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# Soil Survey

# Lincoln County Tennessee

By
FOSTER RUDOLPH, in Charge, L. J. STRICKLAND, and E. F. HENRY
Tennessee Agricultural Experiment Station
and
ROBERT WILDERMUTH and B. H. WILLIAMS
United States Department of Agriculture

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
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In cooperation with the
Tennessee Agricultural Experiment Station
and the
Tennessee Valley Authority

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## HOW TO USE THE SOIL SURVEY REPORT

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

**Readers interested in the area as a whole** include those concerned with general land use planning—the placement and development of highways, power lines, urban sites, industries, community cooperatives, resettlement projects, areas for forest and wildlife management, and for recreation. The following sections are intended for such users: (1) County Surveyed, in which location and extent, physiography, relief, and drainage, climate, vegetation, history and population, rural culture, transportation and markets, and industry and business are discussed; (2) Agriculture, in which a brief history and the present status of the agriculture are described; (3) Productivity Ratings and Physical Land Classification, in which are presented the productivity of the soils, which are grouped according to their relative physical suitability for agricultural use; (4) Generalized Physical Land Classification Map; (5) Land Uses and Soil Management, in which the present uses of the soils are described, their management requirements discussed, and suggestions made for improvement; and (6) Water Control on the Land, in which problems pertaining to drainage and control of runoff are treated.

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

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

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

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

ROBERT M. SALTER, *Chief*

Division of Soil Survey

CHARLES E. KELLOGG, *Head Soil Scientist, in Charge*

TENNESSEE AGRICULTURAL EXPERIMENT STATION

C. A. MOOERS, *Director*

and the

TENNESSEE VALLEY AUTHORITY

Series 1937, No. 16 Issued February 1946

# SOIL SURVEY OF LINCOLN COUNTY, TENNESSEE[1]

By FOSTER RUDOLPH, in Charge, L. J. STRICKLAND, and E. F. HENRY, Tennessee Agricultural Experiment Station, and ROBERT WILDERMUTH and B. H. WILLIAMS, Division of Soil Survey,[2] Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture

Area inspected by J. W. MOON, Principal Soil Scientist, Division of Soil Survey

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

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[1] This report was revised by A. C. Orvedal, Division of Soil Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering.
[2] The field work for this survey was done while the Division was a part of the Bureau of Chemistry and Soils.

SETTLEMENT began in Lincoln County, Tennessee, about 1801, and since then agriculture has been the principal occupation of the people. From typical pioneer farming it has developed to its present highly diversified status. The main crops are corn, cotton, wheat, and hay. In the Highland Rim section of the county the agriculture is centered largely on cotton production, whereas in the Central Basin a varied agriculture prevails, in which livestock raising and dairying are combined with growing crops. To provide a basis for the best uses of the land a cooperative soil survey was begun in 1937 by the United States Department of Agriculture, the Tennessee Agricultural Experiment Station, and the Tennessee Valley Authority. The report is here presented and may be briefly summarized as follows.

## SUMMARY

Lincoln County, in the south-central part of Tennessee, covers a total area of 574 square miles. It forms a part of two of the main physiographic sections of Tennessee, (1) the Highland Rim and (2) the Central Basin. In this county the Highland Rim is predominantly undulating to gently rolling and the Central Basin is predominantly rolling, although there are numerous steep hills and ridges. The elevation of the Highland Rim in this county ranges from about 900 to 1,000 feet and that of the Central Basin from about 600 to 700 feet.

The climate is temperate and continental. It is featured by mild winters with short cold periods, warm summers with occasional hot periods, and a fairly well-distributed mean annual precipitation of about 51 inches. The average annual frost-free period is 198 days.

The soils differ widely from one another in characteristics and conditions associated with productivity and use capability. Some of these are color, texture, consistence, fertility, reaction, relief, and conditions of stoniness, erosion, and moisture. Largely on the basis of such differences, the soils have been classified and mapped into 60 unit separations consisting of 33 soil types, 21 soil phases, and 6 miscellaneous separations. In the section on Soils each soil is described and its relation to agriculture discussed.

Differences in physical use capabilities of the soils are accounted for by a number of internal and external soil features and conditions. Inasmuch, however, as these affect soil use and management through the three conditions of productivity, workability, and conservability, the soil types and phases are grouped in the Soils section of this report into five classes according to their physical suitability for use in the present agriculture. For convenience, these soils are referred to as First-class soils, Second-class soils, Third-class soils, Fourth-class soils, and Fifth-class soils.

Silt loams occupy approximately three-fourths of the area of the county. The rest is composed of loams, silty clay loams, loamy fine sands, and very fine sandy loams. The soils in about 6 percent of the county are too poorly drained for ordinary crop production; those in the rest of the county are well drained. The proportions of the land rendered unsuited for cultivated crops largely because of strong relief, stoniness, and severe erosion are 12 percent, 19 percent, and 1.5

percent, respectively. About 15 percent of the land is nearly level, 40 percent is practically stone-free, and about 18 percent is injured little or none by erosion. Taking the average of the Central Basin of Tennessee as a standard, about 10 percent of the First-, Second-, and Third-class soils in Lincoln County are comparatively high in natural fertility and productivity, about 47 percent are medium, and about 43 percent are comparatively low. Nearly all of the soils of the terraces and uplands are acid in reaction. Tilth conditions are generally good on the First-, Second-, and Third-class soils.

The First-class soils are characterized by good to excellent productivity and workability, and they can be conserved with relative ease. These soils include a total of 22,016 acres, or 5.9 percent of the area of the county.

Some one or a combination of the conditions of productivity, workability, or conservability is materially less favorable for the Second-class soils, but not sufficiently unfavorable to render them physically unadapted to use for cultivated crops. Second-class soils include a total of 114,432 acres, or 31.3 percent of the area of the county.

Each Third-class soil is rendered less suitable for crops requiring tillage by one or some combination of the conditions of productivity, workability, and conservability than are the Second-class soils, although most of the Third-class soils are now used for crops requiring tillage for which they are considered physically adapted, provided good soil management is practiced. Third-class soils include a total of 87,488 acres, or 23.8 percent of the area of the county.

The Fourth-class soils are moderately productive, but they are characterized by adverse conditions of workability or conservability, or both. A considerable acreage of these soils is used for permanent pasture, for which they are generally physically adapted. Fourth-class soils include 135,552 acres, or 36.8 percent of the area of the county.

The Fifth-class soils are low to very low in productivity and possess adverse conditions of workability or conservability, or both. These soils are very poorly adapted, if adapted at all, either to crops requiring tillage or to permanent pasture, and, through elimination, a good use is for forest. Most of these soils are now in forest. Fifth-class soils include 7,872 acres, or 2.2 percent of the area of the county.

The best available data indicate that more than 75 percent of the land has been cleared and put into cultivation at one time or another. Although no definite data are available as to just what extent wrong use of land is responsible for the broad difference in the amount of land cleared and that yielding crops, general observations bear out the conclusion that wrong land use has been influential in bringing about this situation. It is perfectly apparent that a considerable acreage once cleared and put into cultivation was physically unadapted to such use. On the other hand, some land physically adapted to crop use is still being used for pasture or forest. The proper adjustment of land use is probably the present basic agricultural need of the county. Once land use is properly adjusted, it is equally necessary that proper measures of land management follow.

Each of the 60 soils and land units in Lincoln County has been described and its relation to agriculture discussed. Productivity ratings of each soil for the main crops of the present agriculture have been tabulated and discussed. A small generalized map giving the extent and areal distribution of significant land types has been prepared and briefly discussed.

In the section on Land Uses and Soil Management the soils are grouped into 10 groups, on the basis of management requirements, for convenience in discussing the soils in this connection. Each group is discussed in regard to requirements for maintenance of tilth, control of water, fertilization, and selection of crops.

In the section on Water Control on the Land the general aspects of control of runoff and erosion, protection from floods, drainage, and irrigation are discussed.

Forestry in the county, beginning with the early white settlements and leading up to and including the present time, is discussed in the section on Forests. The relations that exist between forest production and the soils, and to a less extent the place of forestry in the agriculture of the county, are also discussed therein.

The section on Morphology and Genesis of Soils deals with soils from the point of view of the soil scientist, particularly in connection with soil classification. The aim of this section is to meet the needs of the soil student or the soil scientist rather than those of the layman.

## COUNTY SURVEYED

### LOCATION AND EXTENT

Lincoln County is in the south-central part of Tennessee (fig. 1). The State of Alabama borders it on the south. Fayetteville, the county seat and principal town, is about 70 miles south of Nashville and about 70 miles west of Chattanooga. The county is roughly square

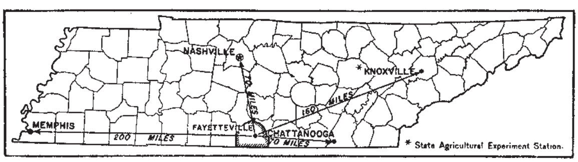


FIGURE 1.—Location of Lincoln County in Tennessee.

in shape with a somewhat semicircular boundary on the north. The greatest distance from north to south is about 26 miles and from east to west is 29 miles. The total land area is 574 square miles, or 367,360 acres.

### PHYSIOGRAPHY, RELIEF, AND DRAINAGE

Lincoln County embraces a part of two sections of the Interior Low Plateaus physiographic province—the Central Basin (also called the Nashville Basin) and the Highland Rim—and in addition, two minor physical units recognized locally as the Highland Rim escarpment and the Cumberland escarpment (fig. 2). As will be brought out later in this report, marked differences in both the soils and the agriculture are associated with these different physiographic sections.

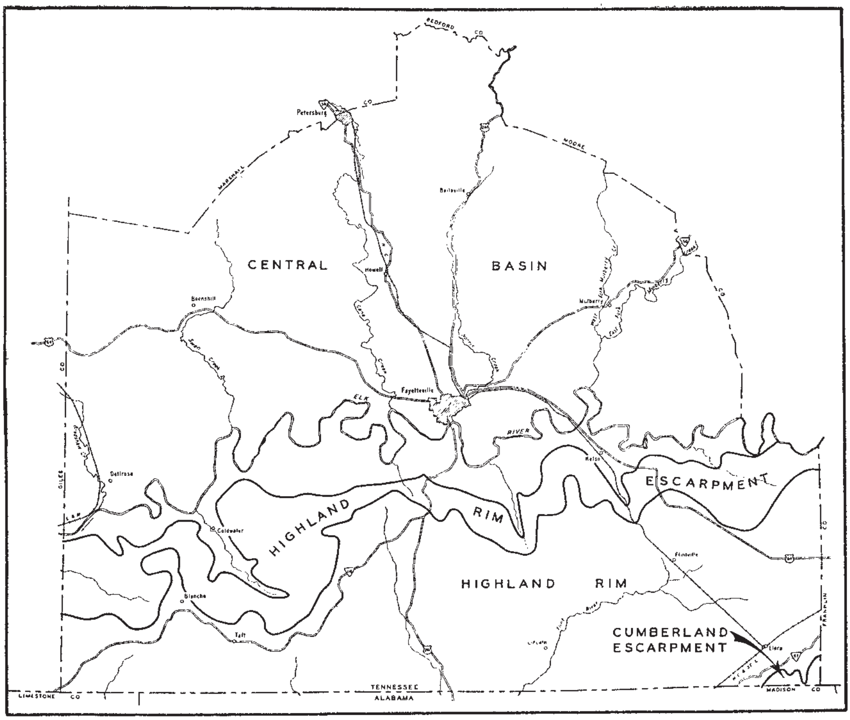


FIGURE 2.—Physiographic map of Lincoln County, Tenn.

The Central Basin is a comparatively low-lying area in middle Tennessee that is almost completely surrounded by the plateau called the Highland Rim. It is roughly oval in shape, with the long axis running slightly east of true north, and is approximately 120 miles long and 60 miles wide. The term "inner basin" is frequently applied to the middle part, which has a rather smooth surface, and the term "outer basin" refers to the outer part, which is hilly and lies at a higher elevation. The part of Lincoln County included in the Central Basin lies in this so-called outer basin. It is characterized by numerous short valleys of comparatively smooth land separated by steeply sloping hills and sharp narrow-crested ridges. These hills and ridges are, for the most part, spurs, outliers, and remnants of the Highland Rim, many of which rise to the same elevation as the Highland Rim proper. More than one-half (the northern half) of the county is included in this outer basin. It is the lowest part of the county.

The Highland Rim escarpment represents the front of the Highland Rim section that faces the Central Basin. This narrow belt of land rises abruptly from the Central Basin to the Highland Rim, an increase in elevation of about 300 feet. In this county the foot of this escarpment coincides with the southern boundary of the Central Basin and the top coincides with the northern boundary of the Highland Rim. Dissection is intense; short narrow-crested ridges extend out from the Highland Rim, and short steep-walled V-shaped valleys cut into it from the Central Basin below. This escarpment crosses the county from east to west, just south of and roughly parallel to the Elk River.

The southern one-fourth of the county is a part of the Highland Rim plateau that nearly surrounds the Central Basin. This area is frequently referred to locally as the "barrens." Drainage is not well developed in this area, and stream dissection is slight. The land, which is prevailingly smooth, ranges from undulating to gently rolling. This area slopes gently southward; the elevation decreases from about 1,000 feet in the northern part to about 900 feet in the southern part (*18*).[3]

The fourth physiographic unit is referred to as the Cumberland escarpment. It is a part of the escarpment on the western front of the Cumberland Plateau, which lies from 500 to 1,000 feet higher than the adjoining Highland Rim. Only about 2 square miles, in the southeastern corner of the county, are included in this unit; and it represents the foot of a spur that extends westward from the Cumberland Plateau proper. Only the lower part of the geological formations of the escarpment outcrops in the county. The slopes are generally steep, surface drainage is excessive, the soils are shallow, and limestone outcrops are abundant.

The general elevation above sea level of the Central Basin part of the county is about 700 feet, and that of the Highland Rim is about 950 feet. The elevation at the courthouse at Fayetteville is 717 feet. Elevations of several towns are as follows: Kelso, 742 feet; Flintville, 895 feet; Elora, 929 feet; and Petersburg, 750 feet.

Drainage is well developed in all parts except on the Highland Rim. Roughly, the northern three-fourths of the county, which embraces the Central Basin and the Highland Rim escarpment, drains into the Elk River, a stream that flows westward through the approximate middle of the county and onward to the Tennessee River. The Highland Rim drains southward through the Flint River and Limestone Creek into the Tennessee River. The half of the county north of this river is drained by fair-sized tributaries, including Norris, Cane, and Swan Creeks; but no large creeks flow into the Elk River from the south. A well-defined dendritic drainage pattern has developed in the Central Basin and on the Highland Rim escarpment. In the Central Basin stream dissection is well advanced, and drainage is good. The Elk River and its larger tributaries have reached their approximate temporary base level, and the flow of these streams is rather sluggish. At the point where the Elk River enters the county the elevation is about 715 feet above sea level, and at the point where it leaves it is 615 feet, the lowest point in the county. The river falls about 100 feet in its 64-mile winding channel across the county, and it therefore has a gradient of less than 0.03 percent. In sharp contrast with these comparatively slow-flowing streams of the Central Basin are the swift-flowing ones of the Highland Rim escarpment. These small, short streams flow rapidly for 3 or 4 miles northward before joining the Elk River, and they drop 100 to 150 feet in that distance. Drainage on the Highland Rim is not well developed. The streams are neither numerous nor well entrenched. The general direction of flow is southward. Slightly depressed and nearly flat poorly drained areas are on this plateau. The small area of the Cumberland escarpment is very well drained.

[3] Italic numbers in parentheses refer to Literature Cited, p. 134.

## GEOLOGY

The entire county is underlain by sedimentary rocks, most of which are limestones of the Paleozoic era. The formation exposed at the base of the Cumberland escarpment in the southeastern corner of the county is Bangor limestone. It is stratigraphically the highest and geologically the youngest formation in the area. Little or no soil has been developed over material weathered from this formation. Just below this are the highly siliceous St. Louis limestone and the Warsaw formation, which cap most of the Highland Rim. Weathered materials from these give rise to the broad areas of Baxter and Dickson soils of the Highland Rim. Underlying the Warsaw is the Fort Payne chert formation. This is exposed along the Highland Rim escarpment and in a few places along the larger streams on the Highland Rim. Remnants of the Fort Payne chert cap the hills and knobs of the Central Basin, where this material gives rise largely to the Frankstown soils—yellow, cherty, stony soils. These siliceous formations are more resistant to weathering than the underlying formations and therefore are largely responsible for the steepness of the break between the Highland Rim and the Central Basin. Beneath the Fort Payne chert lies a thin layer of Chattanooga shale, known locally as black slate. This separates the highly siliceous limestones of the Highland Rim from the comparatively pure limestones of the Central Basin. The latter belong to the Ordovician period and give rise to a large variety of soils in the Central Basin.

## CLIMATE

The climate of Lincoln County is temperate and continental. Seasonal changes are gradual. There are no natural land features, such as mountains or lakes, large enough to affect materially local climatic conditions. Seasonal variations are in proportion to the intensity of variation through much of the central United States.

Winters are mild with rather sudden short drops to below freezing temperatures. The ground seldom freezes to a depth of 6 inches, and it usually thaws between successive cold spells. Some snow falls, usually to a depth of less than 6 inches, every winter, but it soon melts. The winters ordinarily are sufficiently open to allow field work. Plowing on the soils of gentle relief in the Central Basin and on the Highland Rim, however, is usually done in the fall and spring because of the high moisture condition prevailing during the winter.

The mean annual temperature at the United States Weather Bureau station at Coldwater is 59.9° F. Changes in temperature in the summer are not so abrupt as in the winter. Hot spells of short to rather long duration occur from late in May through September, but they are most frequent and of greatest intensity during July and August. Generally, the temperature falls sufficiently at night to afford relief from the high temperature prevailing throughout the day.

A mean annual rainfall of 53.33 inches at Coldwater and 48.54 inches at Fayetteville is fairly well distributed throughout the year but is lowest in fall and highest in winter and spring. The least rain falls during September and October. Such weather conditions at this time are favorable for the harvesting of cotton and of lespedeza seed. This season of light rainfall and low moisture content of the soil, however, is not conducive to establishing good stands of fall-planted small grains.

The spring and summer rainfall usually is sufficient for all the crops commonly grown. Summer droughts exceeding 3 weeks in duration are infrequent, but, when they do occur at critical periods of crop development, yields are greatly decreased. Drought especially reduces the yield of pasture grasses, as most of the soils used for this purpose are shallow over bedrock, and on such soils the reserve supply of moisture is limited.

Occasionally periods of excessive rainfall or downpours occur in the summer and are sufficient to raise the streams to flood stage. During these brief, comparatively rare periods of high rainfall the steeply sloping soils that are bare or in row crops suffer from accelerated erosion and crops on the flood plains are usually injured. Hailstorms, cyclones, and tornadoes are rare.

The average frost-free season at Coldwater is 198 days, extending from April 9 to October 24. Killing frost has been recorded, however, as late as April 23 and as early as October 7.

Table 1, which gives the more important climatic data for the county, is compiled from the records of the United States Weather Bureau stations at Fayetteville and Coldwater.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Coldwater, and precipitation at Fayetteville, Lincoln County, Tenn.*

| Month | Coldwater [Elevation, 624 feet] | | | | Fayetteville [Elevation, 700 feet] | | |
|---|---|---|---|---|---|---|---|
| | Temperature | Precipitation | | | Precipitation | | |
| | Mean | Mean | Total for the driest year (1930) | Total for the wettest year (1920) | Mean | Total for the driest year (1930) | Total for the wettest year (1929) |
| | *°F.* | *Inches* | *Inches* | *Inches* | *Inches* | *Inches* | *Inches* |
| December | 41.8 | 5.65 | 3.32 | 3.12 | 4.35 | 3.17 | 3.38 |
| January | 41.2 | 4.97 | 1.80 | 6.44 | 4.06 | 1.66 | 6.82 |
| February | 42.3 | 4.64 | 4.39 | 5.67 | 4.85 | 3.58 | 5.06 |
| Winter | 41.8 | 15.26 | 9.51 | 15.23 | 13.26 | 8.41 | 15.26 |
| March | 51.1 | 5.93 | 5.75 | 9.51 | 5.48 | 5.47 | 13.03 |
| April | 59.2 | 4.98 | .82 | 11.47 | 4.24 | .62 | 4.83 |
| May | 67.9 | 4.35 | 5.77 | 7.05 | 4.19 | 6.57 | 6.72 |
| Spring | 59.4 | 15.26 | 12.34 | 28.03 | 13.91 | 12.66 | 24.58 |
| June | 75.3 | 4.26 | .83 | 5.11 | 3.87 | 1.09 | 3.08 |
| July | 78.3 | 4.19 | .55 | 6.95 | 3.97 | 1.42 | 2.68 |
| August | 77.3 | 4.24 | .77 | 12.10 | 3.73 | 2.90 | 1.16 |
| Summer | 77.0 | 12.69 | 2.15 | 24.16 | 11.57 | 5.41 | 6.92 |
| September | 72.8 | 2.96 | 2.76 | 1.95 | 2.69 | 2.58 | 7.38 |
| October | 61.2 | 3.46 | 2.81 | .05 | 3.14 | 2.93 | 5.40 |
| November | 50.3 | 3.70 | 4.30 | 3.30 | 3.97 | 3.21 | 6.91 |
| Fall | 61.4 | 10.12 | 9.87 | 5.30 | 9.80 | 8.72 | 19.69 |
| Year | 59.9 | 53.33 | 33.87 | 72.72 | 48.54 | 35.20 | 66.45 |

## VEGETATION

When the first white settlements were made, the county was entirely covered by forest, chiefly hardwoods. On the Highland Rim the following trees were abundant: Blackjack oak, chestnut oak, hickory, chestnut, tuliptree (yellow poplar), and gum, with an undergrowth including huckleberry bushes and briers. In the Central Basin, where vegetation was more dense and luxuriant, the forest included such species as beech, southern red oak, black oak, northern red oak, blackjack oak, a few white oak, gum, hickory, walnut, tuliptree, chestnut, black locust, elm, hophornbeam or ironwood, hornbeam, dogwood, sourwood, wild cherry, boxelder, maple, hackberry, and a sparse stand of cedar. Cane grew along most of the streams. It is reported that the bottoms along the Elk River and Cane Creek were covered with heavy growths of cane that reached a height of 30 feet (*8*).

The growth of grass in a forest such as existed here was necessarily limited. It is reported, however, that bluegrass grew luxuriantly on the glady land, which is land with a thin mantle of soil over limestone.

## WATER SUPPLY

The character and source of domestic water supplies differ according to the main physiographic divisions. In the Central Basin and also in the Highland Rim escarpment, springs and running streams are abundant. The greater part of water for human consumption is obtained from springs, and practically all of the water for the animals is obtained from springs and running streams. Large springs are particularly abundant around the edge of the Highland Rim. The municipal water supply for Fayetteville, amounting to 600,000 gallons a day, originates in 26 springs on Wells Hill, which is about 3 miles south of Fayetteville. All these springs flow out of the basal part of the Fort Payne chert (*18*). Wells are comparatively few in the Central Basin and the Highland Rim escarpment. On the Highland Rim the source of the water supply is distinctly different. On this plateau both springs and perennial streams are comparatively scarce. Most of the water for both humans and animals is obtained from dug wells, most of them about 30 feet deep. Ground water on the Highland Rim occurs in the weathered residue of the Mississippian formations; that is, the Warsaw and Fort Payne formations (*18*).

## ORGANIZATION AND POPULATION

The first recorded settlement of white people in Lincoln County was made on Norris Creek in 1801. This was followed shortly by settlements at or near Petersburg, Camargo, and Smithland. Most of the early settlers came from North Carolina, South Carolina, Virginia, Kentucky, and Georgia. They were of English, German, Scotch, Irish, and Welsh descent (*4*). The area was surveyed in 1808; and Lincoln County, slightly larger than it is now, was created November 14, 1809, from a part of Bedford County. In 1835 a small part of Lincoln County was taken to form a part of Marshall County, and in 1872 a small part was taken to form a part of Moore County. Fayetteville, the county seat, was established in 1810 (*3, 4, 16*).

The population of the county in 1810 was 6,104. By 1820 it had increased to 14,761, and by 1870 to 28,050, the maximum recorded population. Since 1870 there has been a slight decline. According to the United States census, the population in 1940 was 27,214.

The present population is dominantly native white and consists largely of descendants of the early settlers. There are, however, a number of Negroes. In 1940 the population was 84.8 percent white and 15.2 percent Negro. Most of the Negroes live in the Central Basin, but a few live on the Highland Rim west of Elora. The population is chiefly rural and is fairly well distributed. Certain districts on the Highland Rim, however, are sparsely populated, especially the area of about 8 square miles between United States Highway No. 241 and Unity Church, known as the Patrick Woods; the area of nearly 12 square miles north of Elora; and an area of about 3 square miles west of Lincoln. In the Central Basin part there are no outstanding sparsely populated areas, but there are some rather densely populated ones. These are chiefly in the general vicinity of Cash Point and Blanche and in the immediate vicinity of Fayetteville. The rural population averages about 39 persons to the square mile.

Fayetteville is the principal town. According to the United States census, its population in 1940 was 4,684. Howell, Petersburg, Mulberry, Kelso, Flintville, Elora, Coldwater, Dellrose, and Blanche are small towns, which serve their respective rural communities as local trading centers and shipping points for agricultural products.

## INDUSTRIES

The county has but few industries other than agriculture, and all of these are in Fayetteville. They include a thread mill, a silk mill, two garment mills, and a milk-processing plant. The last has materially affected the development of agriculture. The great increase in dairying during the last decade is associated with the establishment of this plant.

## TRANSPORTATION

A branch of the Nashville, Chattanooga & St. Louis Railway traverses the county from Elora through Fayetteville to Petersburg. The Lewisburg division of the Louisville & Nashville Railroad runs through a small part of the county, along the western boundary, and serves Dellrose. There is a total of 62 miles of railroad in the county. Two paved United States highways traverse the county—No. 241 from north to south and No. 64 from east to west. One paved State highway crosses the county from northeast to southwest. There are numerous graveled all-weather roads well distributed so that practically all localities are accessible by automobile throughout the year.

The distribution of rural homes with respect to the highways is considerably different on the Highland Rim from that in the Central Basin. On the Highland Rim the homes are more or less concentrated along the highways and well-improved secondary roads. One of the chief reasons for this condition is that the secondary roads that are not paved or graveled are impassable to motor vehicles and difficultly passable to horse-drawn vehicles during wet seasons. These conditions are due chiefly to the particular character of the soils on this plateau—the almost level surface with extensive slowly or poorly drained areas and the boggy conditions of the soils when wet. In the Central Basin, however, the homes are not concentrated along the paved and graveled roads but are fairly well distributed. Here the condition of the land is such that secondary and unimproved roads remain passable nearly all of the year.

## CULTURAL DEVELOPMENT AND IMPROVEMENT

Farmhouses range from the unpretentious pioneer type with practically no modern conveniences to substantial dwellings well equipped with such conveniences. In general, the majority of the houses of the pioneer type are on areas of soils of low productivity, whereas the more modern homes are chiefly on areas of the more productive soils. As with houses, the better barns generally are on the more productive soils and the poorer ones on the less productive soils.

According to the 1940 United States census, 45 percent of the farms have automobiles (including passenger cars, motortrucks, and tractors), 16.5 percent have telephones, and 15 percent are equipped with electricity.

The amount, kind, and condition of farm fencing vary with the prevailing type of agriculture. On the Highland Rim, where the production of cotton and corn is of primary importance and livestock raising is secondary, practically the only fences are around the permanent pastures. In the Central Basin, where livestock raising as well as the production of crops is important, the farms and fields are adequately enclosed with substantial fences.

The county has rural mail service to all points and is well supplied with conveniently located churches and schools. A county school bus service transports pupils to the elementary and high schools.

## AGRICULTURE

A crude, simple type of agriculture was carried on by the Indians before the coming of white men. Wild fruits, such as persimmons, grapes, mulberries, blackberries, and wild plums, seem to have been rather abundant (*17*).

Available authentic information of the pioneer agriculture is meager. It is apparent, however, that the white man's first agriculture typified American pioneer farming in that it consisted primarily of growing supplies for the home. As corn was a crop highly resistant to disease, quick to mature, easy to cultivate, well adapted to virgin land conditions, nonexacting as to time of harvest, and usable as a staple food for man and feed for beast, it was the principal staple crop of the pioneer in Lincoln County as in the greater part of the humid United States.

Before the advent of railroads and other modern transportation facilities, produce was transported on flat boats by river to New Orleans or by wagon and horseback over crude roads to Nashville. The early settlers marketed their heavy produce, such as corn, oats, and pork, chiefly in New Orleans. The few light, easily transported items, such as furs, feathers, hides, and tallow, were marketed in Nashville, and small supplies were obtained in exchange. The supplies of the early local merchants were purchased chiefly in Baltimore and were transported to this area by wagon.

As brought out in the preceding section, a great increase in population took place between 1810 and 1860. It is reasonable to believe that a great expansion in agriculture took place simultaneously. Agricultural development, however, was impeded by inadequate transportation facilities until 1858, when the Nashville, Chattanooga & St. Louis Railway was extended to Fayetteville. Transportation facilities were further improved in 1882, when a narrow-gage railroad was extended into the county from Columbia, Tenn. Agriculture not only continued to expand and develop after these improvements. but it began to change in a number of respects. Wheat became an important crop, and the tendency to feed corn on the farm and to market the animals was a change toward wider diversification. A greater variety of products, including flour, corn, wheat, oats, sweetpotatoes, poultry, and cattle and other livestock was offered for market. According to the United States census, agriculture in 1880 consisted largely of the production of corn, small grains, cotton, and hay, and to a less degree of sweetpotatoes and tobacco. Some additional income was derived from livestock, poultry, and forest products.

Although the crops mentioned above have been among the sources of agricultural income during most of the history of the county, they have varied in relative importance, as indicated in table 2, giving the acreages of principal crops.

TABLE 2.—*Acreages of principal crops in Lincoln County, Tenn., in stated years*

| Crops | 1879 | 1889 | 1899 | 1909 | 1919 | 1929 | 1939 |
|---|---|---|---|---|---|---|---|
| | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* |
| Corn | 57, 460 | 59, 127 | 74, 331 | 68, 722 | 73, 248 | 62, 096 | 57, 701 |
| Oats: | | | | | | | |
| Threshed | 2, 993 | 6, 991 | 1, 945 | 6, 724 | 3, 015 | 568 | 914 |
| Cut and fed unthreshed | ------- | ------- | ------- | ------- | ------- | 1, 438 | 717 |
| Wheat | 37, 279 | 25, 893 | 41, 969 | 13, 478 | 10, 557 | 8, 405 | 8, 796 |
| Rye | 268 | 1, 206 | 1, 467 | 3, 723 | 1, 101 | 175 | 2, 182 |
| Barley | 76 | 14 | 13 | 2 | 193 | ------- | 945 |
| Peas (mostly cowpeas) | ------- | ------- | 1, 103 | 880 | 96 | 1, 970 | 1, 261 |
| Beans (mostly soybeans) | ------- | ------- | 9 | ------- | 48 | 6, 454 | 4, 335 |
| All hay and sorghums for forage | 3, 415 | 7, 496 | 5, 106 | 12, 177 | 19, 658 | 21, 033 | 36, 364 |
| Timothy and clover, alone or mixed | ------- | ------- | ------- | 1, 422 | 6, 159 | 5, 924 | 978 |
| Lespedeza | ------- | ------- | ------- | ------- | ------- | 1, 337 | 25, 823 |
| Alfalfa | ------- | ------- | ------- | ------- | 97 | 80 | 521 |
| Sorghums for silage, hay, and fodder | ------- | ------- | ------- | ------- | [1] 516 | 453 | 1, 137 |
| Grains cut green | ------- | ------- | 481 | 1, 192 | 2, 299 | 862 | 1, 111 |
| Legumes cut for hay | ------- | ------- | ------- | ------- | 3, 277 | 8, 250 | 4, 434 |
| Other hay | ------- | ------- | 4, 625 | 9, 563 | 7, 310 | 4, 127 | 2, 360 |
| Potatoes | ------- | 372 | 131 | 551 | 213 | 442 | 466 |
| Sweetpotatoes and yams | 776 | 317 | 136 | 307 | 311 | 252 | 302 |
| Market vegetables | ------- | ------- | ------- | ------- | 171 | 196 | ------- |
| Tobacco | 39 | 14 | 11 | 1 | 1 | 256 | 632 |
| Cotton | 8, 868 | 15, 000 | 7, 338 | 11, 099 | 12, 234 | 23, 192 | 13, 953 |
| Sorgo | ------- | 905 | 363 | 1, 292 | 532 | 225 | 355 |
| | *Trees* | *Trees* | *Trees* | *Trees* | *Trees* | *Trees* | *Trees* |
| Apples [2] | ------- | 77, 321 | 126, 035 | 81, 019 | 54, 760 | 22, 766 | 35, 517 |
| Peaches [2] | ------- | 40, 443 | 34, 101 | 44, 393 | 27, 576 | 12, 373 | 16, 135 |
| Pears [2] | ------- | 905 | 3, 775 | 3, 357 | 2, 345 | 1, 428 | 1, 344 |

[1] For forage only.
[2] Fruit trees are for the years 1890, 1900, 1930, and 1940, respectively.

