furnish a considerable part of the pasturage in this county, may be on any of the soils suitable for crops. The more important plants used for permanent pasture are whiteclover, dallisgrass, fescue, rescuegrass, bluegrass, and orchardgrass. Other plants used for pasture are crimson clover, ryegrass, fall-seeded small grains, alfalfa, sericea lespedeza, and kudzu. The quality of forage depends on the soil and on the proper use of fertilizers and the seeding of suitable grasses and legumes. Pastures have not been so well managed as field crops. Many farmers are now using lime, nitrogen, phosphate, and potash on pastures, and they are trying to improve them through grazing control, weed eradication, and proper seeding.

Livestock and Livestock Products

Livestock are much less important than cotton as a source of income on farms. The number of livestock as reported by the census is shown in table 7.

Dairy cattle are more common than beef cattle. Most farms have 1 or 2 milk cows to supply milk for home use. A few farms obtain their major income from dairy products, chiefly raw milk sold within the county. Most dairy cattle are grade-quality Jersey and Guernsey. There are a very few purebred herds.

TABLE 7.— *Number of livestock on farms*

Livestock	1940	1950	1954
	Number	*Number*	*Number*
Horses and colts	[1] 1,685	1,330	609
Mules and mule colts	[1] 6,231	5,135	2,156
Cattle and calves	[1] 10,216	15,350	24,311
Sheep and lambs	[2] 99	357	1,618
Swine	[3] 10,367	16,720	13,655
Chickens	[3] 98,387	[3] 114,409	[3] 89,784

[1] Three months old and over.

[2] Six months old and over.

[3] Four months old and over.

The main breeds of beef cattle are the Hereford and Angus. Most beef cattle are in large herds on large farms in the Tennessee and Moulton Valleys. Beef cattle are mostly sold at local markets or in Athens, Hartselle, or Russellville.

Hogs are the main source of meat on many farms. The chief breeds are Poland China, Duroc, Hampshire, and Ohio Improved Chester White.

Few sheep are on the farms. Southdown and Hampshire breeds are the most common. Lambs and wool are sold to local or nearby markets.

Poultry and eggs are produced on practically every farm for home use. A few farms specialize in poultry and egg production. White Leghorn, Plymouth Rock, New Hampshire Red, and Rhode Island Red are the most common breeds.

Glossary

[Definitions in this glossary were taken mainly from Soils and Men (*8*), the Soil Survey Manual (*9*), and Soil (*10*)]

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

	pH
Extremely acid	below 4.5
Very strongly acid	4.5–5.0
Strongly acid	5.1–5.5
Medium acid	5.6–6.0
Slightly acid	6.1–6.5
Neutral	6.6–7.3
Mildly alkaline	7.4–7.8
Moderately alkaline	7.9–8.4
Strongly alkaline	8.5–9.0
Very strongly alkaline	9.1 and higher

Alluvium. Fine material, such as sand, silt, or clay, deposited on land by streams.

Bedrock. The solid rock underlying soils and other earthy surface formations.

Clay. Small mineral soil grains, less than 0.002 millimeters in diameter. As a textural class, clay includes material containing 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Claypan. Compact horizons or layers rich in clay and separated more or less abruptly from the overlying horizon; hard when dry, and plastic or stiff when wet.

Colluvium. Deposits of rock fragments and soil material accumulated at the base of slopes through the influence of gravity; includes creep and local wash.

Consistence. Degree of cohesion and resistance to forces tending to deform or rupture the aggregate. The relative mutual attraction of the particles in the whole mass, or their resistance to separation. The following terms are commonly used to describe consistence.

Brittle. Breaking with a sharp, clean fracture when dry, or shattering into cleanly broken hard fragments if struck a sharp blow.

Compact. Dense and firm but without any cementation.

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

Friable. Easily crumbled by the fingers; nonplastic.

Hard. Moderately resistant to pressure; can be broken in hands without difficulty but is barely breakable between thumb and forefinger.

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

Plastic. Readily molded or mottled without rupture; puttylike.

Sticky. Adhesive when wet, but cohesive when dry; shows tendency to adhere to other material and objects.

Stiff. Resistant to deformation or rupture; firm and tenacious and tending toward imperviousness. Usually applied to conditions of the soil in place and moderately wet.

Tight. Compact, impervious, tenacious, and usually plastic.

Contour tillage. Furrows plowed at right angles to the direction of slope, at the same level throughout, and ordinarily at comparatively close intervals.

Cropland. Land regularly used for crops, except forest crops. It includes rotation pasture, cultivated summer fallow, or other land ordinarily used for crops but temporarily idle.

Crumb. Generally soft, small, porous aggregates, irregular but tending toward a spherical shape, as in the A_1 horizons of many soils. Crumb structure is closely related to granular structure.