Several changes in agriculture have taken place since 1880. The production of wheat and oats has declined greatly, whereas the production of hay has increased markedly. About 1900, wheat began to be replaced by hay crops, and the numbers of beef cattle and swine began to increase and continued to increase until the peak was reached in the early twenties. A few years earlier the number of dairy cattle began to increase, and by 1918 small creameries were established. The growth of dairying was comparatively slow until 1927, when a large milk-processing plant was established in Fayetteville. In the next few years the number of dairy cattle and the value of dairy products increased greatly. The value of dairy products sold in 1939 increased tenfold over that of 1919, according to the United States census. This change brought about an increase in the acreage of hay and a decline in the acreage of grain and in the numbers of beef cattle and swine.

There has also been a significant increase in the production of cotton, which more than doubled in acreage from 1879 to 1929. Although the acreage was sharply reduced in 1939, the production was slightly larger than in 1929—9,029 bales, as compared with 8,947 bales. Most of the expansion in the production of cotton has taken place on the Highland Rim, where agricultural development has lagged behind that of the Central Basin. The part of the Highland Rim west of a line drawn through Lincoln and Flintville and the part southeast of the Nashville, Chattanooga & St. Louis Railway through Elora were settled more than 75 years ago, but the rest was not opened up until about 1900. The area north of Elora is now in the process of being cleared and placed under cultivation. Typical cotton farming is practiced in this area.

Corn has always been the leading crop in Lincoln County. The acreage in corn increased from 1879 to 1899 and subsequently declined, and in 1939 it was about the same as in 1879. Nevertheless, corn still occupies about 16 percent of the county and nearly 45 percent of the cropland harvested. About 75 percent of the acreage in corn is in the Central Basin.

A consistent increase in all hay and forage crops has taken place since 1879; the acreage in 1939 was more than 10 times that in 1879. During the 10-year period from 1929 to 1939 there was an increase of more than 15,000 acres, or over 70 percent, in the acreage devoted to hay and sorghums for forage, attributed largely to a rapid expansion of the production of lespedeza. Other hay and forage crops are crimson clover, cowpeas, soybeans, sorghums, alsike clover, and red clover. Tobacco is still a minor crop in acreage, but the total increased greatly from 1919 to 1939.

On the other hand, the acreages of other crops have declined or remained more or less stationary since 1879. Rye, barley, and oats, never very important, reached their maximum acreage around 1909. The greatest acreage of wheat, 41,969 acres, was reported in 1899, but by 1939 the acreage had dropped to about one-fifth of this maximum.

The acreages of potatoes, sweetpotatoes, and sorgo have remained fairly small. The production of apples has met with varying success. The numbers of apple and peach trees are about one-half of the number in 1889. The less important fruits, such as grapes, plums, cherries, strawberries, raspberries, and blackberries, are grown mostly for home consumption. Other important crops, such as small grains, tame grasses, clovers, and tobacco, are grown mainly in the Central Basin, although small acreages are devoted to these crops in other parts of the county. The commercial production of watermelons and cantaloups is carried on chiefly on the Highland Rim.

Cotton is usually sold at the local gin. The surplus corn is sold through local mills and feed stores or elevators. Beef cattle and hogs are marketed through local livestock buyers who ship to outside markets by truck or rail. Poultry and eggs are generally sold to local buyers. The greater proportion of dairy products is marketed at Fayetteville. Tobacco is sold by auction in local tobacco warehouses. Wheat is sold to the local flour mills and produce dealers. Sheep and wool are marketed cooperatively. Sorgo sirup is manufactured cooperatively and marketed through both wholesale and retail merchants. Other surplus farm products, such as watermelons, cantaloups, barley, potatoes, and sweetpotatoes, are sold to local buyers.

At present the principal field crops consist of corn, wheat, hay, cotton, and tobacco. Some of the less important ones are cowpeas, soybeans, oats, barley, and rye. Tobacco and cotton are grown entirely as cash crops. Corn and wheat are grown in part for market and in part for home use. The hay crops consist mainly of lespedeza and to a less extent of clover, alfalfa, timothy, and other legumes and tame and wild grasses.

The value of products sold, traded, or used by farm households in 1929 and 1939 from the United States census data, given in table 3, indicates that the income from the sale or trade of livestock and livestock products is more than equal to the corresponding income from all other farm products, including grains, cotton, tobacco, and vegetables.

TABLE 3.—*Value of farm products sold, traded, or used by farm households in Lincoln County, Tenn., in 1929 and 1939*

| Product | 1929 | 1939 |
|---|---|---|
| Crops sold or traded | $1,230,036 | $1,001,352 |
| Field crops | (1) | 951,107 |
| Vegetables | (1) | 9,827 |
| Fruits and nuts | (1) | 38,838 |
| Horticultural specialties | (1) | 1,580 |
| Livestock sold or traded | 944,393 | 618,009 |
| Livestock products sold or traded | 666,060 | 702,466 |
| Dairy products | (1) | 529,856 |
| Poultry and poultry products | (1) | 153,649 |
| Other livestock products | (1) | 18,961 |
| Forest products sold | 28,916 | 15,596 |
| Total farm products sold or traded | 2,869,405 | 2,337,423 |
| Farm products used | 805,179 | 804,651 |
| Total farm products sold, traded, or used | 3,674,584 | 3,142,074 |

[1] Not reported separately.

Permanent pastures are very important in this county, and most of them are in the Central Basin. They are largely on soils that are shallow over limestone bedrock. A small proportion of the pastures occupy the cherty or "gravelly" ridges and steep sides of such ridges. It is estimated that the total area of both open and shaded permanent pastures on shallow soils is nearly 55,000 acres, or 15 percent of the area of the county, whereas the total area of those on the cherty ridges and steep slopes is about 3,700 acres, or about 1 percent of the county. There are only a few permanent pastures on the Highland Rim, and most of them are on small areas of imperfectly drained soils (chiefly the Lawrence soils). On such soils the pastures are generally of poor quality.

Over the county as a whole, Kentucky bluegrass and white clover are the dominant pasture plants, although in a few scattered areas Bermuda grass and orchard grass are mixed with the bluegrass and white clover. The quantity and quality of the pasturage, particularly in the Central Basin, are excellent in the spring, early summer, and late fall, when an adequate supply of soil moisture is present; but in the late summer and early fall, when rainfall is comparatively low, the pasture plants often dry up. Frequently a supplementary pasture or a green forage crop is provided, particularly by dairy farmers, to carry livestock over this period. The soils used for permanent pastures, in addition to being shallow over bedrock, are generally heavy in texture and plastic in consistence, features that make for unfavorable moisture conditions. These soils are incapable of holding a large supply of moisture available for plants during dry periods.

Equipment for preparing the seedbed ranges from a single-shovel or bull-tongue plow, spike-tooth harrow, and log roller, many of which are home-made, to a complete set of modern horse- or tractor-drawn tillage implements. Crops are frequently planted and harvested by hand labor, particularly on the soils of low productivity, whereas on the better producing soils of comparatively gentle relief machinery is frequently used for all operations from the planting to the harvesting of the general field crops.

Bluegrass and tobacco are seeded in February; spring oats, lespedeza, red clover, and alfalfa are sown in March; cotton and corn are planted in May; tobacco is transplanted about June 1; crimson clover is sown in August; winter oats and barley are sown during the last half of September; and wheat is sown in the first half of October (*13*).

Alfalfa, bluegrass, and crimson clover for hay are usually harvested in the latter half of May; red clover, the latter part of May and the first part of June; barley, May 20 to June 5; wheat, June 5 to 15; spring oats, June 10 to 20; winter oats, June 15 to 25; tobacco, August 15 to September 15; lespedeza, for hay, September and October, and for seed, October; corn, September 1 to 15; and cotton, September to November (*12*).

Rotation of crops is rather generally practiced. The rotations followed, however, differ largely according to soil and land conditions. On the Highland Rim, where the Dickson soils predominate, the following rotation is most common: Cotton, cotton, corn. On the steep, cherty slopes of the Highland Rim escarpment and the remnants and outliers of the Highland Rim, where the Baxter and Dellrose soils predominate, the most common practice is to put the land in corn for 1 or 2 years, let it lie idle for 2 to 5 years, and then repeat the rotation.

On the gently sloping valley uplands in the Central Basin, where the Mimosa, Maury, and Mercer soils predominate, and on the well-drained terrace lands, where the Cumberland, Etowah, Sequatchie, and Wolftever soils predominate, the following two rotations are the most common: Corn, corn, wheat, and lespedeza or clover; or corn, wheat or barley, and lespedeza or clover. On the well-drained and fairly well drained bottom lands—that is, on the Huntington, Egam, Ennis, and Lindside soils—corn is generally grown year after year.

According to the United States census data, the amount spent for fertilizers increased from $1,557 in 1879 to $108,053 in 1929, and decreased to $56,614 in 1939. Practically all of the fertilizer was factory-mixed and was purchased individually through local dealers.[4] It is used most extensively for cotton, tobacco, and legumes. A 3–10–3 [5]

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[4] MOOERS, C. A. CONCENTRATED FERTILIZERS. Tenn. Agr. Expt. Sta. Inform. Cir. No. 30. [2 pp.] 1935. [Mimeographed.]

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

mixture for cotton is perhaps the most popular and is applied at the rate of 200 to 250 pounds to the acre; whereas a 5–10–5 mixture is used mostly for tobacco and applied at the rate of 250 to 700 pounds to the acre. In a few instances farmers apply superphosphate to cornland (*14*) at the rate of about 100 pounds to the acre.

The numbers of livestock are given in table 4.

TABLE 4.—*Number and value of livestock in Lincoln County, Tenn., in stated years*

| Livestock | 1880 [1] [2] | 1890 [1] [2] | 1900 [2] [3] | 1910 [4] | | 1920 [5] | | 1930 [6] | | 1940 [7] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Number | Number | Number | Value | Number | Value | Number | Value | Number | Value |
| Horses | 5, 473 | 6, 762 | 6, 560 | 6, 741 | $782, 212 | 6, 732 | $670. 970 | 3, 946 | $240, 374 | 4, 281 | $372, 019 |
| Mules | 3, 852 | 6, 046 | 5, 925 | 6, 415 | 851, 191 | 7, 592 | 1, 202, 986 | 5, 831 | 498, 184 | 5, 760 | 663, 985 |
| Cattle | 14, 099 | 18, 149 | 15, 247 | 18, 056 | 356, 596 | 21, 682 | 992, 840 | 25, 252 | 942, 335 | 30, 197 | 996, 570 |
| Swine | 12, 303 | 46, 977 | 39, 711 | 37, 265 | 177, 684 | 54, 251 | 487, 284 | 29, 029 | 272, 695 | 26, 850 | 153, 083 |
| Sheep | 5, 269 | 11, 701 | 10, 147 | 42, 430 | 157, 926 | 16, 199 | 219, 048 | 23, 139 | 126, 115 | 12, 657 | 68, 236 |
| Goats | ------- | ------- | 1, 467 | 3, 471 | 4, 797 | 6, 278 | 18, 406 | 4, 322 | 7, 893 | ------- | 6, 480 |
| Chickens | 70, 993 | 265, 487 | 136, 798 | [8] 188,817 | [8] 88, 872 | [8] 270,666 | [8] 215, 408 | 202, 715 | 154, 063 | 189, 673 | 91, 043 |
| Bees (hives) | ------- | ------- | 2, 757 | 1, 897 | 4, 308 | 3, 190 | 12, 508 | 2, 771 | 8, 306 | 2. 455 | 5, 646 |

[1] Animals of all ages on June 1, including spring lambs.
[2] Value not reported.
[3] Animals of all ages on June 1.
[4] Animals of all ages on Apr. 15, 1910.
[5] Animals of all ages on Jan. 1.
[6] Animals of all ages on Apr. 1.
[7] Animals on Apr. 1, excluding horses, mules, and cattle under 3 months, swine, goats, and chickens under 4 months, and sheep under 6 months of age.
[8] All poultry.

The number of cattle has increased fairly steadily since 1880, and dairying is the chief livestock enterprise. Price levels and market conditions have been important influences on the shift from beef raising to dairying. Livestock raising is confined for the most part to the Central Basin. Most of the dairy cattle are of the Jersey breed, but some are Guernseys. According to the 1940 census, 489 farms make a specialty of dairying, but a greater part of the dairying is carried on in connection with other agricultural enterprises. In 1929, 3,757,236 gallons of milk were produced and 10,169 cows were milked. In 1939, 5,911,588 gallons of milk were produced and 16,108 cows were milked. Of the milk produced in 1939, 4,123,030 gallons were sold as fluid milk.

Raising beef cattle is secondary to dairying. Most of the beef cattle are grade Hereford and Aberdeen Angus. Beef production is carried on almost entirely in the Central Basin. Most of the animals are sold locally and subsequently shipped to Nashville and other points north and east.

The number of swine has decreased more than one-half since 1920, although it is greater than in 1880. Poland China and Duroc-Jersey are the popular breeds of hogs.

The largest number of sheep was reported in 1910. Since then sheep raising has declined. Hampshires and Southdowns are the predominant breeds. Sheep and wool are marketed principally in Nashville, Tenn.; Cincinnati, Ohio; and Louisville, Ky. A few goats are kept.

During the period 1910 to 1940 the number of work animals decreased about 30 percent. Horses decreased more rapidly than mules. The Percheron is the principal breed of work horse. Practically all of the work animals are raised locally.

Poultry is an important supplementary source of farm income. In 1929, 1,147,313 dozen chicken eggs were produced, of which 790,847 dozen, valued at $233,551, were sold. In the same year 314,662 chickens were raised, of which 98,913, valued at $74,185, were sold. No great change took place in poultry products in 1939, when 1,103,278 dozen eggs were produced and 295,842 chickens were raised. Although some turkeys are raised, chickens probably represent more than 90 percent of the poultry. Poultry is produced both as a specialty and as an adjunct to other types of farming. The census reported 33 poultry farms in the county in 1940, but by far the greater part of the poultry is raised as a sideline on general and other types of farms. Usually two or more carloads of turkeys are marketed cooperatively each fall and shipped to eastern markets. Most of the chickens and eggs are collected with trucks by local buyers and shipped to eastern markets.

According to census figures, the number of farms increased from 2,745 in 1880 to 4,289 in 1940, and the average size of farms decreased from 120.6 acres to 79.9 acres. The proportion of improved land to farm land increased from 52 percent to 64 percent, and the acreage of improved land per farm decreased from 62.9 acres to 51.4 acres. During this same period the population of the county declined slightly.

Most of the increase in number of farms was at the expense of their size, as the total land in farms increased only slightly from 331,911 acres in 1880 to 342,896 acres in 1940, or from 88.3 percent to 92.2 percent of the area of the county. Improved land showed a decided increase, however, from 172,741 acres in 1880 to 220,325 acres in 1940.

In size, the farms range from extremely small—less than 3 acres—to more than 1,000 acres, but the majority—2,236 farms—range between 20 acres and 99 acres. There were 909 farms of less than 20 acres, 1,144 farms over 100 acres, and only 3 farms of 1,000 acres or more. Of the land in farms as given in the 1940 census, 141,185 acres, or about 41 percent of all land in farms, is classified as cropland; 79,140 acres, or 23 percent, as pasture; 69,535 acres, or 20 percent, as woodland (including woodland pasture); and 53,036 acres, or 16 percent, as other land in farms (including pasture that is neither plowable nor wooded).

According to the 1940 census, 1,611 farms were operated by owners, 291 by part owners, 2,383 by tenants, and 4 by managers. Of the 2,383 tenants reported by the census, 187 are classified as cash renters, 39 as share-cash renters, 2,068 as sharecroppers, and 89 as other tenants. Tenancy increased from 36.9 percent in 1880 to 55.6 percent in 1940.

In the valley lands and bottom lands of the Central Basin the tenant usually furnishes the labor, implements, and work animals and receives one-half of all the products. On the hilly land in the Central Basin the tenant furnishes everything except the land and usually receives three-fifths of the crops. On the Highland Rim the systems of tenancy are variable, but probably the most common is the one in which the tenant furnishes the labor, tools, work animals, and seed and receives three-fourths of the cotton crop and two-thirds of the grain crops. The fertilizer is furnished jointly according to the

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ratio of division of crops. In some instances the tenant furnishes everything and receives one-half to three-quarters of all crops; in others, the landlord furnishes everything and the tenant receives only one-third of all crops.

According to the United States census, a total of $133,831 was spent in 1939 for farm labor by 1,034 farms, or 24.1 percent of all farms. The proportion of farms hiring labor and the amount spent for labor has remained comparatively uniform the last 20 years. Local farm labor is moderately plentiful at this time. It consists of both white and Negro residents, and the quality is fair to good. Prevailing wages range from 50 cents to 75 cents a day with board and from 75 cents to $1.25 a day without board.

The average investment per farm increased from $2,007 in 1880 to $3,730 in 1940. During the same time the total number of farms decreased 34 percent in average size. Of the investment in the average farm in 1940, 54.7 percent was in land, 24.8 percent in buildings, 5.7 percent in implements, and 14.8 percent in domestic animals. The value of land and buildings was reported to be $2,970 a farm and $37.15 an acre in 1940. The proportion of the investment in land, buildings, implements, and domestic animals has changed but little in the 60 years prior to 1940.

On the basis of source of farm income, the census of 1930 classified farms as follows: 1,349 cotton, 800 general, 516 self-sufficing, 501 animal-specialty, 226 dairy, 187 cash-grain, 53 crop-specialty, 21 poultry, 2 fruit, 1 truck, and 196 abnormal (part-time, feed lot, livestock dealer, institution, etc.); and 279 were unclassified. Of the 196 abnormal farms, 177 were part-time and 13 were livestock-dealer farms. According to the 1940 census, 1,616 farms derived their major source of income from field crops; 1,564, from farm products used by farm households; 489, from dairy products; 478, from livestock; 33, from poultry and poultry products; 5, from forest products; 3, from horticultural specialties; 2, from vegetables harvested for sale; 2, from fruits and nuts; and 2, from other livestock products.

Most of the cotton farms are on the Highland Rim, and most of the cash-grain, dairy, and animal-specialty farms are in the Central Basin. The general, poultry, and abnormal farms are mainly in the Central Basin, and the crop-specialty and self-sufficing farms are largely on the Highland Rim. In general, farms of limited improvement and equipment are located on the Highland Rim, and the highly improved farms and those carrying good quality livestock are situated in the Central Basin, reflecting the productivity of the soils in these two physiographic sections of the county.

## SOIL SURVEY METHODS AND DEFINITIONS

Soil surveying consists of the examination, classification, and mapping of soils in the field.

The soils are examined systematically in many locations. Test pits are dug, borings are made, and exposures, such as those in road or railroad cuts, gullies, ditches, pits, and other excavations, are studied. Each excavation exposes a series of distinct soil layers or horizons, called collectively the soil profile. Each horizon of the soil, as well as the parent material beneath the soil, is studied in detail and the color, structure, porosity, consistence, texture, and content of organic matter, roots, gravel, and stone are noted. The approximate reaction of the soil is determined by simple tests. Drainage, both internal and external, and other external features, such as stoniness and the relief or lay of the land, are taken into consideration, and the interrelations of the soil and vegetation are studied.

The soils are classified according to their characteristics, both internal and external, with special emphasis upon the features influencing the adaptation of the land for the growing of crop plants, grasses, and trees. On the basis of these characteristics soils are grouped into classification units, the three principal of which are (1) series, (2) type, and (3) phase. Certain areas of land, such as coastal beach or bare rocky mountainsides, that have no true soil, are called (4) miscellaneous land types.

The most important of these groups is the series which includes soils having the same genetic horizons, similar in their important characteristics and arrangement in the soil profile, and developed from a particular type of parent material. Thus the series includes soils having essentially the same color, structure, and other important internal characteristics, the same natural drainage conditions, and the same range in relief. The texture of the upper part of the soil, including that commonly plowed, may vary within a series. The soil series are given names of places or geographic features near which they were first found. Mimosa, Dickson, Baxter, Dellrose, and Huntington are names of important soil series in this county.

Within a soil series are one or more types, defined according to the texture of the upper part of the soil. Thus, the class name of the soil texture, such as sand, loamy sand, sandy loam, loam, silt loam, clay loam, silty clay loam, and clay, is added to the series name to give the complete name of the soil type. For example, Huntington silt loam and Huntington silty clay loam are soil types within the Huntington series. Except for the texture of the surface soil, these types have approximately the same internal and external characteristics. The soil type is the principal unit of mapping, and because of its specific character it usually is the soil unit to which agronomic data are definitely related.

A phase of the soil type is recognized for the separation, within a type, of soils that differ in some minor soil characteristic that may, nevertheless, have an important practical significance. Differences in relief, stoniness, and the degree of accelerated erosion are frequently shown as phases. For example, within the normal range of relief for a soil type certain parts may be adapted to the use of machinery and the growth of cultivated crops and others may not. Even though no important differences may be apparent in the soil itself or in its capability for the growth of native vegetation throughout the range in relief, there may be important differences in respect to the growth of cultivated plants. In such an instance the steeper parts of the soil type may be segregated on the map as a rolling or a hilly phase.

The soil surveyors make a map of the county or area, showing the location of each soil type, phase, complex, and miscellaneous land type, in relation to roads, houses, streams, lakes, and other local cultural and natural features of the landscape.

Texture refers to the relative amounts of clay, silt, and various grades of sand making up the soil mass. Light-textured soils contain much of the coarser separates (sands), and heavy-textured soils contain much clay. Structure refers to the natural arrangement of the soil particles into aggregates, or structural particles or masses. Consistence is a term that has come into rather recent use as regards soil characteristics and refers to such conditions as friability, plasticity, stickiness, hardness, compactness, toughness, and cementation. Permeability and perviousness connote the ease with which water, air, and roots penetrate the soil. Surface soil as used in this report, refers to the lighter textured surface layer, which generally extends to a depth ranging from 6 to 12 inches. The subsoil is the deeper and heavier textured layer, which generally is of uniform color in well-drained soils. The substratum, beneath the subsoil, is characteristically splotched or mottled with two or more colors. Bedrock, as used here, is consolidated rock upon which the substratum rests.

In a practical sense, the degree of acidity may be thought of as the degree of poverty of lime (available calcium carbonate). An alkaline soil in this county is rich in lime, a neutral soil contains a sufficient quantity for any crop commonly grown, and an acid soil is generally low in lime. Reaction[6] refers to the condition of the soil as regards degree of acidity.

Differences in internal and external physical characteristics are reflected in marked differences in land use and management. The most important of these are texture, structure, consistence, quantity and character of organic matter, chemical character (including reaction), moisture conditions, depth of soil, erosion, stoniness, and slope, or lay of the land. These soil characteristics affect land use and management through productivity, workability, and conservability.

Productivity as used here refers to the capacity of the soil to produce crops under prevailing farm practices. The soil may be productive of a crop but not well adapted because of its poor workability, poor conservability, or both.

Workability as used here refers to the ease of tillage, harvesting, or other field operations. Among the characteristics that affect workability are texture, structure, consistence, organic-matter content, stoniness, and slope, or lay of the land.

Conservability as used here refers to the relative ease of maintaining and improving the soil and its productivity and workability. The degree to which the soil responds to management practices is reflected in the conservability.

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[6] The reaction of the soil is its degree of acidity or alkalinity, expressed mathematically as the pH value. A pH value of 7 indicates precise neutrality, higher values alkalinity, and lower values acidity. Terms that refer to reaction and are commonly used in this report are defined by Kellogg (*7, p. 86*) 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 | 7.4–8.0 |
| Strongly alkaline | 8.1–9.0 |
| Very strongly alkaline | 9.1 and higher |

## SOILS

Soil and land conditions have dominantly determined the local differences in the present agriculture of Lincoln County. Although social and economic factors also have been influential, it is apparent that soil and land conditions have largely affected the prevailing social and economic conditions.

For example, soil and land conditions characterizing the bottom lands of the Central Basin suit them ideally for the production of corn, which, together with livestock raising and dairying, dominates the agriculture on these lands. The dominant soils of the comparatively smooth valley lands of the Central Basin are inherently productive and have a wide crop adaptation, and the prevailing land features are favorable; consequently a widely diversified agriculture, including all the crops grown except cotton, has become established here (pl. 1, *A* and *B*). Practically all of the clover, alfalfa, and tobacco, as well as most of the corn, are produced on these soils. Furthermore, the dairying and the raising of beef cattle are carried on mainly on these soils.

The bottom lands and adjacent smooth terraces and uplands, being productive and easily cultivated, attracted the early settlers. Large farms were established, and the larger farms of today are on these lands. Citizens of the more progressive type were attracted in the first place, and the productive soils and favorable land features provided opportunity for further development; consequently the better economic and social conditions of the county prevail there.

As compared with the Central Basin, soils in that part of the county included in the Highland Rim are much less productive of grains, hays, and pastures. Associated with these differences in general productivity of the soils in the two areas are marked differences in the agriculture. In contrast with the highly diversified agriculture of the valley lands in the Central Basin, the agriculture of the Highland Rim lacks diversification; instead, it centers around the production of one crop—cotton (pl. 2, *A*). This crop has been, and still is, the principal source of cash income on farms on the Highland Rim. Enough livestock and poultry products are generally produced to supply the needs of the home, but comparatively small quantities of such products are sold. Capital investments per farm generally are considerably less on the Highland Rim than in the Central Basin.

Agriculture in Lincoln County is evolving from a simple system toward a complex one. This trend is at least partly an expression of the effort to properly adjust the agriculture to the soils, which are even more diverse in character than the present types of agriculture.

The soils differ widely in color, texture, structure, consistence, reaction, drainage, hardpan development, relief, stoniness, erosion, depth to bedrock, content of organic matter, and fertility—all of which bear close relationship to productivity, workability, and conservability.

The soils range from slightly acid to very strongly acid in reaction. In general, the soils of the bottom lands are medium acid, those of the uplands of the Central Basin are medium to strongly acid, and those of the uplands of the Highland Rim are strongly to very strongly acid. In content of organic matter the soils range from fairly high to very low. The color of the surface soils ranges from very light gray

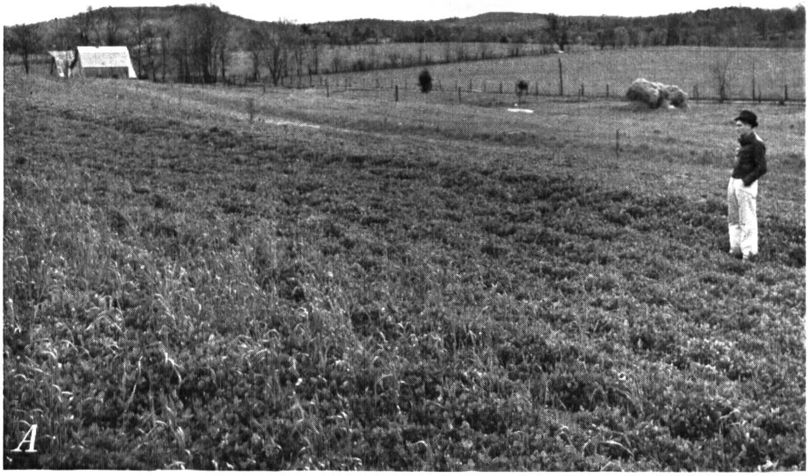
(Guthrie silt loam) through gray and yellow to red (Dewey silt loam), and the color of the subsoil has an even greater range. The consistence is loose to sticky and plastic. The texture is loamy sand, silt loam, silty clay loam, or silty clay. Approximately three-fourths of the area of the county consists of silt loams. The rest is composed of loams, silty clay loams, loamy fine sands, and very fine sandy loams. Imperfectly drained soils occupy slightly more than 6 percent of the county and poorly drained soils nearly 4 percent. Approximately 20 percent of the soils have a hardpan, and about 25 percent are shallow over bedrock, that is, bedrock lies within 3 feet of the surface in most places.

The proportions of the land that are unsuited for cultivated crops, largely because of strong relief, stoniness, and erosion, are estimated at 12 percent, 19 percent, and 1.5 percent, respectively. About 42 percent of the land is practically nonarable because of some one or some combination of these and other depreciative features. About 22 percent of the land considered suitable for cultivation is characterized by one or more of these conditions in more moderate degrees. About 15 percent of the land is nearly level, 40 percent is practically free of stone, and 18 percent is injured little or none by erosion. Over 37 percent of the total area of the county has a gradient in excess of 15 percent.

The well-developed soils, which occur only on the smooth uplands and stream terraces—having developed in an environment of moderately high temperature, heavy rainfall, and hardwood forest cover—never have possessed the natural fertility characteristic of soils of the western prairies. On the other hand, they are more fertile than comparable soils farther south and southeast, where the temperature is higher and leaching has been more severe and continuous. Even the soils of the uplands in Lincoln County, however, differ from each other in the virgin state. The character of the materials from which the soils are developed is strongly reflected in the degree of natural fertility as well as in other characteristics. During the history of cultivation, erosion and other artificially stimulated processes of impoverishment have intensified such variations in fertility and productivity.

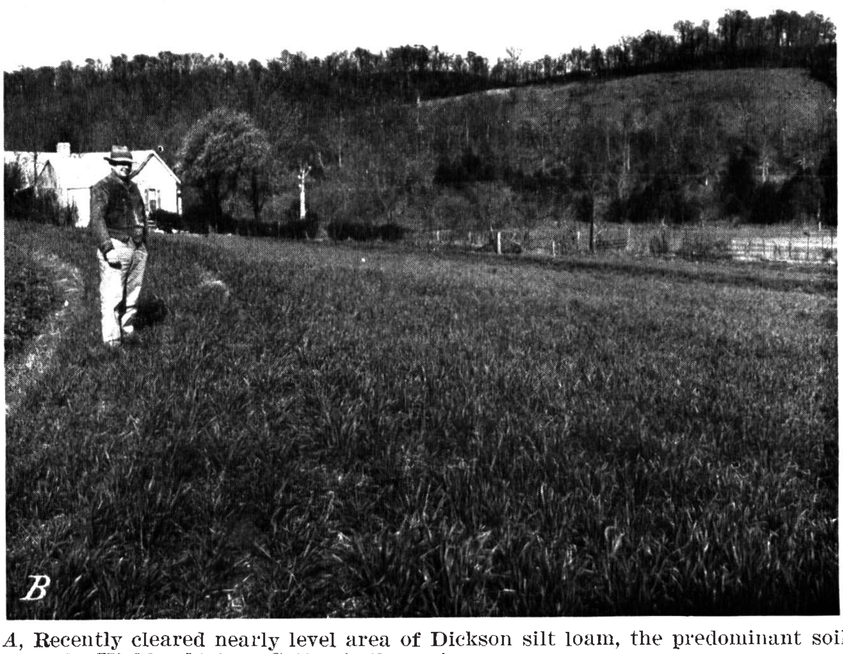
It is estimated that about 58 percent of the land area is suitable for tilled crops, about 40 percent is poorly suited to crops but is suitable for pasture, and a little over 2 percent is unsuitable for either of these purposes but is suitable for forestry. It is estimated that about 6 percent of that part of the land suited to cultivation is relatively high in natural fertility and productivity, about 50 percent is medium, and about 44 percent is relatively low.

The soils of the Highland Rim have developed largely from materials weathered from highly siliceous limestones, whereas the soils of the Central Basin have developed from materials weathered from more or less pure limestones. Most of the soils of the uplands, not only on the Highland Rim but also in the Central Basin, are deficient in lime, since practically all of the material was leached during the processes of weathering and soil development. Even under virgin conditions the organic-matter content was not high, and on the cultivated soils much of the organic matter has been oxidized, lost in drainage waters, or otherwise dissipated. Both the quantity and the



*A*, Typical valley of the Central Basin. Such valleys have a wide variety of soils and a well-established diversified agriculture. Mimosa silt loam, undulating phase, and Lindside silt loam are in the foreground; and rolling stony land (Mimosa soil material), forested, and Dellrose cherty silt loam are in the background.

*B*, Typical soil pattern in the Central Basin. Maury loam, used for general field crops, in the field in the foreground; Lindside silt loam used for corn, hay, and pasturage, in the small stream bottom just below the field; Mimosa stony silt loam in the cleared sloping area on which cattle are grazing; Colbert stony silty clay loam, hilly phase, on the sparsely wooded hill to the left and the wooded slope immediately above the cleared Mimosa soil; Dellrose cherty silt loam on the steep ridge slope in the background; Frankstown cherity silt loam, shallow phase, on the very top of the ridge.



*A*, Recently cleared nearly level area of Dickson silt loam, the predominant soil on the Highland Rim. Cotton is the main crop.

*B*, Another common soil pattern in the Central Basin; Cumberland silt loam, a productive soil in the immediate foreground; Lindside silt loam in the stream bottom just below the field; rolling stony land (Mimosa soil material) in the lower part of the wooded area where cedar trees are numerous; Colbert stony silty clay loam, hilly phase, in the upper part; Dellrose cherty silt loam in the cleared field on the ridge slope above the woodland.

character of this constituent differ widely under virgin conditions and much more so after the land is cultivated.

The bottom lands in general are well supplied with lime, organic matter, and mineral plant nutrients.

Good tilth is easily maintained except in those areas of the silty clay loams that are subject to puddling, surface baking, and cloddy conditions when tilled unwisely. Such soils are exacting as regards moisture conditions for tillage. With comparatively few exceptions, such refractory surface soils result from accelerated erosion.

As brought out previously, the agriculture on the Highland Rim is centered largely on the production of cotton, whereas in the Central Basin a widely diversified agriculture prevails, where livestock raising and dairying are combined with the growing of several crops. Not only do the prevailing farms on the Highland Rim average considerably smaller, but the necessary farm equipment, improvements, and numbers of livestock kept are considerably less than in the Central Basin. Yields of the crops grown both on the Highland Rim and in the Central Basin are much lower on the Highland Rim. The tenant on the Highland Rim generally receives a larger proportion of the crops produced than does the tenant on the more productive land in the Central Basin.

## GROUPING OF SOIL SERIES AND LAND TYPES ACCORDING TO TOPOGRAPHY

As brought out in the preceding paragraphs, the soils of the county differ widely in a great number of characteristics. On the basis of these characteristics, the soils have been classified into 26 series and 6 miscellaneous land types. Some of these series are of comparatively little importance because the soils are of small extent, unfavorable use adaptation, or both. In order to use the soil survey to the greatest advantage, it is necessary to become familiar with the series of soils, particularly the main ones. Perhaps this can be done most readily by associating the soils of each series with the position they occupy on the broad landscape; in other words, by associating the soils with prominent physical land features, namely, (1) uplands, (2) colluvial lands, (3) terraces, and (4) bottom lands. By uplands is meant those lands lying above the stream bottoms, stream terraces, and accumulations of colluvium and local wash. Colluvial lands are those areas where soil material has accumulated at the foot of slopes and in depressions. Terraces and bottom lands are water made. The bottom lands comprise areas along the streams that are subject to flooding, whereas the terraces are benchlike areas that border the bottom lands but occupy higher positions and are not subject to flooding.

Table 5 sets forth the associations of the soil series with these land features and gives the chief characteristics of the soils of each series.

### SOILS OF THE UPLANDS

The soils of the uplands are classified into ten series, namely, Mimosa, Maury, Mercer, Colbert, Dewey, Baxter, Dickson, Lawrence, Frankstown, and Dellrose. The soils of all these series have developed from material that is residual from the weathering of various grades and kinds of limestones, with the exception of the Dellrose

TABLE 5.—*Characteristics of soil*

SOILS OF

| Series | Physiographic position | Parent material | Dominant relief | Drainage | |
|---|---|---|---|---|---|
| | | | | External | Internal |
| Mimosa | Central Basin | Residual material from weathering of high-grade slightly phosphatic limestone. | Undulating to rolling. | Good | Fair |
| Maury | Central Basin | Residual material from weathering of phosphatic limestone. | do | do | Good |
| Mercer | Central Basin | Residual material from weathering of moderately clayey, slightly cherty limestone. | do | do | Fair |
| Colbert | Central Basin | Residual material from weathering of highly clayey limestone. | Undulating to hilly. | do | Slow |
| Dewey | Highland Rim | Residual material from weathering of high-grade limestone. | Undulating to rolling. | do | Good |
| Baxter | Highland Rim | Residual material from weathering of cherty limestone. | do | do | do |
| Dickson | Highland Rim | do | do | do | Fair |
| Lawrence | Highland Rim | do | Nearly level | Slow | Poor |
| Frankstown | Tops of high ridges and hills in Central Basin. | do | Rolling | Good | Good |
| Dellrose | Highland Rim escarpment. | Partly residual material from chert-free limestones and partly cherty colluvium from Baxter, Frankstown, and Dickson soils. | Steep | Excessive | do |

SOILS OF THE

| | | | | | |
|---|---|---|---|---|---|
| Greendale | Central Basin | Local wash derived chiefly from Dellrose, Mimosa, Maury, and Mercer soils. | Gently sloping | Good | Fair |
| Abernathy | Central Basin | Local wash derived chiefly from Dewey and Baxter soils. | Depressed | Poor | Good |
| Ooltewah | Central Basin | Local wash derived chiefly from Baxter soils. | do | do | Intermediate |
| Guthrie | Central Basin | Local wash derived chiefly from Dickson and Baxter soils. | do | do | Poor |
| Burgin | Central Basin | Local wash derived chiefly from stony land types, Colbert, Mercer, Maury, and Mimosa soils. | Nearly level | Slow | Slow |

See footnote at end of table.

*series in Lincoln County, Tenn.*

THE UPLANDS

| Surface soil (A horizon) | | | Subsoil (B horizon) | | | Remarks |
|---|---|---|---|---|---|---|
| Color | Consistence | Approximate thickness[1] | Color | Consistence | Approximate thickness[1] | |
| | | *In.* | | | *In.* | |
| Grayish brown | Friable | 10 | Brownish yellow | Moderately sticky and plastic. | 15 | Medium to high productivity. A few limestone outcrops. |
| Light brown | Mellow | 10 | Reddish brown | Firm but friable. | 20 | High in phosphorus. High in productivity. |
| Brownish gray | do | 10 | Brownish yellow | Moderately sticky and plastic. | 20 | Medium productivity. |
| Grayish brown | Friable | 5 | Yellow, mottled with gray. | Compact, sticky, and plastic. | 20 | Stony. Shallow over limestone. Low productivity. |
| Light brown | Mellow | 12 | Brownish red | Firm but friable. | 40 | High productivity. |
| Grayish brown | do | 9 | Light brownish red. | do | 24 | Medium productivity. Cherty in places. |
| Light gray | do | 7 | Brownish yellow | Friable | 20 | Hardpan below subsoil. Medium to low productivity. |
| do | do | 10 | Grayish yellow, mottled. | Moderately compact. | 12 | Compact layer below subsoil. Low productivity. |
| Dark gray | Loose | 14 | Brownish yellow | Friable | 16 | Highly cherty. Medium to low productivity. |
| Represents a condition on steep slopes where the surface layer, 6 to 30 inches thick, consists of grayish-brown cherty material that has rolled down from above, and the subsoil consists of brownish-yellow chert-free silty clay that is residual from the weathering of the underlying limestone. | | | | | | Cherty. Medium productivity. |

COLLUVIAL LANDS

| | | | | | | |
|---|---|---|---|---|---|---|
| Grayish brown | Mellow | 13 | Yellowish brown. | Friable | 17 | High to medium productivity. |
| Young soil. Brown or reddish brown to a depth of 30 or more inches. Friable. | | | | | | High productivity. Subject to flooding. |
| Young soil. Light brown or reddish brown to depth between 8 and 16 inches. Friable. Material below is highly mottled, generally friable. | | | | | | Medium productivity. Subject to flooding. |
| Very light gray or almost white. | Friable | 12 | Mottled gray | Compact | 18 | Low productivity. |
| Dark gray to nearly black. | Moderately friable. | 12 | do | Sticky and plastic. | 16 | Medium productivity. |

TABLE 5.—*Characteristics of soil series in*

SOILS OF THE

| Series | Physiographic position | Parent material | Dominant relief | Drainage | |
|---|---|---|---|---|---|
| | | | | External | Internal |
| Cumberland | Central Basin | Alluvial material derived chiefly from upland underlain by limestone (generally low in chert). | Undulating to rolling. | Good | Good |
| Etowah | Central Basin | do | Gently sloping to nearly level. | do | do |
| Wolftever | Central Basin | do | Nearly level | Fair | Fair |
| Sequatchie | Central Basin | Alluvial material derived chiefly from upland terraces underlain by sandstone and shale. | Nearly level to gently sloping. | Good | Good |
| Humphreys | Highland Rim | Alluvial material derived chiefly from upland terraces underlain by limestone (high in chert). | do | do | do |
| Robertsville | Highland Rim | do | Nearly level | Poor | Poor |

SOILS OF THE

| Series | Physiographic position | Parent material | Dominant relief | External drainage | Internal drainage |
|---|---|---|---|---|---|
| Huntington | Central Basin | Alluvial material derived chiefly from upland underlain by limestone (generally low in chert). | Nearly level | Slow | Good |
| Egam | Central Basin | do | do | do | Fair |
| Lindside | Central Basin | do | do | do | Intermediate |
| Ennis | Highland Rim | Alluvial material derived chiefly from upland underlain by limestone (high in chert). | do | do | Good |
| Melvin | Highland Rim | do | do | do | Poor |

[1] Thickness where no appreciable accelerated erosion has taken place.

soils, which have developed partly from residual material and partly from colluvial material. All the soils of the uplands have been leached. They are all acid in reaction, although they differ somewhat in degree of acidity. All except the Dellrose have moderately well to very well developed soil layers. The soils of the uplands, however, differ greatly in a number of respects.

As indicated in table 5, the soils of most of the series occur in fairly distinctive topographic positions. For example, the Mimosa, Maury, Mercer, and Colbert soils lie on the gentle valley slopes in the Central Basin; the Frankstown soils occupy the tops of ridges and knobs in the Central Basin along the border of the Highland Rim escarpment; the Dellrose soils lie chiefly on the slopes below the Frankstown soils; and the Lawrence, Dickson, Baxter, and Dewey soils occur on the Highland Rim, where the Dickson soils predominate.

*Lincoln County, Tenn.*—Continued

TERRACES

| Surface soil (A horizon) | | | Subsoil (B horizon) | | | Remarks |
|---|---|---|---|---|---|---|
| Color | Consistence | Approximate thickness [1] | Color | Consistence | Approximate thickness [1] | |
| | | *In.* | | | *In.* | |
| Brown | Mellow | 10 | Brownish red | Firm but friable. | 30 | High productivity. |
| Grayish brown | do | 12 | Yellowish brown. | do | 24 | Do. |
| do | do | 10 | Brownish yellow, mottled. | Moderately compact. | 10 | Compact below subsoil. Medium productivity. |
| Light brown | Friable | 10 | Yellowish brown. | Friable | 20 | Medium productivity. |
| do | do | 10 | Grayish brown | do | 25 | Medium productivity. Cherty in many places. |
| Grayish yellow | do | 8 | Yellowish gray, mottled. | Firm | 14 | Compact layer below subsoil in many places. Low productivity. |

BOTTOM LANDS

| | |
|---|---|
| Young soil. Brown mellow silt loam to a depth of about 30 inches | High productivity. |
| Young soil. Brown friable silt loam to a depth between 15 and 24 inches, underlain by light-brown compact layer; generally mottled below depth of 30 inches. | Do. |
| Young soil. Brown mellow silt loam to a depth of about 15 inches, below which the material is mottled with gray and yellow. | Medium productivity. |
| Young soil. Friable silt loam to 30 or more inches; upper part is generally light brown and lower part is generally yellowish brown. Cherty in many places. | Do. |
| Young soil. Light gray mottled with yellow and blue | Generally too wet for crop production. |

The surface soil of the Maury and Dewey soils is light brown; that of the Mimosa, Colbert, Frankstown, Baxter, and Dellrose is light grayish brown; that of the Mercer and Dickson is brownish gray or light gray; and that of the Lawrence is dominantly very light gray.

The subsoil of the Maury series is reddish brown; that of the Dewey and Baxter is brownish red; that of the Mimosa, Frankstown, Mercer, Colbert, Dellrose, and Dickson is brownish yellow or yellow; and that of the Lawrence is mottled grayish yellow. In a few small areas the Maury soils have a small quantity of stone on the surface; and some members of the Mimosa series and all members of the Colbert series are characterized by the presence of stone on the surface, shallowness over bedrock, and a few bedrock outcrops. Chert fragments generally are present in the Dellrose, Frankstown, Baxter, and

Dickson soils. In general, the Dellrose soils are highest in chert content, the Frankstown soils rank a close second, the Baxter soils third, and the Dickson soils fourth.

The Mimosa soils, which occur only in the Central Basin, are underlain by a high-grade though somewhat clayey limestone containing a few phosphatic layers. In uneroded fields the surface soil is grayish-brown friable silt loam to a depth of about 10 inches. The underlying subsoil, extending to a depth of 20 to 30 inches, is light brownish-yellow moderately sticky plastic silty clay loam. The substratum underlying the subsoil generally is very light brownish-yellow massive sticky and plastic silty clay, streaked and splotched with brown, yellow, and gray. This layer, having a wide range in thickness—from less than 3 feet to more than 8 feet—rests directly on an uneven bedrock floor of horizontally bedded limestone. The Mimosa soils in general are highly productive. They are used chiefly for the production of the general field crops. The relief is gentle enough to allow the use of modern farm equipment.

The Maury soils include the brown well-drained highly productive soils in the Central Basin. They are noted for their high content of phosphorus. They are underlain by high-grade limestone containing phosphatic material and a small quantity of sand. In uneroded areas the surface soil is light-brown mellow loam about 10 inches thick. The subsoil, extending to a depth of about 30 inches, consists of light reddish-brown firm but friable silty clay loam. The underlying substratum is moderately compact silty clay, yellowish brown splotched with yellow and gray. Depth to bedrock ranges from about 3 to 10 feet. The Maury soils are very productive. They are used for the production of general field crops, including corn, small grains, and hay. The relief is moderately gentle, thereby allowing the use of modern farm equipment. On the steeper slopes these soils are rather susceptible to the accelerated erosion.

The Mercer soils resemble the Mimosa soils, but they are lighter in color, lower in content of phosphorus, and less productive. The Mercer soils are underlain by moderately clayey limestone, which in places also contains some chert or shale. In uneroded areas the surface soil consists of brownish-gray or light grayish-brown mellow silt loam about 10 inches thick. The subsoil, extending to a depth of about 30 inches, is light brownish-yellow moderately sticky and plastic silty clay loam or silty clay. The underlying parent material is grayish-yellow sticky plastic silty clay, mottled with gray, brown, and yellow. In most places this material rests on bedrock at a depth of 3 to 8 feet. These soils are susceptible to erosion, particularly on the steeper slopes, and have been eroded in many places. They appear to erode more easily than the associated soils. They rank only medium in productivity. They are used chiefly for growing general field crops. The relief is sufficiently gentle to allow the use of all types of farm machinery.

The Colbert soils, which also occur in the Central Basin, have developed over highly clayey limestones. They are characterized by shallowness over limestone, the presence of slabs and fragments of limestone throughout the soil mass, and an extremely heavy textured subsoil. They have moderately friable silty clay loam surface soil, from 4 to 6 inches thick, which ranges in color from dark gray to brownish gray. The subsoil is olive-yellow or brownish-yellow compact, tough, sticky, plastic silty clay splotched with gray, yellow, and brown. In most places the depth to bedrock ranges from 12 to 36 inches, but rock outcrops are fairly common. Fragments of limestone are generally numerous throughout the soil mass. The relief is undulating to hilly; hence external drainage is good. Internal drainage, on the other hand, is slow and imperfect, owing to the heavy consistence of the subsoil. The Colbert soils, particularly those of the rolling and hilly phases, are difficult to work and difficult to conserve, and therefore they are poorly suited to crop production. On the other hand, they are fairly well suited to pasture, for which they are chiefly used.

In contrast with the soils of the Mimosa, Maury, Mercer, and Colbert series, all in the Central Basin, the Dewey soils lie on the highest parts of the Highland Rim, near the Cumberland Plateau escarpment. The Dewey soils are underlain by high-grade limestone. In uneroded areas the surface soil is grayish-brown mellow silt loam extending to a depth of about 12 inches. The subsoil, extending to a depth of about 50 inches, is brownish-red firm but friable silty clay loam. The underlying parent soil material is light brownish-red or brownish-yellow firm but friable heavy silty clay loam splotched with gray, yellow, and brown. Bedrock lies from a few to many feet below the surface. The Dewey soils rank high in productivity. Field crops common to the locality are grown. The relief is gentle enough to allow the use of modern farm equipment. The soils are susceptible to erosion.

The Baxter soils occupy the Highland Rim and are underlain by medium-grade cherty limestone. The surface soil consists of grayish-brown mellow silt loam about 9 inches thick. The subsoil, extending to a depth of about 34 inches, is light brownish-red firm but friable silty clay loam. The underlying parent soil material, which extends to a depth of about 6 feet, is brownish-red firm silty clay that is moderately plastic when wet. Depth to bedrock is generally more than 6 feet. In many places chert fragments in considerable quantity are scattered over the surface and throughout the soil. The Baxter soils, which are used chiefly for the production of the general farm crops, rank only medium in natural productivity. Their productivity and suitability for crop production vary somewhat according to the degree of slope and the quantity and size of chert fragments. The relief is undulating to rolling. The soils are moderately susceptible to accelerated erosion.

The Dickson soils are underlain by medium-grade cherty limestone. They occur only on the Highland Rim and are characterized by a smooth surface, a light-colored surface soil, a yellow subsoil, and a conspicuous hardpan just below the subsoil. The 7-inch surface layer is light-gray mellow silt loam. The subsoil, extending to a depth of about 27 inches, is light brownish-yellow friable silty clay loam. The underlying substratum, extending to a depth between 36 and 50 inches, is grayish-brown silty clay loam mottled with gray, brown, and yellow and is firmly compact or cemented. It is called a hardpan. This layer is sufficiently impervious to remain nearly dry even while free or excess water is present in the layer immediately above. The underlying parent material is firm light silty clay loam that is chiefly light brownish red mottled with gray, yellow, and brown. The bedrock generally lies 5 or more feet below the surface. The soils are low in natural fertility and are comparatively low in productivity. The cultivated areas are devoted largely to the production of cotton and corn. The gentle relief offers no problem to the extensive use of farm equipment, but the soils are rather susceptible to erosion, particularly the more sloping areas.

The Lawrence soils are associated with the Dickson soils and, like them, are underlain by siliceous limestone. They differ from the Dickson soils chiefly in being imperfectly drained. The surface layer, about 10 inches thick, is light-gray or grayish-yellow mellow silt loam faintly splotched with yellow, brown, and gray. The subsoil, extending to a depth of about 24 inches, is grayish-yellow moderately friable silty clay loam containing a few splotches of yellow, brown, and gray. Below this and extending to a depth of about 40 inches is a compact slowly permeable layer consisting of silty clay highly splotched and streaked with yellow, brown, and gray. These soils occupy nearly level or depressed areas. They are considerably less productive than the associated Dickson soils.

The Frankstown soils are characterized by a large quantity of chert fragments, some of which are large and blocky, which interfere greatly with cultivation. They are underlain by a highly siliceous limestone, the rock that caps many of the ridges extending out from the Highland Rim and most of the high knolls, hills, and ridges in the Central Basin. The surface soil, about 12 inches thick, is dark-gray mellow silt loam. The subsoil, extending to a depth of about 3 feet, is brownish-yellow friable or brittle silty clay loam. The underlying parent material is light brownish-yellow friable silty clay loam. The depth to bedrock ranges from 3 to 9 feet. These soils occupy the tops of ridges and knobs. They are medium to low in productivity.

The Dellrose soils are on the Highland Rim escarpment and on steep slopes of associated ridges and knobs. The surface layer of these soils consists chiefly of cherty material that has rolled or otherwise moved down from the Frankstown, Baxter, and Dickson soils above. It consists of grayish-brown cherty silt loam, averaging about 15 inches in thickness but ranging from 6 to 30 inches. The subsoil, on the other hand, is material that is residual from the weathering of fairly high grade limestone; it is brownish-yellow moderately sticky and plastic silty clay loam or silty clay ranging from 20 to 40 inches in thickness. The lower part is generally mottled. The material below this is mottled yellow or mottled grayish-yellow heavy sticky and plastic silty clay or silty clay loam. Depth to bedrock ranges from about 4 feet to probably more than 30 feet. Owing largely to some seepage from the level-bedded underlying limestone, the Dellrose soils are moderately fertile. They are well drained and are also surprisingly resistant to erosion. Because of the steepness of the slopes and the abundance of chert fragments, however, they are difficult to work.

### SOILS OF THE COLLUVIAL LANDS

The so-called colluvial lands might be more properly designated as local alluvium. They are in reality a combination of local alluvium and colluvium that has accumulated at the foot of slopes, particularly at the foot of the longer slopes on which erosion has been active. The soils on such accumulations are classified into five series, namely, Greendale, Abernathy, Ooltewah, Guthrie, and Burgin.

The Greendale soils occupy the foot of slopes or terracelike positions in the Central Basin, and have developed from local wash from Dellrose, Mimosa, Maury, and Mercer soils. The surface soil, which ranges from about 8 to 18 inches in thickness, is gray-brown friable silt loam. Reaching to a depth of about 30 inches, the subsoil consists of yellowish-brown friable light silty clay loam. The underlying substratum extends to a depth of 4 to 15 feet or more. It is mottled yellow or mottled brownish-yellow compact silty clay loam, moderately sticky and moderately plastic when wet. The Greendale soils rank medium to high in productivity. They are used chiefly for the production of grains and hay. The relief is gentle, thus allowing the use of modern farm machinery. Only slightly susceptible to erosion, the soil can be conserved without difficulty.

The Abernathy soils occupy depressions and consist chiefly of materials washed from the associated Dewey and Baxter soils. The Abernathy soils are well drained. The 15-inch surface soil is brown mellow silt loam, and the underlying subsoil, extending to a depth of more than 30 inches, is yellowish-brown friable heavy silt loam. The fertility and productivity are high.

The Ooltewah soils differ from the Abernathy soils chiefly in being less well drained. Like the Abernathy soils, the Ooltewah soils lie in depressions and consist of local wash derived from the surrounding soils. In Lincoln County the Ooltewah soils occur chiefly in association with the Baxter soils. They are intermediate in drainage. The surface soil consists of light-brown mellow silt loam, ranging from 8 to 16 inches in thickness. The underlying subsoil is reddish-brown to grayish-brown light silty clay loam, mottled or splotched with gray and brown. In most places, at a depth of 24 to 30 inches the material is moderately compact. The Ooltewah soils rank only medium in productivity.

The Guthrie soils are in shallow depressions or flat areas, in association with the Baxter, Dickson, and Lawrence soils. The Guthrie soils are poorly drained. The 12-inch surface layer is very light gray or almost white floury silt loam. The subsoil, extending to a depth of about 30 inches, is heavy and compact silty clay or silty clay loam, profusely splotched with gray, yellow, and light brown. The Guthrie soils are low in productivity.

The Burgin soils occur only in the Central Basin, and they are easily distinguished by their dark (nearly black) color, heavy texture, and tough, sticky consistence. They consist of partly water-laid and partly residual material at the foot of slopes, on terraces, or on stream bottoms. Some of the areas are subject to overflow. The character of the soils, however, seems to be directly associated with the character of the soils and rocks of the adjoining upland—heavy-textured soils and argillaceous limestones. Drainage is imperfect. These soils have a dark-gray or nearly black silty clay loam surface soil, about 12 inches thick, underlain by bluish-gray or light-gray sticky and plastic silty clay, which extends to a depth of 2 to 3 feet. Although these soils are inherently fertile, productivity is limited chiefly by poor drainage. Corn and hay are grown to some extent, but artificial drainage is necessary for satisfactory yields.

### SOILS OF THE TERRACES

The soils of the terraces are classified into six series, namely, Cumberland, Etowah, Robertsville, Wolftever, Humphreys, and Sequatchie. The parent material of the first five consists of general alluvium washed from the uplands underlain by limestones, and the parent material of the Sequatchie soils consists of alluvium washed chiefly from the uplands underlain by sandstone and shale.

The Cumberland soils, known locally as red lands, occur on old high terraces. They are well drained. Where uneroded, the 10-inch surface layer is brown mellow silt loam. The subsoil is brownish-red to yellowish-brown firm but friable silty clay loam, which extends to a depth of about 36 inches. This in turn is underlain by brownish-red crumbly silty clay loam to various depths. The depth of the terrace deposit ranges from about 5 to 15 feet. A characteristic feature is the presence in the subsoil and substratum of brown and black soft buckshot-sized concretions. The soils are fertile and productive and are used for the production of all the general farm crops. Although the relief is gentle, the soils are susceptible to erosion.

The Etowah soils are developed on the younger and lower terraces, frequently referred to locally as second and third bottoms. They are well drained. The surface layer, about 12 inches thick, is grayish-brown mellow silt loam. The subsoil, extending to a depth of about 3 feet, consists of yellowish-brown or brownish-yellow firm but friable silty clay loam. The material beneath the subsoil is variable. It ranges in texture from silty clay to fine sandy clay, and in many places it contains thin layers of gravel. In most places this material is mottled with gray and yellow. The Etowah soils are comparatively productive. The crops commonly grown are corn, hay, cotton, and small grains. The relief is gentle, the soil is easily worked, and erosion can be readily controlled.

The Wolftever soils are associated with the Etowah soils on low terraces. The 10-inch surface layer is gray-brown mellow to friable silt loam. The subsoil, extending to a depth of about 20 inches, is brownish-yellow tight, compact, and slowly pervious silty clay loam. The underlying material is chiefly brownish yellow, but it is streaked and splotched with gray and rusty brown. Productivity is about medium. These soils occupy nearly level areas and have slow surface drainage.

In contrast to the Cumberland, Etowah, and Wolftever soils, which occur in the Central Basin, the Humphreys soils occur chiefly on the Highland Rim, where they occupy nearly level or gently sloping areas on second and third bottoms. The parent material has been washed from soils underlain by cherty limestones. The surface foot of soil consists of light-brown friable silt loam. The subsoil, extending to a depth of about 3 feet, is light-brown or gray-brown weakly compact but friable light silty clay loam. In places a few thin beds of fine chert gravel are present at a depth of 2 or more feet. These soils are about medium in productivity.

The Robertsville soils are poorly to intermediately drained and, like the Humphreys soils, occur chiefly along streams on the Highland Rim. The surface layer, about 8 inches thick, is grayish-yellow friable silt loam. The subsoil is yellowish-gray firm silty clay loam, which extends to a depth of about 2 feet. The underlying substratum, extending to a depth of 4 feet or more, is mottled gray heavy silt loam or silty clay. The Robertsville soils occupy nearly level areas having slow surface drainage. These soils are low in productivity.

The Sequatchie soils occur chiefly on low terraces in the Central Basin and are characterized by their sandy texture. Unlike the other soils on the terraces, which have developed from material washed chiefly from the uplands underlain by limestone, the Sequatchie soils have developed from material the greater part of which is thought to have been washed from the uplands underlain by sandstone and shale. Most areas of these soils occupy the inside bends of the larger streams. The surface layer, about 10 inches thick, is light-brown mellow to friable very fine sandy loam or loamy fine sand. The subsoil, extending to a depth of about 30 inches, is yellowish-brown friable heavy fine sandy loam. The Sequatchie soils rank medium in productivity.

### SOILS OF THE BOTTOM LANDS

The soils of the bottom lands are classified into five series and one miscellaneous separation, namely, the Huntington, Egam, Lindside, Melvin, and Ennis series, and alluvial soils, undifferentiated. The series are differentiated largely on the basis of differences in (1) character of the alluvial material, which is closely related to its source in the uplands, and (2) drainage. The Huntington, Egam, and Ennis soils are well-drained brown soils composed of alluvium washed from the uplands underlain by limestones. The materials of the Huntington and Egam soils had their origin chiefly in high-grade limestones, whereas the materials of the Ennis soils originated from cherty limestones of the Highland Rim. The Ennis soils differ from the Huntington and Egam in their lighter brown color and in generally containing chert fragments. The Egam soils differ from the Huntington in having a compact layer at a depth of about 20 inches. The Lindside soils are intermediate in drainage between the poorly drained Melvin soils and the well-drained Huntington and Ennis soils. It happens that practically all of the Lindside soils occur in the Central Basin and are similar to the Huntington as regards character of material. The Melvin soils are poorly drained. In contrast with the Lindside soils, nearly all of the Melvin soils are mapped on the Highland Rim and resemble the Ennis soils as regards character of material. All the soils of the bottom lands are subject to flooding.

### MISCELLANEOUS LAND TYPES

As explained elsewhere in this report, it becomes necessary under certain conditions to recognize certain land conditions as units of mapping. One of these, alluvial soils, undifferentiated, includes the bottom lands that are extremely variable as regards character of material and local differences in drainage and texture. This separation includes small areas of Humphreys, Lindside, Melvin, and Ennis soils, cherty local wash, and gravelly riverwash that are too intricately associated to justify separate delineation. The soils on most of the areas are imperfectly or poorly drained and in many places

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are excessively cherty. In general, areas mapped as alluvial soils, undifferentiated, are not satisfactory for crop use.

Four of the miscellaneous land types include land characterized by many outcrops of limestone. Such outcrops ordinarily are sufficiently numerous to prevent the feasible tillage of the land, even if other features of the land are favorable. Smooth stony land (Mimosa soil material), rolling stony land (Mimosa soil material), and rough stony land (Mimosa soil material) are differentiated chiefly on the basis of differences in the lay of the land. The separation termed limestone outcrop includes the areas where much or most of the surface consists of bare rock.