Drainage. The rapidity and extent of the removal of water from the soil, in relation to additions, especially by runoff, by flow through the soil to underground spaces, or by a combination of both processes. As a condition of the soil, soil drainage refers to the frequency and duration of periods when the soil is free of saturation or partial saturation. The following terms are defined: Runoff, internal drainage, soil permeability, and soil drainage classes.

Runoff. The amount of water removed by flow over the surface of the soil. The amount and rapidity of runoff is closely related to slope and is also affected by such factors as texture, structure, and porosity of the surface soil; the vegetative covering; and the prevailing climate. Relative degrees of runoff are as follows:

PONDED: None of the water added to the soil as precipitation or by flow from surrounding higher land escapes as runoff. Removal is by movement through the soil or by evaporation.

VERY SLOW: Surface water flows away so slowly that free water lies on the surface for long periods or enters immediately into the soil. Very little of the water is removed by runoff.

SLOW: Surface water flows away so slowly that free water covers the soil for significant periods or enters the soil so rapidly that only a small amount is removed as runoff. Normally, there is little or no erosion hazard.

MEDIUM: Surface water flows away at such a rate that a moderate proportion of the water enters the soil profile and free water lies on the surface for only short periods. The loss of water over the surface does not reduce seriously the supply available for plant growth. This commonly is considered good external drainage. The erosion hazard may be slight to moderate if soils with this drainage are cultivated.

RAPID: A large proportion of the precipitation moves rapidly over the surface of the soil, and a small part moves through the soil profile. The erosion hazard commonly is moderate to high.

VERY RAPID: A very large part of the water moves rapidly over the surface of the soil, and a very small part goes through the profile. The erosion hazard is commonly high or very high.

Internal drainage. That quality of a soil that permits the downward flow of excess water through it. It is reflected in the frequency and duration of periods of saturation. It is determined by the texture, structure, and other characteristics of the soil profile and of underlying layers and by the height of the water table, either permanent or perched, in relation to the water added to the soil. Relative terms for expressing internal drainage are as follows:

NONE: No free water passes through the soil mass.

VERY SLOW: The rate of internal drainage is much too slow for optimum growth of important crops (not water-tolerant or water-loving crops) in humid regions.

SLOW: The rate of movement of water through the soil is not so fast as in medium drainage but faster than in very slow drainage. Saturation occurs for periods of a week or two—long enough to affect adversely the roots of many crop plants.

MEDIUM: Internal drainage is about optimum for growth of important crops under humid conditions. Medium is considered good internal drainage.

RAPID: Internal drainage is somewhat too rapid for the optimum growth of the important crops of the region.

VERY RAPID: The rate of movement of water through the profile is very rapid. Internal drainage is too rapid for optimum growth of most of the important crops of the region.

Soil permeability. That quality of the soil that enables it to transmit water and air. Rates of percolation are expressed in inches per hour. Relative classes of soil permeability are very slow, slow, moderately slow, moderate, moderately rapid, rapid, and very rapid.

Soil drainage classes. Relative terms for expressing soil drainage classes are as follows:

VERY POORLY DRAINED: Water is removed from the soil so slowly that the water table remains at or on the surface the greater part of the time.

POORLY DRAINED: Water is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year.

IMPERFECTLY OR SOMEWHAT POORLY DRAINED: Water is removed from the soil slowly enough to keep it wet for significant periods, but not all of the time.

MODERATELY WELL DRAINED: Water is removed from the soil somewhat slowly, so that the

profile is wet for a small but significant part of the time.

WELL DRAINED: Water is removed from the soil readily, but not rapidly. A well-drained soil has good drainage.

SOMEWHAT EXCESSIVELY DRAINED: Water is removed from the soil rapidly so that only a relatively small part is available to plants. Only a narrow range of crops can be grown on these soils, and yields are usually low without irrigation.

EXCESSIVELY DRAINED: Water is removed from the soil very rapidly. Excessively drained soils commonly are shallow to bedrock and may be steep, very porous, or both. Enough precipitation commonly is lost from these soils to make them unsuitable for ordinary crop production.

Erosion. The wearing away of the land surface by detachment and transport of soils and rock materials through the action of moving water, wind, and other geological agents. The erosion classification used is as follows: Slightly eroded, moderately eroded, severely eroded, and gullied land.

Slightly eroded. Such soil may have lost as much as 25 percent of the original surface soil, but the plow layer consists almost entirely of material of the original surface soil. Soils, the names of which include no erosion term, are within this class of erosion.

Moderately eroded. Soil eroded to the extent that the subsoil material is within plow depth over about half or more of the delineated area. Ordinary tillage will bring part of the upper subsoil to the surface and alter the original surface soil with an admixture of subsoil material. About 25 to 75 percent of the original surface soil may have been lost. There may be some shallow gullies. The term "eroded" in soil names designates this class of erosion.