The remaining miscellaneous land type, rough gullied land (Mimosa soil material), includes that land characterized by a close network of gullies. Erosion is so advanced that the owner ordinarily cannot afford to reclaim the land except through very slow processes.

## GROUPING OF SOILS ACCORDING TO RELATIVE PHYSICAL SUITABILITY FOR AGRICULTURAL USES[7]

In order that each of the units of mapping (soil types and phases) might have significance to agriculture, all observable physical characteristics significant to soil use and management, internal and external, were considered in the basis of the classification. On this basis the soils of Lincoln County have been classified into 60 soil units—soil types, phases, and miscellaneous land types—and charted on the accompanying map, as a record of the geographic distribution and areal extent of each soil. The soils differ widely in physical characteristics, and consequently in use capabilities and management needs. The soils have been grouped in five classes on the basis of their relative physical suitability for use in the present agriculture.

An ideal soil for crop production is one that is very productive, is easily worked, and is capable of being conserved with minimum effort. All the soils of Lincoln County fall short of this ideal, but they differ widely in the degree of such departure, and it is on this basis that they are placed in five groups for the purpose of discussing their relation to agriculture. These, in decreasing order of their desirability, will be referred to as First-class soils, Second-class soils, Third-class soils, Fourth-class soils, and Fifth-class soils.

Although the soils of no one class are ideal for crop production, the soils of the First class more nearly approach the ideal than do those of the Second class. Likewise, the soils of each succeeding class are farther removed from the ideal than those of the preceding class. Therefore, the Fifth-class soils are in general less productive, less easily worked, and more difficult to conserve than the soils of any preceding class.

In the following pages the soils of Lincoln County are described in detail and their agricultural relations are discussed; their location and distribution are shown on the accompanying soil map; and their acreage and proportionate extent are given in table 6.

[7] This same grouping is discussed in the section on Productivity Ratings and Physical Land Classification and is shown also on the accompanying soil map.

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

| Type of soil | Acres | Percent | Type of soil | Acres | Percent |
|---|---|---|---|---|---|
| Abernathy silt loam | 128 | (1) | Greendale silt loam | 7,424 | 2.0 |
| Alluvial soils, undifferentiated | 3,968 | 1.1 | Greendale silt loam, slope phase | 2,048 | .6 |
| Baxter cherty silt loam, eroded phase | 7,360 | 2.0 | Guthrie silt loam | 6,976 | 1.9 |
| Baxter cherty silt loam, undulating phase | 5,632 | 1.5 | Humphreys gravelly silt loam | 1,920 | .5 |
| Baxter silt loam | 10,304 | 2.8 | Humphreys silt loam | 1,792 | .5 |
| Baxter silt loam, eroded rolling phase | 320 | .1 | Huntington silt loam | 4,928 | 1.3 |
| Burgin silty clay loam | 1,984 | .5 | Huntington silt loam, dark-subsoil phase | 1,024 | .3 |
| Burgin silty clay loam, drained phase | 2,496 | .7 | Huntington silty clay loam | 2,368 | .6 |
| Colbert stony silty clay loam | 3,776 | 1.0 | Lawrence silt loam | 11,136 | 3.0 |
| Colbert stony silty clay loam, hilly phase | 3,840 | 1.0 | Limestone outcrop | 960 | .3 |
| Colbert stony silty clay loam, rolling phase | 6,912 | 1.9 | Lindside silt loam | 11,712 | 3.2 |
| Cumberland silt loam | 1,600 | .4 | Maury loam | 7,616 | 2.1 |
| Cumberland silt loam, eroded phase | 4,736 | 1.3 | Maury loam, rolling phase | 3,328 | .9 |
| Cumberland silt loam, eroded slope phase | 3,328 | .9 | Melvin silt loam | 7,168 | 2.0 |
| Cumberland silt loam, slope phase | 128 | (1) | Mercer silt loam | 1,344 | .4 |
| Dellrose cherty silt loam | 39,552 | 10.8 | Mercer silt loam, rolling phase | 512 | .1 |
| Dellrose cherty silt loam, steep phase | 31,424 | 8.6 | Mimosa silt loam | 6,080 | 1.7 |
| Dewey silt loam | 1,088 | .3 | Mimosa silt loam, hill phase | 2,496 | .7 |
| Dickson cherty silt loam | 8,192 | 2.2 | Mimosa silt loam, undulating phase | 6,080 | 1.7 |
| Dickson cherty silt loam, rolling phase | 3,776 | 1.0 | Mimosa stony silt loam | 4,480 | 1.2 |
| Dickson silt loam | 45,504 | 12.4 | Mimosa stony silt loam, undulating phase | 4,160 | 1.1 |
| Dickson silt loam, rolling phase | 704 | .2 | Ooltewah silt loam | 960 | .3 |
| Egam silt loam | 3,968 | 1.1 | Robertsville silt loam | 896 | .2 |
| Ennis silt loam | 1,024 | .3 | Rolling stony land (Mimosa soil material) | 49,088 | 13.3 |
| Etowah silt loam | 3,264 | .9 | Rough gullied land (Mimosa soil material) | 3,136 | .9 |
| Frankstown cherty silt loam | 384 | .1 | Rough stony land (Mimosa soil material) | 3,776 | 1.0 |
| Frankstown cherty silt loam, shallow phase | 3,456 | .9 | Sequatchie loamy fine sand | 576 | .2 |
| Frankstown stony silt loam | 4,416 | 1.2 | Sequatchie very fine sandy loam | 704 | .2 |
| Greendale cherty silt loam | 1,856 | .5 | Smooth stony land (Mimosa soil material) | 3,392 | .9 |
| Greendale cherty silt loam, slope phase | 2,816 | .8 | Wolftever silt loam | 1,344 | .4 |
| | | | Total | 367,360 | 100.0 |

1 Less than 0.1 percent.

FIRST-CLASS SOILS

The First-class soils include Maury loam; Dewey silt loam; Cumberland silt loam; Etowah silt loam; Huntington silt loam; Huntington silty clay loam; Huntington silt loam, dark-subsoil phase; and Abernathy silt loam.

First-class soils differ in degree of profile development, character of parent materials, and in other respects; but they differ within narrow limits as regards conditions of productivity, workability, and conservability. Taking the soils of Lincoln County as a standard, all the First-class soils are well supplied with plant nutrients, although they vary in this respect within a limited range. Even the less fertile of them are very responsive to applications of needed amendments. None of them is very poor in lime, although all are slightly or moderately acid in reaction. These soils are well drained, yet their physical properties are such that moisture is well retained, tending to insure an adequate supply for plant growth; that is, the character of these soils is such that growing crops resist extreme variations in seasonal rainfall. Tilth conditions are favorable, and the range of moisture conditions for tillage is wide. These soils are well supplied with organic matter, and that their character is favorable to humifying processes is attested by the fact that most of the organic matter is well combined as an integral part of the soil. The physical properties of these soils favor normal circulation of air and moisture, and roots freely penetrate all parts of the subsoil.

None of these soils is characterized by any prominent adverse external soil condition; that is, they are practically free of stone, the slope or lay of the land is favorable to soil conservation and cultural operations, and none of them is severely eroded or highly susceptible to erosion. To summarize, taking the soils of Lincoln County as a standard, these soils have a high productive capacity and favorable working qualities, and they are easily conserved, that is, their fertility and productivity are easily maintained.

All these soils are well adapted to most of the exacting and important crops of the locality.

**Maury loam.**—Maury loam is characterized by a high content of phosphorus. It is a highly productive well-drained brown friable soil that occupies gently undulating areas in the Central Basin. The slopes range from 2 to 8 percent. This soil is adapted to the production of a great variety of crops. With the other Maury soils, this soil is locally referred to as yellow poplar land, poplar land, beech land, and chocolate land. These soils have developed from material that is residual from the weathering of level-bedded limestones high in phosphate.

In uneroded fields the surface soil consists of brown or light-brown mellow loam or very fine sandy loam from 8 to 12 inches thick. The subsoil, ranging in thickness from about 20 to 30 inches, is yellowish-brown or reddish-brown silty clay loam that is firm but friable and has a poorly developed crumblike structure. The underlying substratum is slightly compact silty clay or silty clay loam that ranges in color from yellowish brown to brownish yellow and contains faint splotches of yellow and gray. This material rests on bedrock, at a depth generally between 6 and 8 feet but ranging from 3 to more than 10 feet. Bedrock consists of level-bedded phosphatic limestone. The surface soil and the subsoil contain numerous black and brown hard and soft concretions. The entire soil is acid except an inch or two just above the bedrock. A small part of the surface soil has been lost from most of the areas by accelerated erosion. This soil is normally free of stone.

Several variations are included. One of these consists of small areas where fragments of limestone are scattered over the surface and throughout the soil. Such areas are indicated on the map by stone symbols. In some places the depth to the underlying bedrock is only about 3 feet, and in such areas the soil layers are considerably thinner than elsewhere. In a variation, mostly in the drainage basin of Swan Creek, the subsoil, to a depth of about 30 inches, is brown friable slightly granular light silty clay loam, which grades into yellow-brown gritty loose clay loam with increasing depth. Thin interbedded layers of gray leached siliceous limestone and siltstone occur at a depth of 4 to 6 feet. In the general vicinity of Hughey the surface soil is dark-brown silt loam and the subsoil is reddish-brown silty clay loam or silty clay that is more compact than the typical soil. This variation is associated with the underlying limestone that contains more than the typical quantity of shaly material. In some areas south of Petersburg the subsoil is brownish yellow instead of yellowish brown or reddish brown.

Maury loam occupies a total area of 7,616 acres, or 2.1 percent of the county. Most of it is in the northwestern part, but a few areas are near Bledsoe. It is associated with the rolling phase of Maury loam, smooth stony land (Mimosa soil material), rolling stony land (Mimosa soil material), and the Mercer, Mimosa, Dellrose, Etowah, Wolftever, Burgin, and Egam soils.

All the land is cleared, and practically all of it is in cultivation. The general field crops are grown, such as corn, wheat, rye, barley, oats, lespedeza, clovers, and other hay crops, as well as some cotton and tobacco (pl. 1, *B*). Recently there has been a decided increase of the production of small grains on the Maury soils. The proportion of land devoted to the small grains is greater on these soils than on any other soil in the county.

The estimated proportions of Maury loam used for the various crops are as follows: Corn 20 percent, wheat 20 percent, rye 5 percent, barley 5 percent, lespedeza 15 percent, clovers and other hay crops (including oats cut for hay) 10 percent, cotton 15 percent, and other crops (potatoes, tobacco, etc.) 10 percent. Some of the expected yields are: Corn, 30 to 45 bushels to the acre; wheat, 15 to 25 bushels; rye, 10 to 18 bushels; barley, 20 to 35 bushels; lespedeza, 1½ to 3 tons; lint cotton, 300 pounds; and tobacco, 800 to 1,100 pounds. Oats are usually cut for hay.

Crops are commonly rotated. The following rotation is most common: Corn 1 year, small grain (generally wheat) 1 year, and lespedeza 2 years.

This soil is physically adapted to the production of a great variety of crops. It generally contains an abundant supply of phosphorus and is thought to be fairly well supplied with potash. Nitrogen is most likely to be the only main fertilizer element needed for most crops. Only a small quantity of fertilizer is used. Fertilizers such as nitrate of soda, ammonium sulfate, and cyanamide are recommended for general use (*15*). Lime may be necessary for certain legumes, particularly alfalfa. Runoff needs to be controlled to prevent erosion. This may require a reduction in intertilled crops and an increase in close-growing crops.

**Dewey silt loam.**—Dewey silt loam is a well-drained productive soil on the Highland Rim in the southeastern and southern parts of the county. It is well suited to agriculture. In contrast with Maury silt loam, which has developed from residuum of limestone high in phosphate, Dewey silt loam has developed from residuum of limestone low in phosphate.

Dewey silt loam has a mellow brown or gray-brown silt loam surface soil and a red or reddish-brown firm but friable silty clay or silty clay loam subsoil. The surface soil generally ranges from 10 to 14 inches in thickness. A moderate quantity of rather durable organic matter is well combined with the plow soil. Under cultivation the organic matter is dissipated slowly and the soil gradually becomes lighter colored. The subsoil extends to a depth between 4 and 5 feet, where it grades into light brownish-red or brownish-yellow silty clay or silty clay loam splotched with red, yellow, and gray. In a few small patches chert fragments are thinly scattered over the surface and throughout the soil mass, but for the most part the entire soil is practically free of chert.

Most of this soil has a slope of 3 to 8 percent, but in some areas the slope ranges from 8 to 15 percent. Good tilth is easily maintained. The physical character of the surface soil and subsoil is favorable to the absorption and retention of moisture. The soil is well drained and permeable to air, water, and plant roots. It is low in both lime and phosphate. When bare or in intertilled crops it is highly susceptible to accelerated erosion, particularly on the more sloping areas. It responds well to good management, and its fertility is relatively durable.

Only a small total area—1,088 acres—is mapped, mainly in the extreme southeastern part of the county, just below the Cumberland escarpment. Other areas occur over the rest of the Highland Rim. Most of this soil is associated with the Baxter and Dickson soils.

On the more sloping areas the surface soil averages 2 to 6 inches thinner than normal and the subsoil is exposed in numerous small patches. Such areas are somewhat inferior to areas of the normal soil as to tilth conditions, organic-matter content, moisture relationships, and productivity.

This soil is well adapted to the production of a wide variety of crops. All the land has been cleared, and practically all of it is used for general farm crops. About 30 percent of the land is planted to corn, 20 percent to hay (including lespedeza), 20 percent to cotton, 10 percent to wheat, 2 percent to rye, 5 percent to oats, and 13 percent to such miscellaneous crops as tobacco, potatoes, and watermelons. Yields normally obtained are as follows: Corn, about 25 to 40 bushels to the acre; lint cotton, 250 to 400 pounds; wheat, 12 to 18 bushels; rye, 7 to 15 bushels; oats, 35 bushels; tobacco, 800 to 1,000 pounds; lespedeza, 1½ to 2½ tons; and clovers and other forage crops, 1 to 2 tons.

Fertilization is required in order to obtain high yields. This soil is especially low in lime and phosphate. It is susceptible to erosion, particularly on the more sloping areas; therefore adequate control of runoff is important. Properly constructed terraces appear to aid in this regard, but it seems that the proportion of intertilled crops must be reduced and close-growing crops increased in order to control erosion adequately, even if the soil is terraced.

Fertilizer recommendations for crops on this soil are as follows: Corn and small grains, 250 pounds of 6–10–0; small grains, to be followed by clover and grass, 300 pounds of 5–10–6; cowpeas, soybeans, and other legumes, 250 pounds of 0–10–4; cotton, potatoes, tomatoes, and similar crops, 300 pounds of 5–10–6; meadows and pastures, 200 pounds of 7–10–6; and tobacco, 300 pounds of 6–10–6 (*15*).

**Cumberland silt loam.**—Cumberland silt loam is developed from old alluvial materials on high terraces, which lie about 40 to 110 feet above the present level of the Elk River. These terraces were formed many years ago when the river cut and formed a broad valley and before it cut the present meandering narrow valley within the broad one. Most of the material from which such terraces were formed was washed from uplands underlain by limestone, but apparently some was washed from uplands underlain by sandstone and shale. With the other Cumberland soils, this soil is locally referred to as red lands. It occurs chiefly along the Elk River.

The 10- to 15-inch surface soil of Cumberland silt loam is grayish-brown or brown mellow silt loam. The subsoil is friable silty clay loam ranging in color from yellowish brown to reddish brown and in thickness from 25 to 35 inches. The subsoil is underlain by brownish-red friable silty clay loam, which extends to a depth of 4 to more than 6 feet. Rounded hard and soft concretions occur throughout. The substratum is variable in color, texture, and consistence. In some places thin beds of small rounded pebbles are present between depths of 6 and 8 feet. The substratum rests on an uneven floor of limestone. In most places the total thickness of the deposit is more than 8 feet, but in some places it is considerably less. The soil is acid in reaction, which indicates a deficiency of lime, and it is also somewhat deficient in phosphate. All the land is nearly level to gently undulating, and the slope is less than 8 percent. Drainage is good, both internally and externally.

The plow soil has good tilth, and the subsoil has good physical properties. Penetration of water, air, and roots is good. The crops respond well to good management, and the soil retains added lime and fertilizer fairly well.

There are only 1,600 acres of this soil in the county. The largest areas are near the Elk River south and southwest of Fayetteville. The soil is associated with other soils on terraces and with the Mimosa soils of the uplands.

As it is well adapted to the production of crops, practically all of this soil is under cultivation (pl. 2, *B*). About 32 percent of it is devoted to corn, 15 percent to cotton, 20 percent to lespedeza and clovers, 10 percent to other forage crops, 8 percent to wheat, 5 percent to oats, and the remaining 10 percent to rye, barley, tomatoes, tobacco, and special crops. Corn normally yields between 30 and 45 bushels an acre; wheat, 12 to 20 bushels; rye, 9 to 15 bushels; oats, 30 to 50 bushels; lint cotton, 350 to 500 pounds; lespedeza, 1½ to 2½ tons; alfalfa, 2 to 3 tons; and tobacco, 900 to 1,200 pounds. Other crops also do well.

The requirements of good management include proper choice and rotation of crops, proper fertilization, and the addition and maintenance of organic matter. If a high proportion of intertilled crops are grown, mechanical measures, such as terraces, for the control of runoff, may be necessary.

The fertilizer recommendations for crops on this soil are as follows: Corn and small grains, 250 pounds of 6–10–0; small grains to be followed by clover and grass, 300 pounds of 5–10–6; cowpeas, soybeans, and other legumes, 250 pounds of 0–10–4; tomatoes, potatoes, and similar crops, 300 pounds of 5–10–6; meadow and pasture, 200 pounds of 7–10–6; and tobacco, 300 pounds of 6–10–6 (*15*).

**Etowah silt loam.**—Etowah silt loam is developed on well-drained moderately young to very young terraces along the Elk River and near the mouth of Bradshaw, Norris, and Mulberry Creeks. These terraces are sometimes referred to as second and third bottoms. Etowah silt loam occurs on younger lower terraces than does Cumberland silt loam. Furthermore, this soil is mainly brown, whereas the Cumberland soil is chiefly red; but both soils are fertile, productive, and well adapted to the production of a wide variety of crops.

The surface soil, extending to a depth of 10 to 16 inches, is brown or grayish-brown mellow to friable silt loam. The subsoil is yellowish-brown or brownish-yellow firm but friable silty clay loam, which extends to a depth of 3 to 4 feet. In a few small areas the subsoil is very fine sandy clay. The material below the subsoil, to a depth of 5 to 7 feet, is generally brownish-yellow silty clay loam with a few faint splotches of brown, yellow, and gray. Below this the material is variable. In places it is silty or fine sandy clay, with a few splotches of gray and brown; in others it is a layer of gravel. The gravelly layer, which may be thick or thin, is underlain by moderately friable silty clay or sandy clay or by heavy compact sticky plastic clay.

Etowah silt loam has developed from general alluvium, most of which has been washed from uplands underlain by limestone, but some has come from uplands underlain by sandstone and shale. The terraces occupied by this soil lie from a few feet to as much as 40 feet above the first bottoms. Some of the lowest terraces are subject to flooding during exceptionally high waters. As compared with the Etowah soil on the lower terraces, that on the higher terraces shows a greater difference between the surface soils and the subsoil and is a little less productive. On some of the higher terraces the subsoil has a red cast.

This soil occupies gentle slopes, most of which range between 2 and 5 percent in gradient.

The quantity of organic matter in the topmost 4 or 5 inches is only moderately high, but it is humified and thoroughly incorporated in the soil. It is moderately durable but gradually disappears under cultivation, resulting in a lighter colored surface layer. There is practically no gravel on the surface or within plow depth. The tilth of the soil is good. Drainage of both the surface soil and the subsoil is good. The physical character and permeability of the soil is favorable for the normal circulation of air and water and for the retention of moisture. The soil is acid in reaction.

A total of 3,264 acres is mapped, mainly in association with the Cumberland, Mimosa, Greendale, Wolftever, Sequatchie, and Huntington soils and rolling stony land (Mimosa soil material).

Practically all of this soil is under cultivation and devoted to general field crops. About 40 percent of the land is planted to corn, 20 percent to lespedeza and clovers, 12 percent to cotton, 7 percent to wheat, and 21 percent to various other crops, including other forage crops, potatoes, tobacco, rye, barley, and pasture. Yields commonly reported are as follows: Corn, 25 to 40 bushels to the acre; lint cotton, 225 to 475 pounds; wheat, 10 to 15 bushels; lespedeza, 1 to 2½ tons; cowpeas and soybeans, 1 to 2 tons; and tobacco, 750 to 1,000 pounds.

In management needs, including fertilizer requirements, Etowah silt loam is considered similar to Cumberland silt loam.

**Huntington silt loam.**—Huntington silt loam is one of the most fertile, productive, and valuable soils in the county. It is a brown well-drained soil of the bottom lands and consists of recent general stream alluvium, most of which originated in the uplands underlain by limestone. It is occasionally flooded. The soil is young and shows but little difference between the surface soil and the subsoil. To a depth of 12 to 18 inches the material is dark-brown or light-brown mellow silt loam, and below this it is brown moderately firm but friable heavy silt loam or silty clay loam, extending to a depth of 3 to 4 feet. The underlying material is variable, but in most places it is grayish-brown heavy silt loam or silty clay loam, mottled and splotched with gray and yellow.

To a depth of 1 foot the soil is comparatively rich in durable humus, and the color fades slowly under cultivation. The reaction (according to the Soiltex method of analysis) is slightly acid or nearly neutral, indicating sufficient lime for all the general field crops. Other plant nutrients also appear to be adequate. Good tilth is easily maintained. The lay of the land is nearly level, the slope in few places exceeding 2 percent. Although surface runoff is slow, internal drainage is good.

Huntington silt loam is mapped in a total area of 4,928 acres. The largest bodies border the Elk River, and the smaller ones border Bradshaw, Swan, Cane, Norris, and Mulberry Creeks. This soil is associated with Huntington silty clay loam, Sequatchie loamy fine sand, Lindside silt loam, Egam silt loam, and Etowah silt loam. The boundary lines between Huntington silt loam and the associated soils are rather arbitrarily placed in some places.

An included variation consists of a similarly brown well-drained soil that is lighter in texture—fine sandy loam rather than silt loam. This variation occurs in narrow strips along the Elk River, chiefly in the general vicinity of Kelso.

All this land is cleared and under cultivation. About 85 percent of it is in corn each year, about 5 percent in barley, and 10 percent in hay or forage crops. Normally yields of 30 to 50 bushels of corn an acre, 30 to 45 bushels of barley, and 2 to 4 tons of hay are obtained. Yields on the sandy variation are somewhat lower.

Huntington silt loam is one of the most productive and valuable soils in the county. It is high in moisture, rich in plant nutrients, and is well adapted to crops exacting of these qualities. It is one of the very best soils for the production of corn, which is grown year after year in many fields. It is also well adapted to hay and forage crops, which are rotated with corn on a few areas. Largely because this soil is flooded one or more times during the winter and spring, it is not well suited to the production of winter grains. Furthermore, small grains tend to lodge more and are more susceptible to injury from diseases, particularly rust, than on suitable soils of the uplands. Barley, however, has been successfully grown on some areas. Because of the occasional flooding, alfalfa would not be expected to succeed. Although Huntington silt loam is not well adapted to a great number of crops, the fact that it is so well adapted to corn (the most important crop grown and so easy to work and conserve) makes it one of the most valuable soils in the county.

**Huntington silty clay loam.**—Huntington silty clay loam differs from Huntington silt loam primarily in being heavier textured throughout. Like the silt loam, the silty clay loam is brown to a depth of about 3 feet, is well drained internally, is fertile, occupies level or nearly level areas in the stream bottoms, and consists of general stream alluvium, most of which has washed from uplands underlain by limestone. Although it is friable and easy to work, it is somewhat less friable and is heavier to work than the silt loam.

An aggregate area of 2,368 acres is mapped. The soil occurs in small bodies or narrow strips along the Elk River and its larger tributaries. The largest individual area is along Coldwater Creek.

The soil is geographically associated with Huntington silt loam, Sequatchie loamy fine sand, Lindside silt loam, Egam silt loam, and Etowah silt loam. In some areas the natural boundaries between Huntington silty clay loam and some of the associated soils are indistinct, and therefore they are placed rather arbitrarily on the map.

A soil is included, lying chiefly along Mulberry Creek, that differs from the typical in having a dark-gray or dark brownish-gray heavy firm layer below a depth of 20 inches. This dark-colored layer appears to contain a large proportion of finely divided organic matter, which apparently acts as a binding agent, but it is not sufficiently compact to interfere seriously with the normal movement of moisture.

As regards productivity, crop adaptation, present use, and present management, this soil is similar to Huntington silt loam.

**Huntington silt loam, dark-subsoil phase.**—This soil differs from normal Huntington silt loam mainly in having a dark-colored compact layer below a depth ranging from 20 to 36 inches. This layer consists of dark-gray or nearly black fairly compact silty clay or silty clay loam. The dark color apparently is due to the high content of finely divided and thoroughly incorporated organic matter, which appears to serve as a binding agent and probably is partly responsible for the comparative compactness. This layer, however, is not sufficiently compact to interfere seriously with the normal vertical movement of water. It is not known definitely how deep this layer extends, but there is some evidence that 5 feet is about the maximum depth.

It appears as though this soil has been formed by a comparatively recent deposition of brown alluvium on top of soils that originally were swampy and high in organic matter. Such superficial depositions are thought to have taken place since the uplands were cleared.

This soil covers an area of only 1,024 acres. It is similar to normal Huntington silt loam as regards present use, yields obtained, present management, and natural adaptability to crops.

**Abernathy silt loam.**—Abernathy silt loam occupies depressions and consists of highly fertile materials that have washed in from soils on surrounding slopes underlain by limestone. There is little or no surface runoff, but internal drainage is good. The surface layer, extending to a depth of about 15 inches, is rich-brown mellow heavy silt loam, and the subsoil is yellowish-brown light silty clay loam extending to a depth of about 3 feet. Below this the material in most places is mottled with gray, yellow, and brown.

The highly fertile materials have been accumulated not only by wash of organic and other solid matter but also by seepage waters carrying materials in solution. Although this soil is not susceptible to erosion, it may be injured by excessive deposition of materials brought in from deeply gullied and otherwise severely eroded slopes.

There are only 128 acres of this soil. The larger bodies are southwest of Dellrose and south of the Shiloh Bridge near the Lincoln-Moore County line. Other areas are scattered between these points. Most of the areas are small—so small that they are generally used and managed the same as the soils on the surrounding slopes.

The physical properties of this soil favor tillage, normal percolation of water, and good circulation and retention of moisture; and cultivation changes the character of the surface soil very slowly. Inherently fertile, well drained, and characterized by favorable physical properties, this is a productive and valuable soil, but it is not of great importance agriculturally because of its small extent. It is adapted to most of the general farm crops and compares favorably with the Huntington soils in productivity.

### SECOND-CLASS SOILS

The group of second-class soils includes 18 soil types and phases, as follows: Dickson silt loam; Baxter silt loam; Baxter silt loam, eroded rolling phase; Baxter cherty silt loam, undulating phase; Mimosa silt loam; Mimosa silt loam, undulating phase; Maury loam, rolling phase; Mercer silt loam; Greendale silt loam; Greendale cherty silt loam; Burgin silty clay loam, drained phase; Cumberland silt loam, slope phase; Cumberland silt loam, eroded phase; Humphreys silt loam; Sequatchie very fine sandy loam; Egam silt loam; Ennis silt loam; and Lindside silt loam. These soils differ from each other not only in the degree to which detrimental conditions exist but also in the kind and number of such undesirable conditions.

Each soil of this division has one or more unfavorable characteristics, such as natural poverty of plant nutrients, scarcity of organic matter, severe leaching, adverse physical condition, or injurious condition of stoniness or erosion. The detrimental effect on the productivity or suitability for cultivation of each of these soils resulting from some one or a combination of such characteristics is greater than that for any soil in the First class, but less than that of any soil in the Third class. The Second-class soils are at least moderately productive of most of the crops commonly grown. Their physical properties are moderately favorable for tillage and to the normal circulation and retention of moisture. None of these soils is extremely stony, severely eroded, or has a strong relief. They have at least moderately favorable features affecting workability and can be conserved by feasible practices of management.

**Dickson silt loam.**—Members of the Dickson series are the main soils on the smooth to gently rolling areas on the Highland Rim. Areas of these soils are known locally as gray lands and "barrens." These soils have formed from materials residual from the weathering of siliceous limestones, chiefly of the Warsaw formation and the upper part of the Fort Payne chert formation. They are characterized by a gentle relief, a light-gray surface soil, a yellow subsoil, and a hardpan at a depth of about 2 feet. They are physically suitable for crop production, but they are low in natural fertility and rather low in productivity.

In cultivated fields Dickson silt loam has a surface layer, from 5 to 8 inches thick, consisting of light-gray or yellowish-gray mellow smooth silt loam. In wooded areas the topmost 2 or 3 inches is stained dark with organic matter. The subsoil, which extends to a depth ranging from 24 to 34 inches, is yellow or brownish-yellow friable silty clay loam. Scattered splotches of brown, yellow, and gray are generally present in the lower part, which is a little less friable than the upper part.

Below the subsoil is the layer referred to as the hardpan. This consists of silty clay or silty clay loam that is particularly hard and cementlike when dry. It softens very little when moistened. It is especially difficult to disrupt. The disrupted lumps, however, have a characteristic brittleness, and they crumble into a slightly gritty mass. The material is brownish gray with numerous mottlings of gray, yellow, brown, and red. This layer extends to a depth of 36 to 48 or more inches. This hardpan is particularly important because it is nearly impervious to water and roots. It is underlain by a fairly compact silty clay loam that is more profusely mottled with gray, yellow, red, and brown. Chert is present in considerable amount in most places and becomes more abundant with increasing depth. This layer reaches to a depth of 5 to 7 feet, where it grades into nearly pure chert that is residual from the weathering of the impure limestone.

Dickson silt loam occupies slopes ranging from about 2 to 8 percent in gradient. There are a few fragments of chert in the hardpan, a very few in the subsoil, and generally none in the surface soil. The entire soil is strongly to very strongly acid, indicating great poverty of lime. It is low in nearly all plant nutrients. The organic matter present in wooded areas is rapidly lost under cultivation, and the surface soil assumes a very light gray or almost white color. Tilth is good, and cultivation is easy. Surface drainage is generally good, but internal drainage, greatly retarded by the hardpan, is rather slow. The soil is adequately drained, however, for the production of most of the crops commonly grown.

Dickson silt loam occurs only on the Highland Rim, but in that district it is the main soil type. It covers a large total area—45,504 acres. This represents more than 12 percent of the area of the county, nearly 40 percent of the area of the Highland Rim, and somewhat over 50 percent of the total area of cultivable land on the Highland Rim. It is associated with the Baxter, Lawrence, Guthrie, Melvin, and other Dickson soils.

Some variability occurs in this soil as mapped. It varies in morphology and productivity from a soil similar to the better drained and more productive Baxter soils of the more sloping areas, on the one hand, to a soil similar to the more poorly drained and less productive Lawrence soils of the less sloping areas, on the other. North of Flintville a few areas, totaling about 500 acres, are more sloping and considerably more cherty than the typical soil. These areas are slightly higher in productivity than most of Dickson silt loam. Generally speaking, in going from the western to the eastern part of the county the productivity decreases slightly, the color of the subsoil changes from brownish yellow to pale yellow, the amount of gray in the hardpan and substratum increases somewhat, the depth of the substratum decreases slightly, and the quantity of chert fragments increases a little. Areas with the lighter colored subsoil are extensive in the eastern part of the Highland Rim, particularly east of Flintville and McCracken School.

As previously stated, this soil has desirable consistence and mild relief, and it is therefore easy to work; but, on the other hand, it is low in organic matter, lime, phophorus, potash, and probably most other plant nutrients. In addition, it is characterized by the unfavorable hardpan development, which interferes with internal drainage and restricts penetration of roots. Chiefly because of the low fertility and the hardpan development, the soil is relatively low in inherent productivity and somewhat limited in its adaptability. Deep-rooted crops, such as alfalfa, would not be expected to succeed very well. Injury to winter crops, such as winter grains, from frost action is generally greater on this soil than on the better drained soils. The soil is well adapted, however, to the production of cotton.

About 80 percent of Dickson silt loam has been cleared, much of it only recently (pl. 3, *A*), and about 20 percent is still in woods. Approximately two-thirds of the largest single area of woodland, about 5,000 acres lying southwest of Belleview, is on this soil. Other large areas in woods are north of Elora. Black oak, red oak, southern red oak, hickory, and post oak are the principal species, but there are also some sourwood, black tupelo (black gum), blackjack oak, and white oak. Sprouts of chestnut, sumac, and mockernut (white) hickory are also present. About 75 percent of the total cleared area is used for the production of crops. The principal crop is cotton, to which an estimated 40 percent of the cultivated land is devoted. About 25 percent of the cultivated land is planted to corn, 15 percent to lespedeza, 2 percent to wheat, 2 percent to oats for hay, 3 percent to other forage crops, and 13 percent to miscellaneous crops, such as potatoes, sweetpotatoes, watermelons, cantaloups, and sorgo. Acre yields commonly obtained are 175 to 325 pounds of lint cotton, 15 to 30 bushels of corn, three-quarters to 1½ tons of lespedeza, 5 to 12 bushels of wheat, 6 to 12 bushels of rye, 1 to 1½ tons of soybeans, 70 to 90 bushels of sweetpotatoes, and 60 to 80 bushels of potatoes.

On most areas a systematic rotation of crops is not practiced. The following rotation is in most common use: Cotton, 2 years; corn, 1 year. Some farmers add lespedeza for 1 or 2 years to the above rotation. A 3–10–3 fertilizer, or a somewhat similar mixture, is generally applied for cotton at the rate of 200 or 250 pounds an acre. Usually, no fertilizer is applied for corn; but when used, it is generally superphosphate applied at the rate of 100 to 150 pounds an acre.

It seems apparent that the productivity of Dickson silt loam can be increased considerably by an improved program of management. Among the most important practices in such a program is the application of lime. It is reported (*6*) that liming offers more immediate and greater rewards to the farmers than any resource at their command. It is also reported (*11*) that the application of lime on this soil has been helpful to practically all crops. Lime is particularly necessary for certain clovers and alfalfa, which have high lime requirements. Not only is this soil in great need of lime but it also needs phosphate. Excellent results from applications of phosphates are to be expected. It is important, however, that lime be applied either before or with the phosphates if best results are to be obtained. Farmers report higher yields where both lime and phosphate are applied than where only one or the other is used. It is also of great importance to increase the supply of organic matter in the soil and maintain it at a higher level. The application of lime and phosphate will aid considerably in this regard by greatly stimulating the growth of roots of practically all plants. Growing grasses that have fibrous root systems is one of the best ways to increase the supply of durable organic matter. Green manuring or applying barnyard manure at frequent intervals will also aid in this regard, and substantial increases in yields of crops are to be expected from such practices. Potash and nitrogen will have to be applied according to the needs of the current crop, but the quantity required will be greatly influenced by the kind of crop previously grown and the treatment the soil has previously received. A rotation of crops including legumes and grasses will be essential.

Fertilizer recommendations are made by the Tennessee Agricultural Experiment Station (*15*) for this soil, in its present condition, for various crops as follows: Corn and small grains, 250 to 400 pounds of 5–10–0 to the acre; small grains to be followed by clover and grass, 320 to 480 pounds of 3–10–5; cowpeas, soybeans, and other legumes for hay, 250 to 400 pounds of 0–10–7; cotton, tobacco, tomatoes, potatoes, etc., 400 to 800 pounds of 5–10–5; meadows and pasture (top dressing), 200 to 400 pounds of 8–10–6.

**Baxter silt loam.**—In common with the other Baxter soils, Baxter silt loam is known locally as red lands. It occupies the more rolling areas, the tablelike crests of ridges, and the higher stream divides of the Highland Rim. It has been formed from materials derived from cherty limestones, chiefly limestones of the Warsaw formation and the Fort Payne chert. The chert-free soil is thought to be developed chiefly from the Warsaw, and the cherty soil from the Fort Payne.

Baxter silt loam has a gray-brown mellow silt loam surface soil 6 to 10 inches deep. The organic matter in the surface in wooded areas is only moderately durable, and the surface layer becomes lighter in color under cultivation. The subsoil, extending to a depth of 22 to 30 inches, is yellowish-brown or light brownish-red fairly friable silty clay loam that is rather brittle when dry and slightly sticky when wet. The underlying substratum, extending to a depth of 4 to 6 feet, is brownish-red tight and fairly compact silty clay that is moderately hard when dry and moderately plastic when wet. The color is light brown when dry and red when wet, and generally it is moderately splotched with gray and yellow. In places there are small fragments of chert in various stages of weathering. The material beneath this is mottled reddish-brown tight compact silty clay in which chert fragments are generally numerous.

The relief is gentle; the slope ranges from about 3 to 8 percent. Tilth is good, and the soil is easy to cultivate. Drainage, both internally and externally, is also good. On the other hand, the reaction is generally strongly acid, indicating a poverty of lime; and the content of phosphate and organic matter is also rather low. Likewise, the content of potash is thought to be low. The responsiveness to proper fertilization, however, is good.

Baxter silt loam is mapped in an aggregate area of 10,304 acres throughout an irregular belt extending along the break between the Highland Rim and the Highland Rim escarpment from the western county boundary to Mary Grove School. There the belt branches; one branch extends northward to the vicinity of Camargo and the other extends eastward to the vicinity of Belleview. Irregular-shaped areas of various sizes extend along both sides of the Flint River from the town of New Hope to the Tennessee-Alabama State line. There are also small bodies south and east of Elora.

Baxter silt loam is associated with Dickson silt loam and Dewey silt loam. Small areas of these associated soils are included with Baxter silt loam. It is less productive than Dewey silt loam but more productive than Dickson silt loam. It is estimated to be about 10 percent more productive of cotton and 30 percent more productive of corn than Dickson silt loam, one of the most extensive soils on the Highland Rim. Baxter silt loam is also suitable to the production of a greater variety of crops than the associated Dickson soils.

Practically all of the land is cleared and under cultivation. The proportions of land devoted to the several crops are about as follows: Cotton, 35 percent; corn, 30 percent; lespedeza, 15 percent; wheat, 3 percent; oats and other crops for hay, 7 percent; potatoes, 3 percent; and other crops, such as watermelons, cantaloups, sorgo, tobacco, and barley, 7 percent. Cotton yields from 200 to 450 pounds an acre, corn 20 to 35 bushels, wheat 10 to 12 bushels, burley tobacco 700 to 1,000 pounds, lespedeza hay 1 to 2 tons, lespedeza seed 250 to 500 pounds.

No systematic crop rotation is followed. Cotton is grown as the principal cash crop, and the other crops are grown largely as necessary supplements according to the needs of the individual operator. Cotton land is usually fertilized at the rate of 175 to 200 pounds of 3–10–3, or a somewhat similar mixture, to the acre.

Greatly increased yields of cotton, corn, and other crops would be expected if a systematic rotation including clovers or clover-grass mixtures were adopted, in conjunction with the practice of making judicious applications of lime and phosphate. This soil, it will be recalled, is low in lime and phosphate, and these amendments would therefore be necessary for the successful production of most clovers and grasses. Potash also is likely to be needed for most crops. With heavy applications of lime, phosphate, and potash, alfalfa would be expected to succeed fairly well. Plowing under green manures or barnyard manures should increase the yields of cotton, corn, and small grains. Some attention needs to be given to the control of run-off and erosion, although these are not particularly serious problems on this soil.

**Baxter silt loam, eroded rolling phase.**—The eroded rolling phase differs from typical Baxter silt loam chiefly in occupying more sloping areas and in having lost much of the original surface soil by erosion. The slopes range from about 8 to 15 percent in gradient, and between approximately one-half and two-thirds of the original surface soil has been lost in most areas. Over much of this soil the topmost part of the subsoil has been mixed with the remaining part of the original surface layer.

The present surface layer, 5 or 6 inches thick, ranges from brownish-gray silt loam to very light reddish-brown light silty clay loam. The subsoil is yellowish-brown or light brownish-red moderately friable silty clay loam. In most places a few fragments of chert are in the subsoil.

This eroded soil comprises a total area of only 320 acres. The largest body is between Belleview and Macedonia Church. One area occurs about 2 miles southeast of Lincoln.

Although this soil is physically fairly well suited to crop production, it is somewhat inferior to normal Baxter silt loam, chiefly for two reasons: (1) It occupies steeper slopes and is therefore more susceptible to accelerated erosion where bare or in intertilled crops; and (2) tilth properties are less favorable and organic matter and valuable plant nutrients have been lost largely as a result of the erosion that has already taken place.

All the land is cleared, and most of it is used for crops, although a significant proportion is abandoned or lying idle. Of the cultivated land, the proportions devoted to various crops are about the same as on normal Baxter silt loam. The present management practices on the two soils are similar. Yields, however, are estimated to be between 15 and 35 percent lower on the soil of the eroded rolling phase than on the typical soil, depending to a considerable extent on the amount of the original surface soil that has been lost.

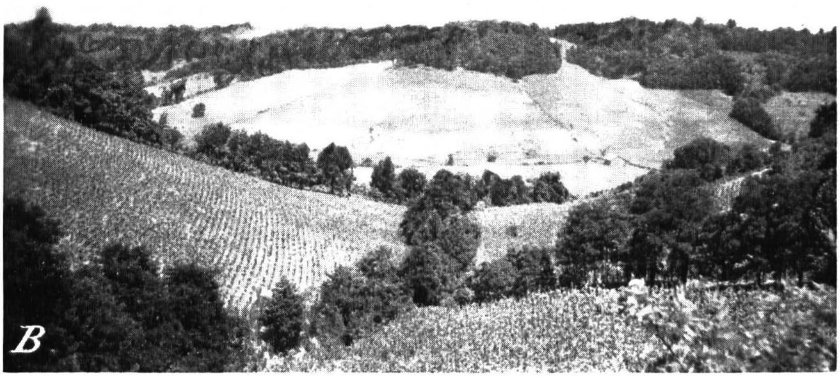
The eroded condition and the decreased yields indicate that the past use and management have not been well adjusted to this soil. Apparently, intertilled crops have been grown too frequently and control of runoff has been inadequate. Potentially, however, this is a good soil. Reduction of intertilled crops and increase of leguminous or legume-grass crops, addition of organic matter, and adequate applications of lime and phosphate would be expected to improve greatly the productivity of this soil. In order to aid in the control of runoff, tillage should be performed on the contour. Strip cropping on the contour on the longer slopes and the construction of terraces are worth considering.

**Baxter cherty silt loam, undulating phase.**—This phase differs from typical Baxter silt loam chiefly in containing many fragments of chert (gravel) both on the surface and throughout the soil mass. Such fragments are sufficiently numerous to interfere materially with cultivation, but they are not numerous enough to preclude feasible tillage. Compared with the silt loam, this cherty soil is generally a little lower in organic matter and plant nutrients, more permeable to water, less susceptible to accelerated erosion, and slightly lower in productivity of the crops common to the locality. Both soils are low in lime and phosphate. This soil differs from normal Baxter cherty silt loam chiefly in having gentler relief.

The surface soil, which consists of grayish-brown or brownish-gray loose cherty silt loam, is from 8 to 12 inches thick. The subsoil of yellowish-brown or light brownish-red friable clay loam or silty clay loam continues to a depth of about 30 inches. Below this material is moderately compact silty clay loam or silty clay that is brownish red with splotches of gray, yellow, and red. Fragments of chert are numerous in both the subsoil and the substratum, and in some places the substratum consists largely of such fragments.

The total area of this soil is 5,632 acres. Most of it is on the tablelike crests in a belt of long fingerlike ridges that extend from the Highland Rim into the Central Basin. Some is mapped along drainageways on the Highland Rim proper. It is associated with the other Baxter soils and with the Dellrose and Dickson soils.

Practically all of this land has been cleared and put into cultivation. Under almost continuous cultivation to row crops, some areas have become eroded and are now in permanent pasture. In general, the crops grown and amendments added are essentially the same as those on Baxter silt loam, but the yields are a little lower. The management requirements of both soils are similar, although water is controlled more easily on the cherty silt loam, undulating phase.



*A*, Typical farmstead on recently cleared Dickson silt loam. The woodland in the background consists chiefly of oaks, which generally predominate on wooded areas of Dickson soils.

*B*, Dellrose cherty silt loam, an extensive soil on the steep slopes leading from the Highland Rim down to the valleys of the Central Basin and on the steep slopes of the high ridges and hills within the Central Basin that are remnants of the Highland Rim.

**Mimosa silt loam.**—Mimosa silt loam occurs on benchlike positions in the Central Basin and is characterized by a tough, sticky, and plastic subsoil. It occupies slopes that range from about 8 to 15 percent in gradient.

The surface soil, 4 to 10 inches thick, is light-brown or gray-brown friable silt loam. In uneroded areas the topmost 3 or 4 inches is stained dark with well-decomposed and thoroughly incorporated durable organic matter. The lower part in places has a red tinge. The subsoil, which extends to a depth between 24 and 36 inches, is yellow or grayish-yellow moderately compact tough, sticky, and plastic silty clay or silty clay loam with a fairly well defined blocky structure. The surface of the aggregates has a glossy appearance, which presumably is due to a coating of colloidal material. The substratum is a similarly compact, tough, sticky and plastic silty clay or silty clay loam. Splotches and mottlings of gray, yellow, and brown take the place of the uniform yellow or grayish-yellow color, and the structural aggregates are larger. This substratum, which rests on the limestone floor, generally ranges between 1 and 3 feet in thickness. Although the underlying limestone is level-bedded, the rock floor is uneven; hence the depth to bedrock varies greatly, but in most places it ranges from 4 to 5 feet. Here and there throughout the soil mass are fragments of limestone or chert. Black and brown hard and soft concretions are present throughout.

It is estimated that this soil in most areas has lost between one-third and one-half of the original surface soil by accelerated erosion, and in a few places erosion has exposed the subsoil. The texture of the surface soil becomes heavier and the tilth becomes progressively more unfavorable as more and more of the original surface soil is lost. Small scattered outcrops of limestone are rather common. Small areas, sufficiently stony to interfere with cultivation, are indicated on the map by stone symbols.

Included with this soil is a soil that differs from the normal soil in that the subsoil is chiefly brown rather than yellow and is more compact than elsewhere, the soil mass contains many more than the usual number of concretions, and the present productivity is lower. This variation is restricted to a few bodies about 3 miles northwest of Fayetteville.

Although no chemical data are available, Mimosa silt loam apparently is well supplied with phosphorus in most places, although the content of phosphorus in the Mimosa soil probably is more variable and considerably lower than in the Maury soils. In regard to phosphorus content, this Mimosa soil ranks between Maury loam, which is high in this constituent, and Mercer silt loam, in which it is low. Mimosa silt loam is acid in reaction, but the degree of acidity is probably not very high. In general, the natural fertility of this soil is favorable for plant growth; but the physical properties are somewhat unfavorable, especially the compact plastic and sticky subsoil, which retards internal drainage and impairs the penetration of roots. Owing largely to this characteristic, the soil is rather highly susceptible to accelerated erosion and crops are rather susceptible to injury from drought. Another unfavorable characteristic is the comparative shallowness over bedrock. On the whole, however, this soil is physically well suited to the production of most of the crops commonly grown.

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This soil occupies a total of 6,080 acres. It occurs in practically all parts of the Central Basin. It is associated with other Mimosa soils, with the Dellrose, Greendale, Maury, and Mercer soils, with rolling stony land (Mimosa soil material), and with smooth stony land (Mimosa soil material).

About 90 percent of the land has been cleared and put into cultivation and is used largely for the production of general field crops. About 25 percent of the cleared land is in corn, 15 percent in lespedeza, 4 percent in wheat, 2 percent in rye, 5 percent in oats for hay, 5 percent in clovers and other hay crops, 14 percent in other crops, 10 percent in rotation pasture, and 20 percent is lying idle or fallow. Under normal conditions corn yields about 25 bushels, wheat 10 bushels, oats 25 bushels, barley 20 bushels, rye 10 bushels, redtop 1 ton, timothy 1 ton, alsike clover 1 ton, red clover 1 ton, lespedeza 1 to 2 tons, potatoes 85 bushels, and tobacco 600 to 900 pounds to the acre. The prevailing rotation is corn 1 year, wheat 1 year, and clover or lespedeza 2 years.

This soil requires rather careful management if the productivity is to be maintained or increased. It is essential that accelerated erosion be controlled. This may necessitate a reduction of intertilled crops and an increase in close-growing crops. Fortunately, the proportion of land devoted to hay and pasture is increasing as a result of expansion of dairying and livestock raising. So far as possible, tillage should be performed on the contour. Strip cropping on the contour also is a good practice. Terraces are generally believed to be valuable, but there may be some doubt as to their value on this soil. As this soil contains a moderate quantity of phosphate and lime, only light applications of these amendments are necessary except for certain legumes, particularly alfalfa. Nitrogen probably is the most necessary fertilizer element required for most crops except legumes.

**Mimosa silt loam, undulating phase.**—The main difference between this phase and the normal type is that the undulating soil has gentler relief with a slope of less than 8 percent. As compared with the normal silt loam, this soil is less eroded and therefore has a thicker surface soil, better tilth, a somewhat higher content of organic matter, and a somewhat higher content of available plant nutrients. In addition, the control of runoff is easier, the susceptibility to erosion is less, and the range in adaptability to use is wider than on that soil.

Mimosa silt loam, undulating phase, has developed from residual material from the weathering of limestone that apparently contained some clay. The surface soil is light-brown or grayish-brown mellow friable silt loam from 8 to 14 inches thick. The subsoil, which extends to a depth of 24 to 36 inches, is yellow or brownish-yellow fairly compact tough, sticky, and plastic silty clay or silty clay loam. This is underlain by a similarly tough and sticky silty clay that is splotched and mottled with yellow, gray, and brown. This material continues to the underlying limestone, which generally lies from 5 to 10 feet below the surface. There are a few outcrops of limestone in many areas.

An important variation of this phase consists of a soil of similar depth and consistence but having a brown or yellowish-brown rather than yellow subsoil. This variation is further characterized by an abundance of brown and black concretions, of variable size and hardness, distributed throughout the soil mass. It is a little less productive than the soil of the undulating phase. It covers about 100 acres, mostly 3 miles northwest of Fayetteville. Another variation consists of a soil of similar depth and consistence that has a light reddish-brown surface soil and a yellowish-brown subsoil. This occurs mainly just northwest of Mulberry.

Mimosa silt loam, undulating phase, occupies a total area of 6,080 acres throughout practically all parts of the Central Basin (pl. 1). The largest bodies are east of Fayetteville and east and west of Mulberry. This soil is associated mainly with other Mimosa soils, rolling stony land (Mimosa soil material), and smooth stony land (Mimosa soil material), and with the Dellrose, Greendale, Maury, and Mercer soils.

Nearly all of the land has been cleared and put into cultivation. About 35 percent of the cultivated land is devoted to corn, 20 percent to lespedeza, clovers and grasses, 8 percent to oats for hay, 5 percent to other hay crops, 12 percent to small grains, chiefly wheat, and 20 percent to pasture in rotation and miscellaneous crops, such as tobacco and potatoes. Expected yields of crops are about as follows: Corn, 20 to 35 bushels an acre; wheat, 10 to 15 bushels; oats, 20 to 40 bushels; barley, 20 to 30 bushels; lespedeza, 1 to 2 tons; clover and grass mixtures, 1 to 2 tons; potatoes, 50 to 100 bushels; and tobacco, 800 to 1,000 pounds.

At present this soil is managed in about the same way as normal Mimosa silt loam. The management requirements also are similar, except that, so far as control of erosion is concerned, a shorter rotation is permissible.

**Maury loam, rolling phase.**—This soil differs from the normal Maury loam chiefly in having steeper relief, the slope ranging from 8 to 15 percent; but in addition it is somewhat more eroded and is less deep over bedrock than the normal type. Because of these differences, it is not so good as that soil for agriculture. In regard to color, consistence, internal drainage, and natural fertility, the two soils are similar.

The rolling phase of Maury loam has a brown or light-brown mellow silt loam surface soil. The original thickness of this layer probably was 9 or 10 inches; but in nearly all areas a part of the surface soil has been lost by erosion, and the thickness now ranges from about 4 to 8 inches. The subsoil, extending to a depth ranging from about 18 to 28 inches, consists of yellowish-brown or reddish-brown silty clay loam that is rather firm but fairly friable. The material in this layer appears to be firmer than the corresponding layer of the normal Maury loam. The depth to bedrock ranges from about 3 to 9 feet and in most places is 4 to 5 feet.

Included with this soil are areas in which all or nearly all of the surface soil has been lost by accelerated erosion; and in these areas tillage is now performed in the upper part of the original subsoil. About 100 acres of such areas have fragments of limestone scattered over the surface and are indicated on the map by stone symbols.

Like normal Maury loam, areas of the rolling phase are well drained internally, easily penetrable by plant roots to all depths, high in phosphate, but medium to low in lime. On the other hand, this soil has more rapid external drainage and is more susceptible to erosion than the typical soil.

A total area of 3,328 acres is mapped. Irregular-shaped bodies occur in the Central Basin in association with bodies of Maury loam, smooth stony land (Mimosa soil material), and rolling stony land (Mimosa soil material).

All the land is cleared. About 80 percent is now in cultivation and about 20 percent is in pasture, which is generally of fairly good quality. The crops grown, rotations followed, and management practiced are similar to those on the normal Maury loam. Yields, however, are generally somewhat less.

In the management of this soil strict attention must be given to the control of runoff. If possible the rotation should be rather long and should include legumes and grasses. Tillage should be performed on the contour, and on the longer slopes it may be feasible to practice strip cropping on the contour. Broad-base terraces appear to be a practical aid in the control of runoff, and such mechanical structures may be necessary where intertilled crops are grown frequently. Apparently phosphate is not required on this soil, but lime is, particularly for the growing of legumes. Nitrogen probably is the main fertilizer element needed for most crops, except legumes.

**Mercer silt loam.**—Mercer silt loam, as well as its rolling phase, occupies positions similar to those of the Maury soils, except that the Mercer soils generally lie a little lower. They have developed over the limestone of the lower part of the Hermitage formation, whereas the Maury soils have developed over limestone of the upper part. The Mercer soils are chiefly yellow and low in phosphorus, whereas the Maury soils are brown and high in phosphorus. The Mercer soils are less productive of farm crops than the Maury soils.

In cultivated fields Mercer silt loam has an 8- to 14-inch surface soil of brownish-gray friable silt loam. In wooded areas or recently cleared areas the topmost part, to a depth of 3 or 4 inches, is stained brown with a rather small quantity of organic matter, and below this the material grades into light brownish-yellow or grayish-yellow heavy silt loam. The subsoil, which extends to a depth of 26 to 30 inches, is moderately compact sticky and plastic silty clay loam or silty clay that is brownish yellow with a few splotches of gray, brown, and yellow. The substratum consists of rather stiff and compact silty clay or silty clay loam highly splotched and mottled with yellow, gray, and brown. This material continues to the level-bedded limestone, which normally lies at a depth of 4 to 10 feet. This limestone generally contains some clay and shale as impurities.

A variation included with this soil in mapping differs from the typical soil in having a somewhat darker colored and lighter textured surface layer. This layer, which ranges from 3 to 15 inches in thickness, is light-brown silt loam containing a small quantity of very fine sand. The subsoil appears to be typical of Mercer silt loam. This variation covers about 100 acres, most of which is one-half mile north of Boonshill.

The slope of Mercer silt loam ranges from about 2 to 8 percent. Good tilth is easily maintained. Surface drainage is good, but internal drainage apparently is rather slow. The organic matter originally present in the surface soil becomes lost rather rapidly under cultivation, and the surface assumes a considerably lighter color. The soil is acid in reaction, indicating a poverty in lime, and is also probably low in phosphorus.

This soil covers only a small total area—1,344 acres. It occurs only in the Central Basin, mainly in the vicinities of Petersburg and Howell and to a less extent near Bledsoe and Blakeville. It is associated mainly with the Maury soils.

All the land is cleared, and nearly all of it is in cultivation. Corn, wheat, and lespedeza are the important crops. The estimated proportion of land devoted to each crop is similar to that of Maury loam. Expected acre yields are as follows: Corn, 15 to 30 bushels; barley, 15 to 25 bushels; wheat, 7 to 15 bushels; oats, 10 to 30 bushels; rye, 7 to 12 bushels; timothy and clover, 1 to 2½ tons; lespedeza, ¾ to 2 tons; lint cotton, 150 to 300 pounds; and potatoes, 50 to 90 bushels. The most common rotation is corn 1 year, wheat 1 year, and lespedeza 2 years. In some rotations corn is grown 2 years instead of 1. Other small grains are sometimes substituted for wheat, and clovers are substituted for lespedeza. In some areas crops are not systematically rotated.

As this soil is obviously rather low in organic matter and lime, it is important in any program of management to add lime and organic matter. Phosphorus also is probably required, but potash may not be necessary. Runoff needs to be controlled and erosion prevented. Under the prevailing rotation, in which an intertilled crop is grown only 1 year in 4, it would appear that a reduction in intertilled crops is not necessary. Where lespedeza is grown 2 or more years in succession, however, it would seem desirable to plant winter grains for protection of the soil in the winter. Tillage, so far as feasible, should be performed on the contour. Terraces may be practicable in certain situations, particularly where it is necessary to grow intertilled crops much of the time.

**Greendale silt loam.**—Greendale silt loam is a fairly well drained, moderately productive soil that has developed from accumulations of local wash at the foot of slopes occupied by the Dellrose and Mimosa soils and stony land.

The surface soil, extending to a depth of 8 to 18 inches, is light-brown or gray-brown mellow to friable silt loam. The subsoil is yellow-brown or brown friable heavy silt loam or silty clay loam that is slightly sticky and plastic when wet. This layer extends to a depth of 20 to 30 inches. The underlying material is yellow or yellowish-brown compact silty clay loam that is somewhat sticky, slightly plastic, and slowly pervious. Below a depth of about 3 feet it is streaked and splotched with gray, yellow, and brown. There are few to many brown and black hard and soft concretions throughout the soil mass. The depth of the deposit of local wash from which this soil is developed ranges from about 4 to 15 feet.

The surface soil contains a moderate amount of well-decomposed comparatively durable organic matter (humus). In places a few chert fragments are scattered over the surface, but they are not sufficiently numerous to interfere materially with cultivation. The surface soil and the subsoil are generally acid. The lay of the land is favorable; the slope ranges from about 1 to 8 percent. Surface drainage is good; internal drainage is moderately slow but adequate for the production of most crops of the area.

This soil occupies a total area of 7,424 acres. Small areas occur throughout the Central Basin, at the foot of slopes, mainly in association with areas of the Dellrose and Mimosa soils of the uplands and the Huntington, Egam, and Lindside soils of the bottom lands.

About 240 acres of an imperfectly drained and less productive soil is included in mapping. It has developed from similar material, lies in similar positions, and has a similar surface soil as the normal Greendale silt loam; but it has a lighter color and more poorly drained subsoil. The 12-inch grayish-brown surface soil is underlain by yellow-brown silty clay loam containing some gray, yellow, and brown splotches. This extends to a depth of about 24 inches, below which the material is highly mottled with gray, blue, yellow, and brown. During some wet seasons the water table stands within 12 inches of the surface. Most of this variation lies about 2 miles west of Concord Church, about 1 mile up Leatherwood Creek from its mouth, one-half mile north of East Cyruston, and one-half mile north of Cowley Bridge.

All the land is cleared and under cultivation. Corn, lespedeza, and wheat are the principal crops, and rye, barley, tobacco, hay, and forage crops are less important. Yields are about the same as those obtained on the undulating phase of Mimosa silt loam. It is estimated that corn occupies about 30 percent of the land, lespedeza and clovers 25 percent, wheat 10 percent, hay grasses and forage crops 10 percent, rye 3 percent, barley 2 percent, cotton 5 percent, and rotation pasture and miscellaneous crops 15 percent.

Greendale silt loam is capable of rather intensive use for crop production, particularly of intertilled crops, if it is adequately fertilized. It has a very low susceptibility to accelerated erosion; and control of runoff is not a serious problem.

**Greendale cherty silt loam.**—This soil differs from Greendale silt loam chiefly in that it has enough chert fragments on the surface and throughout the soil to interfere materially with cultivation. Both soils have developed on accumulations of local wash at the foot of slopes and are similar as regards color, texture, drainage, depth of soil, natural fertility, and present productivity.

The surface soil of Greendale cherty silt loam is light-brown cherty silt loam, from 8 to 14 inches thick. The subsoil, which extends to a depth of 20 to 26 inches, is brownish-yellow friable silty clay loam. This is underlain by a substratum of heavy tough somewhat sticky and moderately plastic silty clay loam or silty clay that is brownish-yellow with splotches of gray. The surfaces of the aggregates seem to be coated with colloidal material. Gray and yellow mottlings and streaks also occur in this layer. Concretions are present throughout the soil mass. In most places the thickness of the deposits of local wash, from which this soil is developed, is at least 4 feet; in some places it exceeds 15 feet.

Chert fragments in sufficiently large quantities to interfere materially with cultivation are strewn over the surface and are present throughout the surface soil and the subsoil. Under virgin conditions the surface soil contains a moderate quantity of well-decomposed organic matter (humus); but under cultivation much of this material disappears and the color of the surface soil becomes lighter. This soil occurs on slopes that range in gradient from about 2 to 8 percent.

Surface drainage is excellent, and internal drainage is fairly good. The soil is medium acid.

A total area of 1,856 acres is mapped. Small irregular-shaped bodies are scattered throughout the Central Basin and are associated chiefly with the Dellrose and Mimosa soils and other Greendale soils.

Practically all of the land has been cleared, and it is estimated that more than 80 percent is under cultivation. Corn, wheat, lespedeza, clovers, and hay grasses are the principal crops, although small acreages of other staple field crops are grown. The proportion of land devoted to the various crops and the acre yields obtained are about the same as those for the undulating phase of Mimosa silt loam. Like Greendale silt loam, Greendale cherty silt loam is capable of fairly intensive use for intertilled crops. As it is only moderate in natural fertility, it will require considerable fertilization if it is to be used chiefly for cash crops. Lime probably will be required for the successful production of legumes. Control of erosion is a minor problem, but it is not one to be ignored.

**Burgin silty clay loam, drained phase.**—This soil occupies low terracelike positions at the foot of slopes. It generally borders a stream or a first bottom, and most of it is subject to flooding during extremely high water. Although much of the parent material is general stream alluvium, the greater part apparently is local wash from the adjoining slopes. Like Burgin silty clay loam, this soil is characterized by a dark color, heavy texture, and rather tough consistence. It differs from that soil in being naturally somewhat better drained, in having a lighter colored surface soil, and in being more suitable for crop production.