Severely eroded. Soil eroded to the extent that all or practically all of the original surface soil has been lost. Tillage is almost entirely in subsoil material. Short shallow gullies are common, and a few gullies may be too deep to be obliterated by ordinary tillage. The term "severely eroded" in soil names designates this class of erosion.

Gullied land. Areas that consist of an intricate pattern of gullies. The profile has been largely mutilated. The term "gullied" in soil and miscellaneous land types designates this class of erosion.

Fertility. The inherent qualities that enable a soil to sustain plant growth.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Forest. Land not in farms that bears a stand of trees of any age or stature, including seedlings, but of species attaining a minimum average height of 6 feet at maturity, or land from which such a stand has been removed, but is not now restocking, and on which no other use has been substituted. Forest on farms is called farm woodland or farm forest.

Genesis, soil. Mode of origin of the soil, referring particularly to the processes responsible for the development of the solum, or true soil, from the unconsolidated parent material.

Granular. Soil structure in which the individual grains are grouped into spherical aggregates with indistinct sides. Highly porous granules are commonly called crumbs. A well-granulated soil has the best structure for most ordinary crops.

Great soil group. Any one of several broad groups of soils with fundamental characteristics in common. Examples are Rendzina, Red-Yellow Podzolic, and Lithosol.

Green-manure crop. Any crop grown and plowed under for the purpose of improving the soil, especially by the addition of organic matter.

Horizon, soil. A layer of soil, approximately parallel to the soil surface, that has characteristics produced by soil-forming processes.

Horizon A. The upper layer of the soil mass, from which material has been removed by percolating water; the eluviated part of the solum; the surface soil. It is generally divided into two or more sub-horizons; A_0, which is not a part of the mineral soil, but the accumulations of organic debris on the surface; and the other subhorizons designated as A_1, A_2, and so on.

Horizon B. The layer of deposition, to which materials have been added by percolating water; the illuviated part of the solum; the subsoil. This horizon may be divided into several subhorizons, depending on color, structure, consistence, or the character of the material deposited, and designated as B_1, B_2, B_3, and so on.

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

Horizon D. Any stratum underlying the C, or the B if no C is present, which is unlike C, or unlike the material from which the solum has been formed.

Leaching, soil. The removal of materials in solution by percolating water.

Massive. Large uniform masses of cohesive soil, sometimes with ill-defined and irregular cleavage, as in some of the fine-textured alluvial soils; structureless.

Moisture relations. The ability of soil to maintain optimum moisture conditions for the commonly grown plants. Soil that has too much or too little moisture, or in which the supply is too variable is said to have unfavorable moisture relations.

Morphology. The physical constitution of the soil including the texture, structure, porosity, consistence, and color of the various soil horizons, their thickness and their arrangement in the soil profile.

Mottled. Marked with spots of color and usually associated with poor drainage.

Normal soil. A soil having a profile in equilibrium or nearly in equilibrium with its environment, developed under a good but not excessive drainage from parent material of mixed mineralogical, physical, and chemical composition, and expressing the full effects of the forces of climate and living matter.

Nutrients, plant. The elements taken in by the plant, essential to its growth, and used by it in elaboration of its food and tissue. These include nitrogen, phosphorus, calcium, potassium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps others obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Parent material. The unconsolidated mass from which the soil profile develops.

Permeable. Easily penetrated by water.

Productivity. The capability of a soil to produce a specified plant or sequence of plants under a system of management. A response to management.

Profile, soil. A vertical section from the surface into the parent material.

Reaction. (See Acidity.)

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Small rock or mineral fragments ranging in diameter from 0.05 mm. to 2.0 mm. The textural class name of any soil that contains 85 percent or more of sand and not more than 10 percent of clay.

Silt. Small grains of mineral soil ranging in diameter from 0.05 mm. to 0.002 mm. The textural class name of any soil that contains 80 percent or more of silt and less than 12 percent of clay.

Single grain. Each particle of soil taken alone, as in sand; structureless.

Soil. The natural medium for the growth of land plants on the surface of the earth; composed of organic and mineral materials.

Stripcropping. The practice of growing crops in alternating strips or bands laid out approximately on the contour on erosive soils or at approximately right angles to the prevailing direction of the wind where soil blowing is a hazard. Close-growing or sod-forming crops are grown in alternate strips with clean-tilled crops.

Subsoil. Technically, the B horizon; roughly, that part of the profile below plow depth.

Substratum. Material underlying the subsoil.

Surface soil. Technically, the A horizon; commonly, the part of the upper profile usually stirred by plowing.

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

Upland (Geologic). Land consisting of material unworked by water in recent geologic time and lying in general at higher elevations than the alluvial plain or stream terrace.

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