The 11-inch surface soil consists of grayish-brown fairly friable silty clay loam. The subsoil, extending to a depth of about 2 feet, is dark-gray or nearly black heavy compact slowly pervious silty clay or silty clay loam. The underlying substratum is heavy sticky and moderately plastic silty clay or silty clay loam that is grayish-yellow mottled with orange, brown, and gray. This layer extends to a depth of 4 or more feet. The entire soil mass generally contains numerous brown and black hard and soft concretions.

This soil is free of gravel or stone and rather high in natural fertility. The surface is nearly level. Drainage, both internal and external, is slow, but it is sufficient for the production of most of the staple crops grown. Tilth conditions are generally fair, but the soil will puddle and become cloddy if worked when too moist.

Small areas of this soil, totaling 2,496 acres, are distributed throughout most of the Central Basin. The largest individual area is 7 miles northwest of Fayetteville. Other bodies are about 2 miles southwest of Dellrose, 1 mile west of Coldwater, 1 mile west of Molino, and 4 miles northwest, 3½ miles west, and 3½ miles east of Fayetteville.

All this land has been cleared. With the exception of a few areas in pasture, practically all of it is used for the production of crops. The usual staple field crops, such as corn, wheat, barley, lespedeza, and other hay crops, are grown. About 30 percent of the land is devoted to corn, 15 percent to lespedeza, 15 percent to other hay and forage crops, 5 percent to wheat, 3 percent to barley, 2 percent to rye, 10 percent to all other crops, and 20 percent to pasture. The following acre yields are commonly obtained: Corn, 25 to 35 bushels;

wheat, 10 to 15 bushels; barley, 20 to 30 bushels; and hay, 1 to 2 tons. Rotations are arranged to meet the needs and equipment of the individual operator.

The soil has a fairly wide range of crop adaptation, but it appears to be best suited to the production of corn and hay. The management problem is chiefly that of maintaining a good tilth and applying the proper fertilizers for the crops grown. As the soil is reasonably fertile, the fertilizer requirements are not high. There is no problem of erosion control.

**Cumberland silt loam, slope phase.**—This soil is similar to Cumberland silt loam in manner of origin, sequence of layers, content of organic matter, physical properties, and, in fact, all its general characteristics except slope. The slope ranges from about 8 to about 15 percent in gradient, whereas the normal soil occurs only on slopes of less than 8 percent. Like the normal Cumberland silt loam, this slope phase lies on old, high terraces and has a grayish-brown or brown friable silt loam surface soil and a reddish-brown or yellowish-brown firm but friable subsoil. A small part of the original surface soil has been lost over a period of many years.

Because of the steeper slope, this soil is more susceptible to accelerated erosion than the normal type; consequently depletion of fertility through loss of organic matter and mineral plant nutrients is greater. Largely for this reason, it is considered a Second- rather than a First-class soil.

Only 128 acres of this soil are mapped, and they occur in the same general areas as the normal type and are associated with similar soils. Practically all of this soil is under cultivation. It is used for the production of similar crops and is managed in a similar way as the normal type, but the yields of most crops are somewhat lower. Like typical Cumberland silt loam, this soil requires similar fertilizers for corresponding crops, but in addition it requires more attention for the control of runoff and the prevention of erosion.

**Cumberland silt loam, eroded phase.**—Like the normal Cumberland silt loam, this eroded soil occurs on the old, high terraces along the Elk River. It occupies eroded areas having a mild slope, occurring chiefly within the more prominent bends or loops of the river. It differs from the normal Cumberland silt loam mainly in that approximately one-half to two-thirds of the original surface soil has been lost by accelerated erosion. It differs from the slope phase of Cumberland silt loam chiefly in that it occupies gentler slopes and is moderately eroded.

The 3-to 6-inch surface layer is grayish-brown or brown friable silt loam. The subsoil and the substratum are similar to the corresponding layers in the normal Cumberland silt loam, except that the subsoil of this eroded soil appears to be somewhat less friable. The slopes of both soils range from about 2 to 8 percent.

An aggregate of 4,736 acres of this soil is mapped. Its soil associates are similar to those of Cumberland silt loam. Small severely eroded patches having a heavier textured surface soil and a few outcrops of limestone are included.

This soil is considered a Second-class rather than a First-class soil, chiefly because of the injury sustained from erosion. Loss of the original surface soil has been accompanied by loss of organic matter and plant nutrients and impairment of tilth. Even though the tilth has become less favorable, this soil still has good physical properties, and it responds well to improvement practices.

All the land has been cleared and about 85 percent of it is in cultivation. Corn, wheat, oats, rye, barley, lespedeza, clovers, alfalfa, potatoes, sweetpotatoes, cotton, and tobacco are produced. The rotations vary considerably, but the following one is most common: Corn, 1 to 3 years; small grain, 1 year; lespedeza, 1 to 3 years. Yields average between 20 and 40 percent less than on the normal Cumberland silt loam.

The management requirements are similar to those of the normal silt loam, except that more attention needs to be given to the control of runoff and the maintenance of good tilth.

**Humphreys silt loam.**—Humphreys silt loam occupies those gentle terracelike slopes that lie between the uplands occupied by the Dickson and Baxter soils and the bottom lands occupied by the Ennis and Melvin soils. The parent material, which is partly general stream alluvium and partly local alluvium, has been washed from the Dickson and Baxter soils of the Highland Rim.

The surface soil, extending to a depth of 9 to 14 inches, is light-brown or gray-brown friable silt loam. In the more recently cleared areas the topmost 4 or 5 inches is somewhat stained with well-incorporated organic matter, but in the old fields most of the organic matter has disappeared and the surface is light-colored. The subsoil, extending to a depth of 3 to 4 feet, gradually changes from light-brown heavy silt loam in the upper part to brownish-gray silty clay loam in the lower part. It is friable throughout. In most areas a few buckshot-sized both hard and soft brown and black concretions are present in this layer. At a depth of 2 to 3 feet there is generally a thin layer of fine chert gravel. The surface soil is ordinarily free of chert gravel except in a few small areas. Both the surface soil and the subsoil are acid. Drainage, both internal and external, is good. The slopes are gentle, having a gradient in most places of less than 5 percent.

Small areas of this soil, totaling 1,792 acres, are scattered along the streams in the Highland Rim. Narrow bodies border the Flint River, Kelly and Hester Creeks, and the upper part of Coldwater Creek. The largest area is in the vicinity of Macedonia Church along the West Fork of the Flint River.

This soil is easily maintained in good tilth, is easy to work, is not appreciably susceptible to erosion, and responds fairly well to applications of fertilizer. On the other hand, it is acid in reaction, rather low in natural fertility, and only moderate in productivity. It is chiefly for those reasons that it is considered a Second-class soil.

Practically all of the land has been cleared, and about 30 percent of it is devoted to corn, 20 percent to cotton, 20 percent to lespedeza and clovers, 10 percent to small grains, 5 percent to potatoes, and 15 percent to other crops, such as watermelons, sorghums, and hay grasses. The following acre yields are commonly obtained: Lint cotton, 300 pounds; corn, 20 to 30 bushels; lespedeza, ¾ to 1½ tons; potatoes, 90 bushels; and sweetpotatoes, 100 bushels. Fertilizer is applied for cotton at the rate of 200 pounds an acre of a 3–10–3 mixture. A management program including a larger acreage of legumes over a longer period of time, together with the judicious use of lime and phosphate, would be expected to increase the productivity of this soil.

**Sequatchie very fine sandy loam.**—This soil occupies well-drained young low terraces (sometimes referred to as second and third bottoms) along the Elk River. The material composing it consists of general alluvium, washed for the most part from soils developed over sandstones and to a less extent from shale and limestone materials.

The 7- to 10-inch surface soil is grayish-brown or brown loose very fine sandy loam. The subsoil, extending to a depth of 24 to 32 inches, is light-brown or yellow-brown friable heavy very fine sandy loam; and the substratum, extending to a depth of 4 to 6 feet, is light-brown or faintly reddish brown heavy fine sandy loam with a few faint splotches of gray, yellow, and brown. The underlying material, which is variable, is generally lighter colored than the substratum and in places contains a few fragments of sandstone or chert gravel. There are no gravel or sandstones in the surface soil or in the subsoil. The entire soil mass is uniformly friable, but in places it ranges in texture from loam to loamy sand.

Only a moderate quantity of organic matter is present in the topmost 3- or 4-inch layer, and it is not so durable as in the heavier soils. The soil is medium to strongly acid in both the surface soil and the subsoil. Drainage is naturally good, even on the level areas, because of the perviousness of the substratum; but the soil holds sufficient moisture to carry crops through ordinary periods of dry weather. It has good tilth and is easy to work, but it is only moderately productive and is relatively low in natural fertility.

Most of the areas of Sequatchie very fine sandy loam are on the low terraces, locally referred to as second bottoms, but some are on the somewhat higher terraces, the so-called third bottoms. The soil on these third bottoms is older and shows more difference in color between the surface soil and the subsoil. In some places, particularly on the third bottoms, the subsoil has a somewhat red cast. Most of this higher lying older variation is mapped just north of Cowley Bridge and 1 mile south of Fayetteville.

Sequatchie very fine sandy loam covers an aggregate area of only 704 acres, practically all of which lies along the Elk River. It is associated with the Huntington, Etowah, and Wolftever soils.

All the land is cleared and in cultivation. The estimated proportions of land devoted to each crop are as follows: Corn, 30 percent; cotton, 10 percent; lespedeza and clovers, 20 percent; hay grasses and other forage crops, 10 percent; oats, 5 percent; wheat, 10 percent; barley, 5 percent; and miscellaneous crops, 10 percent. Corn normally yields 20 to 35 bushels an acre, wheat 8 to 15 bushels, barley 15 to 20 bushels, oats 20 to 30 bushels, hay 1 to 2 tons, and cotton 200 to 300 pounds. This soil has a rather wide crop adaptation. The management problem is chiefly one of increasing the fertility. Increased yields are to be expected from adding organic matter, lime, and phosphate. The addition of nitrogen is required for most crops except legumes. The control of erosion presents no problem on this soil.

**Egam silt loam.**—This soil occurs in the Central Basin, where it is associated with the Huntington soils, from which it differs chiefly in having a compact layer at a depth of about 2 feet. Like the Huntington soils, Egam silt loam lies in stream bottoms and consists of general stream alluvium, most of which originated in the uplands underlain by limestone. It also is productive and well adapted to growing corn.

Egam silt loam consists of brown mellow silt loam to a depth of about 10 inches. Below this the material is similar in color but a little heavier in texture—heavy silt loam or silty clay loam. At a depth of 18 to 30 inches this rests on a compact layer, extending to a depth of 40 to 60 inches. This compact layer consists of tight heavy plastic silty clay or silty clay loam having a fairly well defined blocky structure. The upper part is dark brown or nearly black. With increasing depth the color gradually changes to gray brown with a few splotches of brown, yellow, and gray. The surface of the aggregates is glossy, indicating a coating of colloidal material. The dark color apparently is caused by a high content of organic matter. This layer is slowly pervious to water.

It appears that this soil has been formed by the relatively recent deposition of silty material upon an older soil that was heavy in texture, high in organic matter, and poorly drained. It is probable that the dark compact layer in the present soil was the surface layer of the old soil.

The entire soil apparently is relatively rich in rather durable organic matter and relatively high in natural fertility. The surface soil is slightly to medium acid. Under favorable moisture conditions tilth conditions are good to excellent. As the surface is nearly level, external drainage is slow; and, because the compact substratum impedes the movement of water, internal drainage is likewise slow. This soil is, however, adequately drained for the production of corn, for which purpose most of it is used. A few areas are tile drained, and on such areas the yields of crops are greater than elsewhere. The land is subject to occasional flooding.

Egam silt loam occupies a total area of 3,968 acres. The largest bodies are along Cane Creek, but fairly large ones border Kelly Creek, Chicken Creek north of McBurg, Little Swan Creek, the upper part of Swan Creek, the lower part of Norris Creek, and Mulberry Creek near Mulberry. Small areas are scattered along a few other small streams and the Elk River. This soil is associated chiefly with the Burgin, Lindside, Huntington, and Etowah soils. In a few areas the boundary lines between Egam silt loam and these associated soils are rather arbitrarily placed. Egam silt loam is also associated with rolling stony land (Mimosa soil material), smooth stony land (Mimosa soil material), and the Mimosa, Greendale, and Maury soils.

All the land is cleared and is under cultivation. Under favorable moisture conditions it is productive, and it is used largely for the growing of corn. Some of the areas are planted to corn almost every year. The range in crop adaptation is comparatively narrow, largely owing to the slow drainage and winter flooding. Because of these unfavorable features, the soil is not well adapted to the production of wheat, barley, and alfalfa. A little barley, however, is grown with apparent success, but injury to this crop is likely to result from flooding during some winters.

Although the range in natural crop adaptation of Egam silt loam is rather narrow, this soil is easy to work, easy to conserve, and highly productive of corn and certain hay crops. Corn yields from 30 to 40 bushels an acre. If barley is not injured by winter floods, yields of 40 bushels to an acre are sometimes obtained. Hay commonly yields as high as 3 tons an acre. On some areas mapped as this soil, however, yields are considerably lower. About 75 percent of the land is devoted to corn, 20 percent to lespedeza and other hay crops, 3 percent to barley, and 2 percent to other small grains. Fertilizers are not commonly used on Egam silt loam.

**Ennis silt loam.**—Ennis silt loam is a well-drained moderately productive soil of the stream bottoms. It consists of general stream alluvium that has originated almost exclusively from the Dickson and Baxter soils of the Highland Rim, and nearly all of this soil occurs in the bottoms on the Highland Rim. It is lighter in color and less productive than the Huntington soils, which occur in the Central Basin.

Ennis silt loam is light brown or brownish gray to a depth of 10 to 14 inches. Below this the color changes with increasing depth from light yellowish brown to light brownish yellow, and below a depth of 30 inches mottlings of yellow, rusty brown, and gray appear. The texture is silt loam throughout, although in many places it is heavier silt loam in the subsoil than in the surface layer. Layers of fine chert gravel are common at a depth of 2 to 3 feet.

Organic matter is present in a moderate quantity, but it apparently disappears rather readily under cultivation, leaving the soil lighter colored. In small scattered patches much chert gravel lies on the surface.

The soil occupies comparatively well drained areas along the larger streams, chiefly on the Highland Rim. It is subject to periodic flooding and receives a thin deposit of material nearly every year. Surface drainage is rather slow, but internal drainage is fairly good. The soil is acid in reaction, which indicates a need for lime. The soil probably is deficient in certain other plant nutrients, especially phosphate. Tilth conditions are excellent, and the moisture content in most places is very favorable.

A total of 1,024 acres of this soil is mapped. The largest body is along the upper reaches of Coldwater Creek, the second largest is near Lincoln, and smaller bodies are widely scattered along streams over the entire Highland Rim.

All this land is cleared. About 60 percent of it is devoted to corn, 20 percent is used for hay and forage crops, and 20 percent is allowed to lie idle each season. Corn usually yields between 15 and 30 bushels an acre. Crop adaptations are restricted because flooding normally occurs in the winter and spring. Chiefly for this reason, the soil is not well suited to the production of small grains. On the other hand, it is well suited to hay and forage crops and corn. Increased yields of corn are to be expected from the application of complete fertilizers high in nitrogen, and increased yields of hay are to be expected from the application of lime and phosphate.

**Lindside silt loam.**—Lindside silt loam for the most part is restricted to first bottoms along the Elk River and its tributaries. Like the associated Huntington soils, it consists of general alluvium, most of which has been washed from soils underlain by limestone. Lindside silt loam ranks intermediate in drainage between the well-drained Huntington soils and the poorly drained Melvin soils.

The surface layer, extending to a depth of 12 to 20 inches, is gray-brown or light-brown mellow silt loam, underlain by friable brownish-gray heavy silt loam that is mottled with dark brown, yellow, and gray. The mottling is indicative of poor drainage in the subsoil and consequent poor aeration and oxidation. The reaction is medium acid in most areas but ranges from neutral to strongly acid. Surface drainage is slow. Internal drainage is fairly good to a depth of 12 to 20 inches, below which it is poor. Good tilth is easily maintained, and natural fertility is comparatively high. In most years the soil is flooded one or more times during the winter and spring.

A fairly large total area—11,712 acres—is mapped. The soil occurs along practically every permanent stream in the Central Basin, in association with the Huntington, Egam, Etowah, Greendale, Mimosa, Mercer, and Maury soils (pl. 1).

Several variations are included with this soil on the map. Along the smaller streams the soil appears to contain somewhat more organic matter than along the larger streams. Small fragments of chert are present in some of the areas along the smaller streams. In other places, mainly along the larger streams, the subsoil is compact. Such areas are about 2 miles east of Molino, along Little Swan Creek, northeast of McBurg, along Swan Creek 2⅓ miles north of United States Highway No. 64, and in Hog Hollow at its junction with Warren Hollow. Another variation consists of soils resembling the Lindside but lying above overflow. The largest of these are 1 mile north of Coldwater and 1½ miles southwest of Fayetteville.

Although Lindside silt loam is a comparatively fertile and easily workable soil, its suitability for agriculture is significantly impaired by its inadequate drainage and susceptibility to flooding. Chiefly because of these features, it is considered a Second-class soil.

All the land has been cleared and is now either under cultivation or in pasture. The larger areas are managed and cropped in the same manner as the Huntington soils, but the yields obtained are from 10 to 30 percent less. The smaller areas are devoted to corn, hay, and grass (pl. 1, *B*). Corn produces 20 to 40 bushels and hay as much as 3 tons to the acre. About 30 percent of this soil is devoted to corn, 30 percent to pasture, 25 percent to clovers, lespedeza, and other hay crops, 5 percent to small grains, and 10 percent to various other crops.

Under natural drainage conditions Lindside silt loam is exceedingly well adapted to hay and pasture. It remains moist, and pasture plants survive dry periods in late summer and early fall when pastures in the upland become dry. A mixture of lespedeza, timothy, redtop, and white clover generally does well on this soil. In areas that do not remain wet for long periods, bluegrass may be added to the grass mixture to good advantage. Although high yields of corn are frequently obtained, particularly during dry growing seasons, injury to this crop from wet conditions or flooding is rather common. In a few areas that have been tile drained, yields of corn and other crops have been increased significantly. This soil is not adapted to the production of small grains except where it is artificially drained.

### THIRD-CLASS SOILS

The Third-class soils have one or more markedly unfavorable features such as poverty of mineral plant nutrients, undesirable physical properties, shallowness to bedrock, scarcity of organic matter, steep slopes, stoniness, and eroded condition. Since these unfavorable features affect the use capabilities and management requirements of these soils through the conditions of productivity, workability, and conservability, it is equally true that one or more of these factors is more adverse in the Third-class soils than in the First- and Second-class soils, but less adverse than in the Fourth- and Fifth-class soils. On the basis of differences in internal and external soil characteristics, the Third-class soils are separated into Dickson silt loam, rolling phase; Dickson cherty silt loam; Dickson cherty silt loam, rolling phase; Baxter cherty silt loam, eroded phase; Frankstown stony silt loam; Frankstown cherty silt loam; Frankstown cherty silt loam, shallow phase; Dellrose cherty silt loam; Mimosa stony silt loam, undulating phase; Mercer silt loam, rolling phase; Greendale silt loam, slope phase; Greendale cherty silt loam, slope phase; Burgin silty clay loam; Cumberland silt loam, eroded slope phase; Sequatchie loamy fine sand; Wolftever silt loam; Humphreys gravelly silt loam; and Ooltewah silt loam.

**Dickson silt loam, rolling phase.**—This soil differs from the normal Dickson silt loam chiefly in relief. The normal soil has a nearly level to undulating surface and a slope of 2 to 8 percent whereas this soil is rolling with a slope of 8 to 15 percent. Like the normal soil, this soil has a light-gray mellow silt loam surface soil, a brownish-yellow friable silty clay loam subsoil and a hardpan below the subsoil. Furthermore, it is similarly low in organic matter and mineral plant nutrients and is strongly acid in reaction. Internal drainage is rather slow, but external drainage is moderately rapid. A considerable part of the original surface soil has been lost in many of the cleared areas.

Dickson silt loam, rolling phase, occupies a total area of 704 acres. Like the other Dickson soils, with which it is associated, it occurs only on the Highland Rim. The largest body is just northeast of Corder Crossroads; smaller areas are southwest of this point. Included with this soil is a small area, about one-half mile west of Corder Crossroads, in which the soil contains a considerable quantity of small fragments of angular chert on the surface and throughout the soil mass but is otherwise typical of the rolling soil.

It is estimated that about two-thirds of this rolling land is cleared and is used and managed in practically the same way as the cleared areas of Dickson silt loam, but the crop yields obtained are significantly lower. Largely because of the steeper slope, this soil is more exacting in its management requirements than the normal type. Under the present use and management, which is the growing chiefly of intertilled crops with the application of commercial fertilizers, the soil is eroding and deteriorating. It seems that a rather long rotation, including legumes and grasses, together with proper fertilization will be necessary in order to maintain or improve the productivity of this soil.

**Dickson cherty silt loam.**—This soil is differentiated from Dickson silt loam chiefly on the basis of differences in content of chert fragments. The silt loam is practically free of such fragments, whereas the cherty silt loam contains enough fragments to interfere materially with cultivation. In many respects the two soils are similar, although the cherty soil is somewhat lower in organic matter, has a slightly lighter colored surface soil, is somewhat lower in natural fertility, and generally has a slightly more sloping relief. In fields, the surface soil is between 5 and 8 inches thick and consists of very light gray friable cherty silt loam. The subsoil, which extends to a depth of about 24 inches, is yellow or brownish-yellow friable cherty silty clay loam. Underlying the subsoil is the hardpan consisting of a compact cementlike silty clay loam or silty clay that is brownish gray with mottlings of yellow, gray, and brown.

In most places fragments of chert are numerous on the surface and throughout the soil mass. Most of them are less than 4 inches in diameter. The soil is not uniform, however, in regard to the quantity of such fragments. In some places the quantity is fairly high; in others, low. The soil is low in content of organic matter and of mineral plant nutrients and is strongly to very strongly acid in reaction. The slope ranges from about 3 to 8 percent, but in most places it is between 5 and 8 percent. Surface drainage is good; internal drainage, impaired by the hardpan, is rather slow. The soil is adequately drained, however, for the production of most crops common to the locality. The surface soil and the subsoil can be easily penetrated by roots, but the hardpan can be penetrated only with great difficulty if at all. The soil is physically suitable for the production of crops but is not so well adapted to this use as Dickson silt loam.

A soil included in mapping differs from the normal in having a yellowish-gray rather than yellow subsoil and in containing many more fragments of chert. This variation is somewhat less productive. It occurs only in a few small areas about three-fourths of a mile north of Vann School.

Dickson cherty silt loam occupies a fairly large total area—8,192 acres. Like the other Dickson soils, it occurs only on the Highland Rim. The greater part lies in the southeastern part of the county in the general area outlined by a rough square, the corners of which are Flintville, Howell Hill, Lincoln, and McCracken School. Several bodies are southwest of Skinem and Roland Hill Church. This soil is associated chiefly with Dickson silt loam and with the rolling phase of Dickson cherty silt loam.

It is estimated that about 80 percent of Dickson cherty silt loam is in cultivation. It is used and managed in practically the same way as Dickson silt loam, except that the proportion of the cherty soil devoted to cotton is probably a little greater. Yields on the cherty soil are somewhat lower, probably as much as 25 percent lower for some crops. The management requirements of the two soils are similar.

**Dickson cherty silt loam, rolling phase.**—The chief difference between this soil and normal Dickson cherty silt loam is that it occupies steeper slopes—from 8 to 15 percent in gradient—whereas the gradient of the normal soil ranges from 2 to 8 percent. The relief is similar to that of the rolling phase of Dickson silt loam, but this soil differs from that soil in containing a large quantity of fragments of chert on the surface and throughout the soil mass. Chiefly because of the comparatively steep slope and the abundance of fragments of chert, this soil is physically less suitable for crop production than the other Dickson soils.

Like normal Dickson cherty silt loam, this rolling soil has a very light gray cherty silt loam surface soil, a yellow or brownish-yellow friable cherty silty clay loam subsoil, and a hardpan just below the subsoil. In cultivated fields a considerable part of the original surface soil, probably about one-half, has been eroded, and therefore this layer is only about 4 or 5 inches thick. In some areas the hardpan is not so well developed as in the normal soil.

A variation having a yellowish-gray rather than a yellow subsoil and containing considerably more chert than normal is included. This variation occurs chiefly in small bodies about three-fourths of a mile north of Vann School.

Like the other Dickson soils, this soil is low in organic matter and mineral plant nutrients and is strongly acid in reaction. Internal drainage is rather slow, but external drainage is fairly rapid—rapid enough to cause considerable erosion when the soil is bare.

There is an aggregate area of 3,776 acres of this soil. It is associated chiefly with Dickson cherty silt loam and for the most part occupies slopes adjacent to drainageways.

About 80 percent of the land is cleared. The greater part of the cleared land is used and managed in practically the same way as normal Dickson cherty silt loam, but crop yields are somewhat lower. Row crops, chiefly cotton, are grown to a considerable extent. On most farms, crops are not rotated systematically and adequate measures for maintaining fertility and controlling runoff have not generally been adopted. Under such use and management a considerable part of the original surface soil has been lost and the fertility, which originally was low, has been further depleted. Obviously there must be some shift from intertilled crops to close-growing crops, in conjunction with proper fertilization, if this soil is to be maintained or improved. It might be well to consider using it for hay and pasture a part of the time. Among the fairly well adapted hay and pasture plants are lespedeza, crimson clover, redtop, and orchard grass. On the north-facing slopes bluegrass apparently will grow if the soil is treated with enough lime and phosphate.

**Baxter cherty silt loam, eroded phase.**—This is one of the more extensive soils in the county. It is particularly prominent on the crests of the ridges extending from the Highland Rim into the Central Basin and on isolated remnants of the Highland Rim scattered throughout the Central Basin. It differs from Baxter silt loam chiefly in containing many more fragments of chert, occupying more sloping areas, and in having lost considerably more of the original surface soil by accelerated erosion. It further differs in containing less organic matter and plant nutrients, in being more permeable, and in being less productive. It differs from the undulating phase of Baxter cherty silt loam chiefly in its steeper slope and more eroded condition.

The 5- to 8-inch surface soil is fairly friable heavy silt loam ranging in color from grayish brown to light reddish brown. The subsoil, extending to a depth of 20 to 26 inches, is reddish-brown or brownish-red moderately friable silty clay loam, somewhat plastic and sticky when wet and fairly hard when dry. The underlying material is fairly tight and compact silty clay or silty clay loam, dull-brown or dull reddish-brown splotched and mottled with brown, yellow, and gray. This material grades into a bed of chert fragments at a depth of 3 to 6 feet. The parent material is residual from the weathering of cherty limestones. Most of it is thought to have come from Fort Payne chert, although in some places a large part apparently has come from the limestone of the lower part of the Warsaw formation.

Numerous fragments of chert are scattered over the surface and throughout the soil mass. In most places these are numerous enough to interfere materially with tillage operations. One-half or more of the original surface layer has been lost by erosion. The soil is well drained, both internally and externally, and it is penetrable by plant roots to a great depth. It is acid in reaction and rather low in content of mineral plant nutrients and organic matter. The slope ranges from about 8 to 15 percent.

Included with this soil is a variation in which practically none of the original surface soil has been lost; and in such areas the surface layer is 10 or 12 inches thick. Also included are a few areas in which practically all of the original surface soil has been lost and tillage is now performed in the upper part of the original subsoil. A more significant variation consists of a soil that has a grayish-brown or yellowish-brown mellow silt loam surface soil, from 8 to 18 inches thick, and a moderately friable brownish-yellow silty clay loam subsoil that extends to a depth of about 3 feet. Fragments of chert, some as much as 10 inches in diameter, are numerous throughout the soil. The parent material is probably derived chiefly from St. Louis limestone rather than Fort Payne chert or from the limestone of the Warsaw formation. This variation occupies about 300 acres. It occurs on the cherty slopes at the foot of Stovall Mountain southeast of Elora (Stovall Mountain proper is in Madison County, Ala.) and on the break of a tablelike area about one-half mile east of Elora. It is more productive than most of this eroded soil.

This eroded phase of Baxter cherty silt loam occupies a total area of 7,360 acres. It occurs chiefly on the crests and upper slopes of the narrow ridges that extend from the Highland Rim into the Central Basin; but it also occupies the crests of some of the high ridges, which are isolated remnants of the Highland Rim, throughout the Central Basin. It is associated with other Baxter soils and with the Dickson, Dellrose, and Frankstown soils.

All this land is cleared. About 25 percent of it is temporarily idle, and about 75 percent is in cultivation. The part in cultivation is used and managed in much the same way as the other Baxter soils. Corn and cotton are the main crops. Corn occupies about 30 percent of the cultivated land, cotton 25 percent, lespedeza 15 percent, and soybeans, cowpeas, small grains, other crops, and pasture 30 percent. Acre yields commonly obtained are 150 to 250 pounds of lint cotton, 15 to 25 bushels of corn, one-half to three-fourths of a ton of lespedeza, and three-fourths to 1 ton of soybeans. A systematic rotation of crops is not followed on most farms. Instead, the soil is given a rest period now and then; hence a large proportion of this soil lies idle.

The productivity could be greatly increased by adopting a rather long rotation in conjunction with proper fertilization. This would eliminate the necessity for the rest period, control erosion more effectively, and at the same time increase the productivity for cash crops. The rotation should include legumes and grasses. For the

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successful production of such plants, lime and phosphate are required. In order to aid in the control of runoff and erosion, tillage should be performed on the contour, and where practicable it might be well to consider contour strip cropping.

**Frankstown stony silt loam.**—This soil is characterized by an abundance of both large and small fragments of chert. It differs from Frankstown cherty silt loam in containing not only more but also larger fragments of chert. It occurs on the top of ridges and hills, which are remnants of the Highland Rim and rise to about 300 feet above the adjacent lowland. This soil is considered to be moderately fertile and physically suitable for the production of crops, but it is rather difficult to work. Areas of this and other Frankstown soils are locally referred to as black locust land.

The 12- to 16-inch surface layer is dark-gray or grayish-brown friable silt loam. In woods, the topmost 2 or 3 inches of soil contains a considerable amount of fairly well decomposed organic matter. The subsoil, extending to a depth of 2 to 3 feet, consists of moderately friable silty clay loam ranging from brownish yellow to pinkish yellow. Fragments of chert are abundant in both of these layers. Many of the fragments are rather large—some of them as much as 18 inches in diameter. In many places there are in addition fragments of fine-grained sandstones and siltstones. The subsoil grades into the substratum, which is similar but contains splotches of red, yellow, and gray. The quantity of chert in the substratum increases with depth, and a bed of nearly pure chert is generally reached from 3 to 7 feet below the surface.

Frankstown stony silt loam has developed from material that is residual from the weathering of highly cherty limestones. It overlies the Fort Payne chert, which probably contributed most of the parent material, but some of the parent material apparently has been contributed by the limestone of the Warsaw formation, which originally overlaid the Fort Payne chert.

Fragments of chert comprise as much as 35 or 40 percent of the surface soil and subsoil. These fragments range from small pieces of gravel to large blocks or stones as much as 18 inches in diameter. Some of the chert is dense and heavy; some is porous and light. The greater part of this soil occupies slopes ranging from about 8 to 15 percent in gradient, but some occupies gentler slopes. When bare it is somewhat susceptible to erosion. The soil is about medium in natural fertility. It is acid in reaction, however, which indicates a need for lime; and it probably also needs phosphate. Drainage, both internal and external, is good.

Frankstown stony silt loam occupies a total area of 4,416 acres. It lies on top of high ridges and hills in the Central Basin and is associated with other Frankstown soils and with the Baxter and Dellrose soils. It is easily differentiated from the associated soils by its dark-gray surface layer and yellow subsoil.

All of this land is cleared, and about 75 percent is under cultivation. Corn is the principal crop, and hay crops rank next in importance. Wheat, rye, and a few other crops common to the area are grown to a limited extent. Yields of corn range from about 15 to 35 bushels an acre. It is a rather general practice to grow a grain crop, usually corn, only once in every 2 or 3 years, but frequently the interval is longer. During such intervals much of the soil lies idle, but a considerable part is planted to lespedeza and used for hay or pasture.

Productivity could be significantly increased by adopting a rather long rotation in conjunction with the application of needed amendments, particularly lime and phosphate. Legumes and grasses should be included in the rotation.

**Frankstown cherty silt loam.**—This inextensive and unimportant soil occupies tops of hills and ridges that are remnants of the Highland Rim. It is well drained, moderately fertile, and characterized by a high content of chert fragments, most of which are less than 4 inches in diameter. It differs from Frankstown stony silt loam, which is more extensive, chiefly in that the fragments are smaller. It has a 12- to 16-inch dark-gray or grayish-brown friable cherty silt loam surface soil and a brownish-yellow or pinkish-yellow moderately friable cherty silty clay loam subsoil. At a depth of about 3 to 6 feet a bed of nearly pure chert is reached.

Most of this soil occupies slopes ranging from 8 to 15 percent in gradient, but some occupies gentler slopes. Drainage, both internal and external, is good. Although this soil is moderate in fertility, it needs lime and phosphate in order to produce high yields of crops. It is physically suitable for the production of crops, but its workability is impaired considerably by the abundance of fragments of chert.

Only 384 acres of this soil are mapped. The largest bodies are 2 to 3 miles north of McBurg and 2 miles north of Boonshill. Nearly all of the land is cleared. It is used and managed in practically the same way as Frankstown stony silt loam, and it is similar in regard to management requirements. Of the two soils, however, the cherty silt loam is considered a little more suitable for the production of crops because it is somewhat easier to work.

**Frankstown cherty silt loam, shallow phase.**—This soil, which is locally referred to as locust or chestnut land, is shallower over bedrock than the other Frankstown soils and is underlain by somewhat different rocks. The bedrock immediately under the typical Frankstown soils consists chiefly of chert, but under this shallow soil it consists of alternate beds of chert and shaly fine-grained sandstone. This shallow soil is lower in natural fertility and less productive than the other Frankstown soils.

The surface soil extends to a depth of about 12 inches and consists of grayish-brown or light-brown mellow silt loam. In the lower part the color becomes brownish yellow. Under virgin conditions the topmost inch or two contains a considerable quantity of organic matter. The subsoil extends to a depth of about 22 inches and consists of yellow or pale-yellow moderately friable silty clay loam. Below this the material is moderately plastic and sticky silty clay loam that is yellow with splotches and mottlings of gray and brown. At a depth of 2 to 4 feet this material rests on disintegrated and partly weathered stratified yellow rock that looks like shaly fine-grained sandstone. Apparently this soil is developed over the lower part of the Fort Payne chert formation, which has the aspect of shaly sandstone with many cherty beds (*1*, *2*), whereas the normal Frankstown soils probably are developed chiefly over the upper part of this formation.

Fragments of both chert and this yellow rock are distributed over the surface and throughout the soil mass in quantities sufficient to interfere materially with cultivation. The fragments of chert are blocky, whereas those of the yellow rock are platy and slablike. The gradient of this soil ranges from about 3 to 15 percent. Drainage, both internal and external, is good. Natural fertility is moderate to low, and the reaction is acid. Penetration of roots is limited by the bedrock, which in most places lies from 2 to 4 feet below the surface.

This soil occupies a total area of 3,456 acres. Like the other Frankstown soils, it occupies the crests of ridges and hills throughout the Central Basin (pl. 1, *B*). The largest areas are in that part of the county bounded by a line extending from the northern county line south to Howell, from Howell to Mimosa, and thence north to the county line. Several bodies are on the ridges in the vicinity of Crystal Ridge School. This soil is associated chiefly with other Frankstown soils and with the Dellrose soils.

Practically all of this land has been cleared. About 70 percent of it is now under cultivation, and the rest is temporarily idle or resting. Corn, the principal crop, normally yields between 10 and 25 bushels an acre. Hay crops and small grains are grown.

It seems that this soil could be not only used more efficiently but also made more productive by adopting a rather long rotation than by leaving it idle so much of the time. Legumes and grasses should occupy the greater part of the rotation. Lime and phosphate are needed for grasses and legumes.

**Dellrose cherty silt loam.**—Dellrose cherty silt loam occupies the steep slopes that extend from the Highland Rim down to the Central Basin (pl. 3, *B*). It represents a condition where the surface soil consists chiefly of cherty material that has rolled or drifted down from the Frankstown, Baxter, and Dickson soils above; and the subsoil consists mainly of material that is residual from the weathering of fairly high grade chert-free limestones. This soil is enriched somewhat by seepage from the underlying level-bedded limestones, some of which contain phosphates.

Dellrose cherty silt loam occupies slopes that range between approximately 15 and 30 percent in gradient. In fields the surface layer consists of grayish-brown or light yellowish-brown friable silt loam containing an abundance of angular fragments of chert (gravel). Such fragments constitute from 20 to 30 percent of the soil mass. Most of them range from one-half to 4 inches in diameter, but a few are as much as 8 inches in diameter. The thickness of this layer ranges from about 6 to 30 inches, but in most places it is between 12 and 15 inches. In woods the topmost 2 or 3 inches contains a moderate quantity of fairly well decomposed organic matter. The subsoil, extending to a depth of 24 to 45 inches, consists of moderately plastic and sticky silty clay or silty clay loam ranging in color from brownish yellow to yellow. Light-gray splotches are generally present in the lower part. The material below the subsoil consists of fairly compact sticky and plastic silty clay or silty clay loam that is yellow or grayish yellow with numerous mottlings of gray and a few of red and brown. This material extends down to the limestone, which lies at a depth of 4 to 30 feet.

In most places this limestone is similar to that underlying the Mimosa soils of the Central Basin; and, were it not for the covering of slough from above, the Mimosa soils or stony land types probably would have developed where the Dellrose soils now lie.

Several variations of this soil are included. Typical Dellrose cherty silt loam lies below the level of the Chattanooga shale, locally called black slate, and it is underlain by chert-free limestones such as normally underlie the Mimosa soils. The variations, on the other hand, lie above the level of the Chattanooga shale, where the soils are underlain by cherty limestones such as normally underlie the Frankstown, Baxter, and Dickson soils. The variation of greatest extent, totaling about 7,500 acres, consists of light-brown or grayish-brown friable silt loam, which extends to a depth of 10 to 25 inches; but below this the material is reddish brown or yellowish brown rather than yellow or brownish yellow. This lower layer resembles the subsoil of the Baxter soils more than it does the subsoil of the typical Dellrose soils. Long, narrow belts of this variation are on the uppermost slopes of the ridges that are capped by the Baxter soils and extend out from the Highland Rim. Another variation, a rather conspicuous one but totaling only about 250 acres, is characterized by a red color. It has a reddish-brown heavy silt loam surface layer, between 4 and 12 inches thick, underlain by red compact stiff silty clay loam or silty clay. The largest area of this variation is about 1¾ miles west of Egam School. Other bodies are just north of Dickey Bridge, 1¼ miles west of Mulberry, and in the vicinity of Mount Moriah Church. Still another variation, which covers about 200 acres, occurs in the general vicinities of Hughey and Boonshill. It contains considerable sand and fragments of shale.

Dellrose cherty silt loam, one of the most extensive soils in the county, occupies a total area of 39,552 acres, or nearly 11 percent of the county. It occurs on the slopes of the long fingerlike ridges that extend from the Highland Rim into the Central Basin. Large bodies are within the Central Basin proper on the slopes of isolated remnants of the Highland Rim, which persist in the form of long tortuous ridges or circles of hills. This soil is generally associated with the Baxter and Frankstown soils on the upper part of the slopes and with rolling stony land (Mimosa soil material), smooth stony land (Mimosa soil material), and the Greendale soils on the lower part of the slopes. Large bodies are in the Highland Rim escarpment, from the vicinity of Dellrose north to the county line, and in the vicinities of Mulberry, Booneville, Petersburg, and Howell.

From the point of view of agriculture, Dellrose cherty silt loam is characterized by moderately favorable productivity, moderately favorable conservability, but unfavorable workability. It is well drained, friable, permeable, moderately fertile, and adapted to a wide variety of plants. Even though the slope is steep, this soil is remarkably resistant to accelerated erosion if protected by vegetation, but it will erode when bare. The fertility can be maintained without much difficulty. The soil is difficult to work, however, because the slopes are so steep that they practically preclude the use of heavy machinery and make the use of light machinery rather difficult. In addition to the steep slope, workability is impaired somewhat by the high content of fragments of chert.

Practically all of the land has been cleared and cultivated. Corn is the principal crop grown. About 30 percent of the land is in corn, 3 percent in wheat, 2 percent in rye, 5 percent in other crops, including hay crops, and 60 percent is idle. This unusually large proportion of idle land is explained by the system of managing the soil, which is to grow corn 1 year and let the field lie idle for 2 to 3 years before returning it to corn. During this idle period the fields are allowed to grow up to weeds, small brush, and briers. Fertilizers are seldom used. Under such management, corn ordinarily yields between 25 and 35 bushels an acre. Where the surface soil is shallow, however, the yields are somewhat less. Where the surface soil is not only rather shallow but consists largely of material sloughed from the shallow phase of Frankstown cherty silt loam, yields are low, ranging from 10 to 20 bushels.

Obviously this soil could be made to produce considerably more by modifying its management. The practice of allowing it to lie idle for 2 or 3 years between crops of corn seems wasteful. The primary object of this practice is to replenish the fertility removed by the corn. But this could be accomplished fully as well and probably much better by the adoption of a suitable rotation that at the same time would enable the farmer to harvest a crop each year. Such a rotation should preferably be rather long and include legume-grass mixtures. As very little fertilizer has been used on this soil, little is known about its response to fertilization. Increased yields from certain amendments, particularly lime and phosphate, are to be expected, however, even though the soil is thought to be not particularly low in such constituents. These amendments may be necessary for the production of certain grasses and legumes, such as bluegrass and alfalfa. Available evidence, of which there is but little, indicates that bluegrass will grow well, particularly on north-facing slopes, if lime and phosphate are applied. Where a bluegrass sod is desired on a south-facing slope, it might be well to consider planting some black locust and black walnut trees in order to provide some shade.

**Mimosa stony silt loam, undulating phase.**—This soil differs from the undulating phase of Mimosa silt loam chiefly in containing small irregular slabs and fragments of limestone on the surface and throughout the soil mass, in being shallower, and in having lost more of the original surface soil by accelerated erosion. In addition, the surface soil contains less organic matter and is lighter in color. The surface layer ranges in thickness from about 3 to 10 inches and consists of brownish-gray or grayish-brown mellow silt loam. The subsoil extends to a depth of 12 to 24 inches and consists of yellow or brownish-yellow fairly compact and tough silty clay or silty clay loam. The prevailing depth to the limestone bedrock is approximately 3 feet, although the depth ranges from about 1 to 4 feet.

This soil occupies slopes that range from 2 to 8 percent in gradient. Good tilth is maintained moderately easily, except on those areas where much of the original surface soil has been lost. The fragments of limestone are numerous enough to interfere somewhat with tillage operations. External drainage is good, but internal drainage is rather slow. Roots penetrate the subsoil with considerable difficulty. Crops suffer readily from drought, and during dry periods the injury may be great. Where the soil is more than 20 inches thick over limestone, however, fair yields can be expected in seasons of normal well-distributed rainfall. The soil is thought to be fairly well supplied with mineral plant nutrients, but it is rather low in organic matter.

As mapped east of Fayetteville, west of Molino, and west of Howell, the soil has a yellowish-brown or light-brown subsoil rather than a yellow or brownish-yellow subsoil as it has elsewhere.

This undulating phase of Mimosa stony silt loam, which has a total area of 4,160 acres, occurs in scattered bodies throughout most of the Central Basin and is associated with the other Mimosa soils and with Greendale silt loam, rolling stony land (Mimosa soil material), Maury loam, and the Burgin and Lindside soils.

Practically all of the land is cleared, and about 80 percent of it is cropped. Corn, lespedeza, and wheat are the main crops, although clovers, grasses, and other small grains are grown to some extent. Corn yields 15 to 25 bushels an acre, wheat 7 to 15 bushels, and lespedeza three-fourths to 1½ tons.

In the management of this soil it is particularly important that accelerated erosion be rigidly controlled and that the content of organic matter be increased and maintained at a higher level. Because this soil is physically less favorable for plant growth than the First- and Second-class soils, its response to corresponding fertilizer applications probably will be less. Lack of available moisture is probably more often the limiting factor than lack of plant nutrients. When the rainfall is fairly well distributed throughout the growing season, however, a fairly good response is to be expected from the application of fertilizers, particularly nitrogenous fertilizers. This soil apparently is moderately well supplied with lime, phosphate, and potash but probably it is not adequately supplied for the vigorous growth of plants. Increased yields from the application of these amendments are therefore to be expected.

**Mercer silt loam, rolling phase.**—This soil differs from the normal Mercer silt loam chiefly in having a steeper slope; in addition, it has a shallower surface soil, is lower in organic matter, is more susceptible to accelerated erosion, is slightly less productive, and is somewhat more exacting in its management requirements. The 6- to 10-inch brownish-gray friable silt loam surface soil overlies a moderately compact sticky and plastic brownish-yellow silty clay subsoil, which extends to a depth of 24 to 30 inches. The underlying material is similarly compact, sticky, and plastic, but it is highly splotched with yellow, gray, and brown. Level-bedded limestone is normally reached at a depth of 3 to 8 feet. The slope ranges from about 8 to 15 percent. External drainage is somewhat rapid, but internal drainage is rather slow. Natural fertility is about medium, and the reaction is acid.

Only 512 acres of this soil are mapped, mainly in association with Mercer silt loam in the Central Basin. All the land is cleared. It is used and managed in practically the same way as the normal soil, but crop yields are somewhat lower. The management requirements are similar to those for the normal Mercer silt loam, except for adjustments that need to be made because of the steeper slope.

**Greendale silt loam, slope phase.**—This soil differs from Greendale silt loam chiefly in that it occupies slopes ranging from 8 to 15 percent in gradient, whereas the normal type occupies slopes ranging from 1 to 8 percent. Largely because of its steeper slope, this soil is somewhat inferior to the normal type for the production of crops.

Both soils occur at the foot of slopes and have developed from accumulations of material washed from such soils as the Dellrose, Mimosa, and Mercer. The depth of such accumulations, however, is generally less where the slope phase is mapped. Erosion has removed a large part of the original surface soil in some places.

The 5- to 10-inch surface soil consists of grayish-brown mellow silt loam, and the subsoil, which is from 12 to 20 inches thick, is yellowish-brown fairly friable silty clay loam. In places a few fragments of chert are scattered over the surface and throughout the soil mass. Surface drainage is excellent, and internal drainage is fairly good. The soil is acid in reaction and comparatively low in natural fertility. Physically it is fairly well suited to the production of crops, although the slopes are steep enough to hamper tillage.

A total area of 2,048 acres is mapped. Like the normal type, Greendale silt loam, slope phase, occurs throughout the Central Basin in small areas at the foot of slopes, and it is likewise associated with the Dellrose, Mimosa, Huntington, Egam, and Lindside soils and with stony land.

About 80 percent of this soil is in cultivation. It is used and managed in practically the same way as normal Greendale silt loam, but the yields obtained are somewhat lower. The management requirements of the two soils are similar except for the adjustments required because of the steeper slope.

**Greendale cherty silt loam, slope phase.**—This soil is differentiated from normal Greendale cherty silt loam mainly on the basis of its steeper slope, which ranges from about 8 to 15 percent. It differs further in having lost a part of the original surface soil by erosion, in containing less organic matter, and in being less productive. Like normal Greendale cherty silt loam, this soil has developed on accumulations of local wash at the foot of slopes and contains enough fragments of chert to interfere materially with cultivation. The 5- to 10-inch surface soil is friable grayish-brown or brownish-gray cherty silt loam, and the 8- to 12-inch subsoil is brownish-yellow friable cherty silty clay loam. The subsoil is underlain by fairly tough and moderately compact silty clay or silty clay loam that is brownish yellow splotched with gray. Included are a few areas in which the soil apparently has developed from material that is residual from the weathering of the underlying limestones rather than from material washed from the slopes above.

The soil is medium to strongly acid in reaction, medium to low in content of organic matter, and medium to low in natural fertility. Internal drainage is fairly good, and external drainage is good although rather rapid. Good tilth is fairly easily maintained. Workability is impaired somewhat by the comparatively steep slope and the abundance of fragments of chert.

There are 2,816 acres of this soil. It occurs in small irregular-shaped areas at the foot of slopes and is distributed throughout the greater part of the Central Basin. In most places it is associated with the Dellrose and Mimosa soils and with other Greendale soils.

Practically all of the land is cleared, and about 75 percent of it is under cultivation. The usual staple field crops, such as corn, lespedeza, wheat, rye, barley, clovers, and grasses, are grown. Yields are estimated to range from 20 to 40 percent less than for normal Greendale cherty silt loam.

The productivity of this soil probably could be increased considerably by adopting a suitable rotation and by fertilizing properly. The rotation should be rather long, 4 or 5 years, and should include clovers and grasses. Lime and phosphate should be applied for the clovers and grasses. It is particularly important to grow clovers and grasses in order to increase the supply of durable organic matter in the soil. Tillage, so far as practicable, should be performed on the contour.

**Burgin silty clay loam.**—A dark color, heavy texture, and sticky and plastic consistence characterize Burgin silty clay loam. It occupies nearly level and gently sloping low terracelike areas between the uplands and stream bottoms. A few of the areas are subject to flooding during exceptionally high floods. Natural drainage is barely sufficient for the production of such crops as corn, small grains, and certain clovers. Both internal and external drainage are slow, and the subsoil remains wet for long periods. The tilth is rather unfavorable, and the soil is heavy to work.

The surface soil, extending to a depth of 12 to 15 inches, is dark-gray or nearly black silty clay loam, fairly sticky and plastic when wet and hard when dry. Below this and extending to a depth of about 30 inches the material is fairly compact silty clay that is plastic and sticky when wet and hard when dry. The color grades from steel gray in the upper part to light gray in the lower part. Mottlings of various shades of gray, yellow, and brown are present throughout the layer. Below this the material is compact sticky and plastic silty clay, light gray or bluish gray with numerous mottlings of yellow and light brown. In most places small rounded concretions occur throughout the soil mass. The parent material for this soil is apparently a mixture of general stream alluvium and local alluvium and in a few places may be partly residual. The general stream alluvium has come from uplands underlain by limestone, and the local alluvium has come from slopes underlain by limestone, chiefly from slopes occupied by the Mimosa and Maury soils.

Burgin silty clay loam occurs in a few small areas along streams throughout the Central Basin. The largest area is at Hughey. Bodies are about 2¼ miles south of Dellrose, 2¼ miles west and 1 mile south of Howell, 2½ miles north and 2½ miles northeast of Fayetteville, and south of McBurg. Scattered areas are along Swan and Little Swan Creeks, in the general vicinity west of Blakeville, and east and north of Molino. This soil is associated with the Mimosa, Maury, and Lindside soils.

Practically all of the land is cleared. It is used chiefly for pasture and for the production of hay and corn. Small grains are grown to a limited extent. Corn yields between 15 and 30 bushels an acre, and hay occasionally yields as much as 3 tons.

In its natural condition this soil is well adapted to the production of hay and to pasture, and so far as feasible it should be devoted to such uses. Because of its poor drainage and its tendency to become cloddy if tilled under slightly unfavorable moisture conditions, it is not well suited to crops that require tillage. Such crops can be grown, but the yields are generally rather low. In a few areas where this soil is tiled, however, such crops can be grown with considerably more success. As this soil is naturally rather fertile, it may not require much fertilization, and the response to such treatment may be considerably lower than on the less fertile but well-drained soils of the uplands and terraces. The chief management problem is to keep the soil in as good physical condition as possible, and growing grasses and legumes is probably one of the best ways to do this.

**Cumberland silt loam, eroded slope phase.**—Like the other Cumberland soils in the county, Cumberland silt loam, eroded slope phase, has developed from old high-lying alluvial deposits. This soil differs from the typical Cumberland silt loam in occupying steeper slopes and in being eroded; it differs from the slope phase of Cumberland silt loam in being eroded; and it differs from the eroded phase of Cumberland silt loam in occupying steeper slopes that range from about 8 to 15 percent in gradient. The greater part of the original surface soil has been lost by erosion, and here and there even a part of the original subsoil has been lost. As compared with the other Cumberland soils, the depth to the underlying limestone is less and outcrops of bedrock on the surface are somewhat more numerous.

The present surface layer, which consists of a mixture of the original surface soil and the topmost part of the original subsoil, is moderately friable, ranging from grayish brown to reddish brown in color and from silt loam to silty clay loam in texture. The subsoil is reddish-brown or brownish-red silty clay loam that is moderately friable but significantly more compact than the subsoil in normal Cumberland silt loam.

Drainage, both internal and external, is good, although external drainage is rather rapid. Largely because of accelerated erosion, tilth conditions have been impaired, the soil has become heavier to work, and a significant loss of valuable constituents, particularly organic matter, has taken place. The soil is acid in reaction, indicating a need for lime. Probably it also needs phosphate; and, with the greater part of the organic matter lost, the need for organic matter is apparent. The physical character of this soil is, as a whole, favorable, and good response from improved management may be expected.

There is a total of 3,328 acres of this soil. Irregular-shaped bodies occur on the old high terraces along the Elk River. The soil is associated chiefly with other Cumberland soils of the high terraces and with the Mimosa soils of the uplands. All the land has been under cultivation. At present, however, it is estimated that only about one-half of it is in cultivation, and the rest is in pasture. The cultivated areas are planted to general field crops, such as corn, wheat, rye, barley, oats, and lespedeza and other hay crops. Corn is the main crop. Crop yields are between 20 and 50 percent less than on the normal Cumberland silt loam.

This eroded slope phase of Cumberland silt loam is physically suitable for crop production, but if thus used it requires careful management—more careful than has been practiced. A rather long rotation is required, in which intertilled crops are reduced to a minimum and close-growing crops, particularly grasses and legumes, are increased to a maximum. Organic matter, in particular, needs to be replenished, and lime and phosphate need to be applied. So far as feasible, cultivation should be performed on the contour, and where practicable, it might be well to consider strip cropping on the contour. Where the soil is thick over bedrock it might be well to consider terracing. Where this soil is used for pasture, lime and phosphate should be the only amendments needed; and if ample applications of both are made, excellent pastures should be obtained.

**Sequatchie loamy fine sand.**—This soil differs from Sequatchie very fine sandy loam chiefly in being considerably lighter in texture; but it is also lighter in color, lower in natural fertility, and lower in water-holding capacity. Both soils occupy low terraces, or second bottoms, that are above the flood stage of the adjacent stream except during exceptionally high floods. The material from which these soils have developed consists of general stream alluvium, most of which has come from uplands underlain by sandstone, although a significant part apparently has come from uplands underlain by limestone. Both soils occupy nearly level to gently sloping well-drained areas.

To a depth of 8 to 12 inches Sequatchie loamy fine sand consists of light-brown or light yellowish-brown loose loamy fine sand. Below this and continuing to a depth of 18 to 24 inches the material consists of brownish-yellow or dull-yellow loose fine sandy loam. The underlying material, extending to a depth of 3 feet or more, is similar except that there is a faint splotch of gray, yellow, or brown here and there.

A considerable range in texture was allowed in mapping. The surface soil and the subsoil range from light loam in a few places to loamy sand in others, and the substratum ranges from silt loam to loamy sand.

Owing to the gentle slope and the light texture, Sequatchie loamy fine sand is very easy to work. There is no danger of puddling, even if this soil is plowed when wet. Offsetting this favorable workability, however, are rather low natural fertility, high porosity, and low water-holding capacity. The soil is rather low in organic matter, lime, phosphate, and presumably potash. Plants suffer rather readily from lack of moisture during dry periods. Soluble fertilizer elements are readily leached out, and therefore the soil does not hold its fertility very long.

There is a total area of only 576 acres of this soil in the county, along the Elk River. The lighter textured variations occur within the sharp bends of the prominent loops of the river and the heavier textured variations on narrow areas parallel to the river. This soil is associated with the Huntington, Etowah, and Wolftever soils and with the other Sequatchie soil.

All the land is cleared and is used for the production of the crops common to the locality. Yields are normally rather low. From 15 to 20 bushels of corn and three-fourths to 1½ tons of hay to the acre may be expected.

Because of the high porosity and low water-holding capacity of this soil, it is rather difficult to increase the productivity greatly. Frequent additions of organic matter and proper fertilization, however, would improve the yields materially.

**Wolftever silt loam.**—This soil, which occurs on low terraces along the larger streams, is characterized by a heavy, compact subsoil. It has developed from general stream alluvium most of which has originated in the uplands underlain by limestone. The 10- or 12-inch surface soil is grayish-brown or light-brown mellow silt loam. The subsoil, extending to a depth of 18 or 20 inches, is brownish-yellow silty clay or silty clay loam that is fairly tight and compact. This rests on a tight and compact silty clay or silty clay loam substratum that is dull brownish yellow with splotches and mottlings of gray, yellow, and brown. The substratum extends to a depth of 40 or more inches.

This soil occupies flat or nearly flat areas, and surface drainage consequently is slow. Internal drainage, greatly retarded by the compact subsoil and substratum, also is slow. Drainage is adequate, however, for the production of most of the crops commonly grown. Not only is the internal drainage retarded by the compact subsoil and substratum, but the penetration of roots also is greatly impeded. The soil is acid in reaction, moderate to comparatively low in natural fertility, and about medium in content or organic matter. Good tilth is easily maintained in most places.

Wolftever silt loam covers a total area of 1,344 acres. It occupies low terraces, many of which are subject to flooding during exceptionally high waters. Most of this soil occurs along the Elk River, but small bodies are scattered along some of the larger creeks, chiefly Swan and Cane Creeks. It is associated mainly with the Etowah and Sequatchie soils of the terraces and the Huntington and Lindside soils of the bottoms.

All this land is cleared, and nearly all of it is under cultivation. It is used and managed in practically the same way as the associated Etowah silt loam, but yields are between 20 and 50 percent less.

Wolftever silt loam can be improved by such practices as adding organic matter, adding lime and phosphate, and growing grasses and legumes, but the response from such practices very likely will be less than on the associated Etowah and Sequatchie soils, largely because the unfavorable consistence of the subsoil of Wolftever silt loam in many places limits the growth of plants. Comparatively little can be done in the way of feasible management to improve this condition, but plants having roots that are vigorous and penetrate deeply may be grown successfully.

**Humphreys gravelly silt loam.**—This soil is characterized by a rather high content of fragments of chert, the main feature in which it differs from Humphreys silt loam. It occupies low terracelike positions along the streams. The parent material, partly general stream alluvium and partly local alluvium, has been washed from the Baxter and Dickson soils of the Highland Rim. The 5- to 7-inch surface soil is grayish-brown mellow silt loam, and the subsoil, extending to a depth of about 3 feet, is yellowish-brown heavy silt loam or light silty clay loam.

This soil lies above the level of normal overflow of the adjacent streams, but some areas are so low that they are flooded during exceptionally high waters. Damage to crops from flooding, however, is unusual. Areas of this soil are nearly level or gently sloping, hence surface drainage is rather slow. Internal drainage, on the other hand, is good to excessive. This soil is porous, a feature that favors rapid percolation of water. It is acid in reaction and rather low in natural fertility. Throughout the soil mass there is an abundance of fragments of chert, most of which are angular, but some of which are rounded. They range in size from small pieces of gravel to fragments as much as 3 inches in diameter. The fragments are numerous enough to impair materially but not preclude feasible tillage of the soil.

There are 1,920 acres of Humphreys gravelly silt loam mapped, mostly along streams in the Highland Rim, but a few areas border streams just below the Highland Rim escarpment. This soil is associated chiefly with Humphreys silt loam, Ennis silt loam, Melvin silt loam, and the Baxter and Dickson soils.

Nearly all of the land is cleared. It is used and managed in practically the same way as Humphreys silt loam, but the yields are considerably less. It is physically suitable for the production of a wide variety of crops, including corn, cotton, lespedeza, clovers, grasses, and numerous vegetables and fruits. Such practices as adding organic matter, adding lime and phosphate, growing more legumes, rotating crops systematically, and fertilizing the crops properly would be expected to increase the yields of crops on this soil.

**Ooltewah silt loam.**—Ooltewah silt loam occurs in small depressions scattered throughout the uplands. It is intermediate in drainage between the poorly drained Guthrie silt loam and the fairly well drained Greendale silt loam. As mapped in this county, this soil is associated chiefly with the Baxter soils and consists largely of material washed from those soils and accumulated in sinks.

The soil varies somewhat, owing to differences in thickness of the local deposits, differences in source of the local wash, and differences in drainage. In general, however, it has a surface layer from 8 to 14 inches thick consisting of light-brown friable silt loam. Below this and continuing to a depth of about 24 inches the color grades from light reddish brown to light gray, with mottlings of red, yellow, and brown. The material in this layer is generally moderately friable silty clay loam, although in some places it is compact silty clay. Below a depth of about 24 inches the color in most places is light gray, highly mottled with yellow, red, and brown. In many places the texture of this layer is compact silty clay; in others it is moderately friable silty clay loam.

In most places the reaction is medium acid, but in some places it is nearly neutral and in others strongly acid. Natural fertility is moderate to fairly high. Drainage, however, is not good. The depressions occupied by this soil receive runoff and seepage from the adjacent slopes, and internal drainage is rather slow in most places. Under such conditions the subsoil and the substratum remain waterlogged during most of the winter and spring. Drainage, however, is good enough to allow the use of the soil for growing general farm crops, although such crops are injured occasionally.

Ooltewah silt loam occupies a total area of 960 acres, chiefly on the long ridges extending from the Highland Rim into the Central Basin. The small depressions occupied by this soil range from a fraction of an acre to several acres in size and lie chiefly within larger areas of the Baxter soils of the uplands. Some bodies, too small to delineate on the soil map, are included in the extensive Baxter soils. In some of the larger depressions Guthrie silt loam occurs in association with Ooltewah silt loam.

Practically all of the land is cleared and in cultivation. Most of the bodies are so small that they are not given individual attention but are used and managed in the same way as the surrounding areas of associated soils.

### FOURTH-CLASS SOILS

None of the soils previously classified as First-, Second-, or Third-class soils is characterized by extremely adverse productivity, workability, or conservability, whereas the Fourth- and Fifth-class soils are characterized by such extremely adverse conditions in one or more of these features as to be poorly suited for the production of crops. The Fourth-class soils, are, however, at least moderately productive of pasture grasses; that is, these soils have at least moderate natural fertility and moderate to good moisture relations but are not physically well adapted for cultivated crops. They are therefore considered suitable for pasture and are used rather extensively for this purpose. On the bases of differences in internal and external soil characteristics, these soils are separated into Dellrose cherty silt loam, steep phase; Mimosa silt loam, hill phase; Mimosa stony silt loam; Colbert stony silty clay loam; Colbert stony silty clay loam, rolling phase; Colbert stony silty clay loam, hilly phase; smooth stony land (Mimosa soil material); rolling stony land (Mimosa soil material); Lawrence silt loam; Guthrie silt loam; Robertsville silt loam; Melvin silt loam; and alluvial soils, undifferentiated.

**Dellrose cherty silt loam, steep phase.**—The steep phase of Dellrose cherty silt loam, one of the most extensive soils in the county, is similar to normal Dellrose cherty silt loam, except that it occupies steeper slopes, the gradient ranging from 30 to 60 percent. Other differences are the slightly thinner surface layer, the larger size of fragments of chert, and the protrusion here and there of short, narrow, horizontal ledges of limestone.

Like the normal type, this steep phase has a surface soil consisting chiefly of cherty material that has rolled or sloughed down from higher areas occupied by the Frankstown, Baxter, and Dickson soils. The subsoil consists mainly of material that is residual from the weathering of fairly high grade chert-free limestone. It is likewise enriched somewhat by seepage from the underlying level-bedded limestones, some of which contain phosphatic material.

The surface layer consists of grayish-brown or light yellowish-brown friable cherty silt loam from 5 to 25 inches thick, but in most places the thickness varies between 10 and 15 inches. The underlying material consists of yellow or brownish-yellow moderately plastic and sticky silty clay or silty clay loam that becomes splotched with gray with increasing depth. Variations similar to those included in the normal soil are included in this steep soil. The most extensive one has a light-brown surface soil and a reddish- or yellowish-brown subsoil and occurs on the upper parts of slopes of ridges capped by the Baxter soils. It covers about 8,600 acres.

Dellrose cherty silt loam, steep phase, has a total area of 31,424 acres, or 8.6 percent of the area of the county. Like the normal soil, it occupies steep slopes leading from the Highland Rim, or remnants of the Highland Rim, down to the valley floors of the Central Basin.

It is associated with the Baxter, Frankstown, Mimosa, and Greendale soils and with rolling stony land (Mimosa soil material) and rough stony land (Mimosa soil material).

Between 70 and 80 percent of the land is cleared. A small proportion of this is in corn, a small proportion is in pasture, and a large proportion is idle. It is a common practice to grow corn for a year or two and then let the soil lie idle for a period of several years, when it is again put in corn.

Physically this soil is very poorly suited to crops requiring tillage. This is chiefly because the slope is so steep that the use of even light farm machinery is very difficult. Tillage is also impaired by the abundance of fragments of chert. Furthermore, control of runoff and erosion is extremely difficult if the soil is tilled. Although this land is too steep for feasible use for crops over a period of years, it is physically fairly well suited to pasture. Chiefly because of less favorable moisture conditions, however, it is less productive of pasture plants than normal Dellrose cherty silt loam, which occupies gentler slopes. Although this soil apparently is not particularly low in lime and phosphate, the application of these amendments can be expected to increase the productivity for grasses and legumes. Most of the pasture plants common to the locality, bluegrass and white clover in particular, would be expected to grow successfully if some lime and phosphate were applied. Better stands of bluegrass and white clover would be expected on north- and east-facing slopes than on south- and west-facing slopes. Probably a scattered planting of black locust or black walnut trees on the south- and west-facing slopes would aid in maintaining a good stand of bluegrass and white clover.

**Mimosa silt loam, hill phase.**—Slopes at the foot of the high ridges in the Central Basin that are free from slough or local wash are occupied by Mimosa silt loam, hill phase. In this respect this soil differs from the other Mimosa soils, which for the most part occupy benchlike areas away from such slopes. In color, texture, and consistence this soil resembles to a considerable degree normal Mimosa silt loam, but the slope is much steeper—from 15 to as much as 40 percent. The greater part of this hill soil, however, has a slope of 20 to 35 percent. Considerable erosion has taken place, and gullies are very numerous. In places where erosion has been least serious, the 3- to 8- inch surface soil is grayish-brown or brownish-gray mellow silt loam. The subsoil, extending to a depth of about 20 inches, is yellow fairly compact plastic and sticky silty clay or silty clay loam. Below this the material is similarly compact, plastic, and sticky, and it is yellow splotched with considerable gray and some red and brown. This material continues to the limestone, which in most places is the Cannon limestone. Depth to bedrock is several feet, and outcrops are few.

The soil is free of fragments of limestone and chert. Internal drainage is rather slow, but external drainage is rapid. The soil is about medium in acidity and about medium in natural fertility. A conspicuous property of this soil is its apparent tendency to gully, although it is highly susceptible to sheet erosion as well. Important in regard to erosion is the fact that this soil lies in such a position that it receives not only the rain that normally falls on its surface but also considerable runoff from the long, steep slopes above. Because of this fact, as well as because of the steep slope and the heavy-textured subsoil, erosion is extremely difficult to control.

The hill phase of Mimosa silt loam occupies a total of 2,496 acres. Small bodies are widely distributed over the Central Basin in close association with areas of rolling stony land (Mimosa soil material), the Greendale soils, and the other Mimosa soils.

Practically all of the land is cleared. On the greater part cultivation has been attempted for a few years, the land has become eroded, and subsequently it has been abandoned as almost worthless pasture or practically wasteland. Gully-free fields large enough for feasible tillage are still being cropped.

This soil is physically unsuitable for crops requiring tillage, because of the extreme difficulty of conservation, the rather difficult workability, and, in its present eroded condition, the low productivity. It is not well suited to pasture in its present condition, but potentially it is a fairly good soil for such use. Pastures probably will be rather difficult to establish, but once established both the pastures and the soil should improve with good treatment. The pastures will require lime and fertilizer. Indications are that such pasture plants as orchard grass, bluegrass, white clover, hop clover, and lespedeza will grow successfully. It might be more practicable to return the severely eroded areas to woodland rather than to attempt to establish pastures on them.

**Mimosa stony silt loam.**—This soil is similar to Mimosa silt loam, but it differs from that soil in that it contains small irregular-shaped slabs and fragments of limestone and a few fragments of chert on the surface and throughout the soil mass, in being shallower to the limestone bedrock, and in having lost more of the original surface soil. In addition, there are a few outcrops of limestone. Mimosa stony silt loam differs from the undulating phase of Mimosa stony silt loam chiefly in its steeper slope, but it also has a slightly shallower surface soil, is somewhat shallower over bedrock, and has more outcrops of limestone. Like the other Mimosa soils, the silt loam member is about medium acid in reaction and medium in natural fertility.

The surface soil, which ranges from about 2 to 8 inches in thickness, consists of grayish-brown or brownish-gray mellow silt loam. The subsoil extends to a depth of 12 to 20 inches and consists of yellow or brownish-yellow fairly compact and tough silty clay or silty clay loam. The prevailing depth to bedrock is between 24 and 36 inches, although the depth ranges from about 10 to 50 inches.

This soil occupies slopes ranging from about 8 to 15 percent in gradient. Surface drainage, therefore, is fairly rapid. Internal drainage, on the other hand, is rather slow. This combination of features makes for a considerable runoff and for a fairly high susceptibility to accelerated erosion when the land is bare. Penetration of roots is impeded by the heavy consistence of the subsoil and limited by the slight depth to bedrock. Plants suffer readily from drought, and during extended dry periods the injury may be great. Although the soil is fairly well supplied with mineral plant nutrients, it is rather low in organic matter.

There are 4,480 acres of this soil in the county. Most of the bodies are small, and all lie in the Central Basin. This soil is associated with the other Mimosa soils and with rolling stony land (Mimosa soil material) and smooth stony land (Mimosa soil material).

Practically all of the land is cleared. About one-half of it is used for the production of crops and the rest for pasture. Corn and lespedeza are the chief crops, but small grains and hay crops other than lespedeza are grown to some extent.

Physically this soil is not well suited to the production of tilled crops, because it is rather difficult to work and very difficult to conserve. On the other hand, it is fairly well suited to pasture (pl. 2). Where it is necessary to use this soil for crop production, the crops should be carefully selected. A rotation should be adopted that is long and includes chiefly close-growing crops, so as to control erosion and to increase the supply of organic matter. Although this soil probably is moderately supplied with mineral plant nutrients, some response may be expected from the application of certain amendments, particularly lime and phosphate. This is especially true in regard to grasses and legumes. Lack of moisture and the unfavorable consistence of the subsoil, however, are likely to restrict the growth of plants more than lack of plant nutrients. As organic matter improves the physical condition and increases the moisture-absorbing and moisture-holding capacity of the soil, the supply of this constituent should be increased, and one of the best ways to do this is to grow grasses and legumes.

**Colbert stony silty clay loam.**—Like all the Colbert soils in this county, Colbert stony silty clay loam is characterized by a yellow tough sticky plastic subsoil, slight depth to limestone bedrock, the presence of slabby fragments of limestone throughout the soil mass, and a few outcrops of limestone. It occurs in the valleys of the Central Basin and has developed from material that is residual from the weathering of clayey limestones. Like the other Colbert soils, it is poorly suited for the production of crops but fairly well suited to pasture, the chief use of these soils in this county.

Colbert stony silty clay loam occupies gently sloping areas. The 5- to 8-inch surface soil consists of grayish-brown or brownish-gray silty clay loam. This material is rather plastic and sticky when wet and rather hard when dry. In uneroded areas, in old pastures and woods, the topmost 2-inch layer consists of dark-gray or nearly black friable silt loam high in organic matter. The subsoil is tough plastic sticky silty clay that is dominantly yellow but contains numerous splotches of gray and olive green and a few of red and brown. The material is massive and is resistant to disruption. It is extremely sticky and plastic when wet and hard when dry. This layer is variable in thickness; in some places it is but a few inches thick, and in others it is as much as 18 inches thick. In most places where the subsoil is shallow it rests almost directly on limestone, and in most places where it is thick it overlies material that differs from it chiefly in color. This underlying material is profusely mottled with various shades of gray, yellow, green, brown, and red. Like the subsoil, it is tough, sticky, and plastic in consistence and heavy in texture. This material ordinarily rests on the limestone, which in most places lies not more than 36 inches below the surface.

In most areas flat fragments of limestone are scattered throughout the soil mass, especially in the substratum. The limestone floor is uneven, and the depth to this bedrock in most places ranges between 15 and 30 inches, although in some places it is only a few inches and in others as much as 50 inches. Scattered outcrops occur in most areas. The slope is gentle—from 2 to 8 percent. External drainage is good; but internal drainage, retarded by the heavy subsoil, is slow. Therefore, although the slope is gentle, the runoff tends to be great and the susceptibility to erosion is comparatively high. As indicated by the mottlings, the aeration of the subsoil and substratum is not good. Because of the tough and tight consistence, penetration of roots into the subsoil and substratum is difficult. The reaction in most places is about medium acid, but it ranges from slightly to strongly acid.

Included with Colbert stony silty clay loam are several variations. The chief one consists of a soil that is considerably darker, particularly in the surface soil; but it is similar in slope, texture, stoniness, depth to bedrock, and consistence. The surface soil of this variation ranges in color from brown to nearly black, and the subsoil from yellowish brown to brownish yellow with splotches of gray, yellow, and brown. Another variation includes a soil that is nearly free of limestone fragments and limestone outcrops; and still another variation consists of a soil where limestone fragments are abundant and limestone outcrops are numerous. Areas containing numerous outcrops are locally referred to as glady land.

Colbert stony silty clay loam covers a total area of 3,776 acres in low areas in the Central Basin. The areas range in size from large to small. This soil is associated chiefly with the Mimosa, Maury, and Mercer soils, the other Colbert soils, smooth stony land (Mimosa soil material), and rolling stony land (Mimosa soil material).

About 70 percent of the land has been cleared and cultivated at one time or another. Now, however, most of the cleared land is used for permanent pasture, although a small part is used alternately for pasture and crops. The staple crops of the area are grown. Plants on this soil are highly susceptible to injury from drought. If extended dry periods occur during the growing season, yields of both crops and pasturage are low; but if the rainfall is well distributed, the yields may be high.

Chiefly because of stoniness, both loose stones and outcrops, unfavorable tilth, and unfavorable moisture relationships, this soil is physically very poorly suited to the production of crops. On the other hand, it is physically fairly well suited to permanent pasture. A good growth of pasture plants may be expected in the spring and early summer, when rainfall is generally abundant and the temperature is favorable, but comparatively little growth is to be expected in the late summer and early fall, when the rainfall generally is rather low and the temperature high. Increased pasturage probably would be obtained from the application of phosphate, but the response to such treatment may be considerably less than on the deeper and more friable soils. Lime may not give an appreciable response, but the application of some finely ground lime with or before the application of phosphate should cause more efficient use of the phosphate. Where the soil is prevailingly shallower and more stony than is typical, the physically best adapted use apparently is forestry.

**Colbert stony silty clay loam, rolling phase.**—This soil differs from Colbert stony silty clay loam chiefly in having a steeper slope—from 8 to 15 percent. Like the normal soil, this soil has a grayish-brown or brownish-gray silty clay loam surface soil that is moderately sticky and plastic when wet and rather hard when dry. Likewise, it has a tight, tough, plastic, and sticky subsoil that is chiefly yellow, with mottlings of gray and olive green. It is similarly characterized by the presence of flat fragments of limestone throughout, a depth to limestone bedrock that in most places is less than 36 inches, and scattered outcrops of this rock. Variations similar to those included with Colbert stony silty clay loam are included with this rolling phase. The two soils are distributed over the same general areas and are associated with similar soils. There are 6,912 acres of the rolling soil in the county.

Owing to the steeper slope, runoff and erosion are even greater on this soil than on the normal type. In some of the cleared areas a considerable part of the original surface soil has been lost by erosion. Contrary to expectation, however, the moisture relations of the rolling phase are generally more favorable for the growth of plants. Because of the position of many of the areas adjoining higher slopes, and because the underlying rocks are nearly level-bedded, this soil apparently receives a little seepage, which tends to improve the moisture relationships. Plants, however, are readily injured by drought.

About 50 percent of the land is cleared, and nearly all of it is used for pasture. Like normal Colbert stony silty clay loam, this soil is physically very poorly suited to crop production, but it is fairly well suited to pasture. The soil in many of the areas still in woods, however, is shallower and more stony than the typical soil and is therefore rather poorly suited to pasture. Such areas apparently are physically best suited to forestry.

**Colbert stony silty clay loam, hilly phase.**—This hilly soil is similar to Colbert stony silty clay loam in most characteristics except slope. The slope, which ranges from about 15 to 30 percent, is steeper than that of either of the other Colbert soils. Like the other Colbert soils, this soil is characterized by heavy texture, tough plastic and sticky consistence, yellow color, limestone fragments throughout the soil mass, a few limestone outcrops, and rather slight depth to bedrock. As compared with the other Colbert soils, however, this hilly soil is somewhat shallower over bedrock, considerably more susceptible to accelerated erosion, and less productive of plants.

In uneroded areas the 3- to 6-inch surface soil is grayish-brown or brownish-gray moderately sticky and plastic silty clay loam. In many of the cleared areas, however, much of this layer has been lost by erosion. The subsoil is tough, sticky, and plastic silty clay that is chiefly yellow but contains splotches of gray and olive green. The substratum is similarly tough, sticky, and plastic in consistence but is more highly mottled than the subsoil, being profusely mottled with various shades of gray and yellow and slightly mottled with red and brown. Platy fragments of limestone are numerous throughout the soil mass, and the depth to bedrock is less than 30 inches; in most places it is between 10 and 24 inches. Variations in color and stoniness included with the other Colbert soils are also included with this phase.

Chiefly because of the steeper slope and the associated handicaps, such as more difficult workability, more rapid runoff, and higher susceptibility to erosion, this hilly soil is considerably less suitable to crop production and somewhat less suitable to pasture than the other Colbert soils. Physically, it is unsuitable for the production of crops, but it is fairly well suited to permanent pasture. As plants are injured readily by drought on this soil, only scant pasturage is obtained during the late summer and early fall, when the temperature is generally high and the rainfall comparatively low. Fairly good pasture may be expected, however, during the spring, when the temperature is generally more favorable and the rainfall is rather high. Included with this soil, however, are a few small bodies that are too stony even for feasible use as pasture.

The hilly phase of Colbert stony silty clay loam covers 3,840 acres. Like the other Colbert soils, it occurs only in the Central Basin and is associated chiefly with other Colbert soils, the Mimosa, Maury, and Mercer soils, smooth stony land (Mimosa soil material), and rolling stony land (Mimosa soil material).

About 40 percent of the land is cleared. Nearly all of this is now devoted to permanent pasture, which in most places ranges from moderate to low in productivity. The rest is still in woods (pl. 2), although some of it was cleared at one time. On the whole, this soil is considered physically suitable for pasture in the present agriculture, but some of the areas in woods apparently are too stony even for feasible use for pasture under present conditions.

**Smooth stony land (Mimosa soil material).**—This land type is characterized by outcrops of limestone sufficiently numerous to preclude feasible tillage. Between such outcrops the soil, which in most places is shallow over limestone, resembles the Mimosa soils in color, consistence, and other characteristics. The slope is gentle—not over 10 percent. This land occurs in valleys throughout the Central Basin in topographic positions similar to those occupied by Mimosa silt loam. The soil is consistently heavy in texture, sticky and plastic in consistence, and predominantly yellow or brown in color, but it varies greatly in depth over bedrock and in the extent to which it has been eroded. In some places it is between 2 and 3 feet deep, in others between 1 and 2, and in still others outcrops of limestone occupy so much of the surface that the soil between them is generally less than 12 inches deep. These latter areas, locally referred to as glady land, are estimated to occupy about 20 percent of the total area of this land type. Accelerated erosion has taken place to a considerable extent in many of the areas, and it seems apparent that much bedrock has been exposed by such a process. This land is considered physically unsuitable for crops requiring tillage but is fairly well suited to pasture.

Where the soil between the outcrops is fairly deep, it has a dark-gray or grayish-brown fairly friable silty clay surface soil from 2 to 8 inches thick. In woods or in pasture the topmost inch or two is stained dark with a small quantity of organic matter. The subsoil extends to a depth of 14 to 20 inches and consists of tough sticky moderately plastic and relatively impervious silty clay ranging in color from brownish gray to brownish yellow. This in turn is underlain by material of similar consistence that ranges in color from grayish yellow to olive green with numerous splotches and mottlings of gray, yellow, light brown, and olive green. In most places a few fragments of limestone occur throughout the soil mass. In general the soil is about medium acid in reaction, although it is variable in this respect. It is considered medium to comparatively high in natural fertility. External drainage is good, but internal drainage is impaired by the heavy-textured subsoil. Penetration of roots is impeded by the heavy-textured subsoil and limited by the slight depth to bedrock. Plants suffer readily from drought.

Smooth stony land (Mimosa soil material) occupies a total area of 3,392 acres. It is associated chiefly with Mimosa silt loam, Greendale silt loam, rolling stony land (Mimosa soil material), and rough stony land (Mimosa soil material). The largest areas are east of Harms and in the general vicinities of Fayetteville and Mulberry.

About 75 percent of this land has been cleared. Perhaps 50 percent was cultivated at one time or another. Most of the areas that were cultivated became badly eroded, gullies formed, and the underlying bedrock became exposed in numerous places. A significant proportion of this land is thought to have been formed in such a manner from areas that originally contained but few outcrops of limestone. The greater part of the cleared land is now in pasture, but a considerable part is reverting to woodland. Cedars and hardwoods are establishing themselves. Pasture grasses do well, particularly in the early spring when moisture is generally ample. Bluegrass grows successfully, but on south-facing slopes it apparently needs some shade, which in many places is afforded by a thin stand of young trees. Clovers and other legumes do well on land that has not lost all or nearly all of the original surface soil by accelerated erosion. The following pasture mixtures, used by some farmers, appear to be fairly well suited to this land: (1) Bluegrass, white clover, and hop clover; and (2) orchard grass and lespedeza.

**Rolling stony land (Mimosa soil material).**—This land type is known locally as limestone land and glady land. It is characterized by numerous outcrops of limestone. Some of the areas are excessively stony—too stony for any feasible use except forestry—but most of the areas are moderately stony and suitable for pasture. Somewhat more than one-half of this land is fairly well suited to pasture; most of the rest is rather poorly suited to pasture; but practically none of it is physically suited for the feasible production of crops.

Most of the soil between the outcrops is dark-brown or grayish-brown friable silt loam or plastic silty clay. It varies considerably in depth, ranging from only a few inches to several feet. Generally, the deepest soil is the farthest from the outcrops. In areas of deeper soil development the surface soil and the subsoil are somewhat similar to the corresponding layers of Mimosa stony silt loam. The rocks range from grayish blue to light gray. Some are thick-bedded, others are thin-bedded; some are crystalline, others are clayey; some are highly fossiliferous, others are fossil-free; a few are phosphatic, but most are nonphosphatic; and some are interbedded with thin layers of calcareous shale. External drainage is rapid, and runoff is great. Internal drainage is, of course, slow. The slope ranges from about 7 to 30 percent.

According to old residents, a number of the areas included in this separation originally had sufficient covering of soil to produce fairly good crops. Owing to accelerated erosion, however, so much of the soil has been lost that outcrops now occupy as much as 50 percent of the surface.

A total of 49,088 acres, or 13.3 percent of the area of the county, is occupied by this land. Areas are widespread throughout all parts of the Central Basin in association with areas of rough stony land (Mimosa soil material), the Dellrose and Mimosa soils of the uplands, the Greendale soils of the colluvial lands, and most of the soils of the terraces and bottoms.

Practically all of this land has been cleared of its original forest. It is estimated that at present about 40 percent is devoted to permanent pasture, much of which is rather brushy and some of which supports a thin stand of young trees. Most of the rest is reverting to woodland (pl. 1, *B*). Cedars are conspicuous and numerous on most areas of this soil.

Most of this land is physically suitable for pasture, but a small proportion that is excessively stony is unsuitable for feasible use for pasture. Some of it is fairly well adapted to pasture and affords good grazing in the spring and early summer, when moisture is ample. Bluegrass and white clover grow well in some places, and several other grasses and a few legumes are adapted to this land.

**Lawrence silt loam.**—Lawrence silt loam is a poorly drained light-colored strongly acid soil that occupies flat or slightly depressed areas on the Highland Rim. In drainage it is intermediate between the fairly well drained Dickson soils and the poorly drained Guthrie soils, and it generally occupies areas between members of these series. Like the Dickson soils, Lawrence silt loam has developed from material that is residual from the weathering of cherty limestones and is similarly characterized by a compact nearly impervious layer at a depth of about 2 feet.

The surface soil, extending to a depth of 10 to 15 inches, is light-gray or yellowish-gray mellow silt loam that generally contains faint splotches of yellow, gray, and rusty brown. The subsoil, extending to a depth of about 24 inches, is moderately friable silty clay or silty clay loam that is grayish yellow with a few mottlings of gray, yellow, and brown. Below this and continuing to a depth of at least 40 inches is compact slowly pervious or nearly impervious silty clay that is highly mottled and streaked with grayish blue, gray, yellow, and light brown.

Drainage, both internal and external, is poor. During the winter and spring the soil is saturated with water much of the time. Because of the compact substratum, which greatly retards the downward movement of water, the soil remains wet for a long time when once saturated. In some places seepage from slightly higher areas of the Dickson soils also tends to keep it wet for extended periods. The soil is free from stone and chert.

There are 11,136 acres of this soil. It is distributed over the Highland Rim chiefly in association with the Dickson and Guthrie soils. About two-thirds of the land is cleared, and about one-third is in forest. A large part of the cleared land is in pasture, but an equally large part is devoted to the production of crops, such as those grown on the associated Dickson soils. Yields of most crops, however, are considerably lower than on the Dickson soils.

Physically, Lawrence silt loam is poorly adapted to the production of crops requiring tillage. It is thought to be much more suitable for hay and pasture. Hay and pasture plants such as redtop, orchard grass, and lespedeza should grow reasonably well.

**Guthrie silt loam.**—Guthrie silt loam is a light-colored poorly drained soil of the shallow depressions, incipient drainageways, and flat areas on the Highland Rim. The 10- to 16-inch surface soil is very light gray, almost white, or yellowish-gray friable silt loam. In woods the topmost inch is stained dark with organic matter, and below this there are in most places a few mottlings of yellow and light brown. The subsoil, extending to a depth of about 30 inches, is heavy compact silty clay or silty clay loam profusely mottled and splotched with gray, bluish gray, yellow, and light brown. The subsoil is nearly impervious to water. The parent material is thought to consist chiefly of local wash derived from the associated Dickson and Baxter soils, but in many places it is apparently residual from the weathering of cherty limestones.

As previously stated, drainage of this soil is very poor. In most places there is no runoff; and, owing to the compact subsoil, internal drainage is indeed slow. During wet seasons water may stand on the surface much of the time. During prolonged dry seasons the soil becomes rather hard. The soil is acid in reaction, low in organic matter and mineral plant nutrients, and nearly impermeable to plant roots as well as to water.

This soil, which occupies a total area of 6,976 acres, occurs in all parts of the Highland Rim, especially between Cash Point and Macedonia Church. It is associated chiefly with Lawrence silt loam and the Dickson soils.

Most of the land is still in woods. The small proportion that is cleared is used chiefly for pasture, and the production of general farm crops is attempted on a few small areas. As on the Dickson soils, the trees on Guthrie silt loam are chiefly deciduous; but the proportion of water-tolerant species, such as red maple, sweetgum, willow oak, water oak, and black tupelo (black gum), is much greater, and such trees as blackjack oak, post oak, white oak, and hickory, characteristic of dry ridges, are generally scarce or absent.

Physically, Guthrie silt loam is unsuitable for the production of crops, chiefly because of poor drainage. Artificial drainage is not feasible, because an outlet for most areas would be extremely difficult and expensive to build; even if it were feasible, the soil would not be expected to drain well, because of the compact and impervious character of the subsoil. In its natural drainage condition it is physically suitable for pasture, although it must be admitted that it is not especially productive of pasture plants. Nevertheless such plants as redtop, orchard grass, and lespedeza should grow fairly well. The application of lime, phosphate, and potash would be expected to stimulate the growth of plants somewhat, but the response to such treatment may not be great.

**Robertsville silt loam.**—This is a light-colored poorly drained strongly acid soil occupying low terraces along streams. It has developed from general stream alluvium, most of which has originated in uplands underlain by limestones, chiefly cherty limestones. In some places, however, it has apparently developed from a mixture of general stream alluvium and local wash. Most of the areas are above overflow, but some of the lowest ones are flooded occasionally. All the areas are level to gently sloping. Moisture conditions are unfavorable. The soil remains waterlogged much of the winter, spring, and early summer; and it generally becomes dry and hard in the fall.

The surface soil of typical Robertsville silt loam is between 8 and 12 inches thick and consists of grayish-yellow or light-gray silt loam that is friable when moist but rather hard and brittle when dry. In fields the topmost inch or two generally is light-gray floury silt loam. In woods or pastures the topmost inch or two in most places is stained dark gray with organic matter. The subsoil, extending to a depth of about 24 inches, is silty clay loam or silty clay that is chiefly light gray or yellowish gray, with numerous mottlings of bluish gray, yellow, and light brown. The substratum, extending to a depth of 4 feet or more, is bluish-gray or light-gray silty clay loam or silty clay, profusely mottled with grayish blue, gray, yellow, and light brown.

The consistence of the subsoil and the substratum varies widely. In some places these layers are moderately friable; in others they are compact, sticky, and plastic. Concretions generally scattered throughout the soil mass are particularly abundant where the soil is heavy and compact. In a few areas some cherty gravel is distributed over the surface and throughout the soil mass, and such areas are indicated on the map by special symbol. Where the land is gently sloping, the color, texture, and consistence vary somewhat within short distances.

This soil covers a total area of 896 acres. The greater part is mapped on the Highland Rim, where it is associated chiefly with the Melvin, Humphreys, and Dickson soils. It occupies elongated terraces adjacent to stream bottoms. The more typical areas are near the Tennessee-Alabama State line south of Cash Point; in the general vicinities of New Hope, Lincoln, and Elora; south of Brown Chapel; 1 mile south of Prospect; and 2 miles south of Corder Crossroads.

Nearly all of the land is cleared. It is used chiefly for pasture and hay, and corn is grown to some extent. Yields of corn are generally low, and those of hay are moderate to low. Owing to poor drainage and low fertility, this soil is very poorly suited for the production of crops and only moderately suited to hay and pasture, but the latter uses are thought to be the best adapted ones. Redtop and lespedeza should make one of the most suitable mixtures for hay and pasture, although redtop is not likely to last for many years. The application of lime, phosphate, and potash would be expected to give moderately good results, but not so good as on the deep well-drained soils of the terraces and uplands.

**Melvin silt loam.**—Melvin silt loam is a light-colored poorly drained soil that occupies stream bottoms subject to frequent flooding. It consists of general stream alluvium, most of which has originated in the uplands underlain by limestone. It generally has an 8- or 9-inch surface layer of friable silt loam that is brownish gray with a few mottlings of gray, yellow, and brown. This layer is underlain by light-gray or brownish gray slightly sticky silty clay loam profusely mottled with gray, yellow, and light brown. This material continues to a depth of at least 36 inches. The subsoil remains waterlogged much of the time, and the surface layer remains waterlogged part of the time. The soil is low in organic matter. It is generally acid in reaction, and in this respect it differs from Melvin silt loam developed outside the county, which is generally about neutral.

There is a total area of 7,168 acres mapped, mostly along numerous streams on the Highland Rim. Some areas, totaling about 450 acres, lie along streams in the Central Basin. In the latter areas the soil is probably less acid than on the Highland Rim. Most bodies in the Central Basin are mapped on the first and second bottoms along the Elk River, but a few are scattered along Cane and Bradshaw Creeks. Along the streams on the Highland Rim small islands of a somewhat better drained soil are included.

In the Central Basin, where most of the areas of Melvin silt loam are small, they are cultivated and planted to the same crops as the associated soils. Yields are generally low, and crop failures are rather common. On the Highland Rim most of this land is in forest, some is used for pasture, and a few acres are devoted to the production of crops. Chiefly because of poor drainage and susceptibility to flooding, this soil is poorly suited to the production of crops requiring tillage. There is the possibility, however, that it could be made suitable by artificial drainage. Without artificial drainage it is suitable for pasture and can be expected to support a moderately good stand of adapted pasture plants. Among such plants are redtop and lespedeza.

**Alluvial soils, undifferentiated.**—These soils are mapped chiefly in the narrow bottoms along intermittent streams and small perennial streams, and they include soils that vary greatly in color, texture, drainage, and fertility and in regard to source of material. This miscellaneous separation embraces areas in which the alluvial soils differ so greatly within such short distances that it is considered impracticable to delineate the boundaries between them. Such areas occur chiefly in narrow V-shaped valleys and in the broader U-shaped valleys, but they even occur on small alluvial fans. For the most part the soils consist of material that has recently been washed down from the adjacent slopes, and in a sense much of it can be considered local wash. In many places this material contains numerous fragments of chert. Drainage is generally rather poor, and nearly all of the areas are subject to flooding. The color of the surface soil ranges from nearly black to light gray. The texture, however, is nearly everywhere silt loam. Included here and there are small areas of the Huntington, Egam, Lindside, Melvin, and Ennis soils.

A total area of 3,968 acres is mapped. Except for about 300 acres along streams on the Highland Rim, all this land borders the small streams in the Central Basin. The areas on the Highland Rim consist largely of gravelly riverwash.

Nearly all of this land in the Central Basin is cleared. The greater part is used for pasture, but some is used for the production of crops common to the locality. Although areas here and there are well suited to crop production, most of them are poorly adapted to such use. On the other hand, they are fairly well adapted to pasture.

A mixture of timothy, redtop, bluegrass, white clover, and lespedeza would be expected to grow well and produce good pasture.

### FIFTH-CLASS SOILS

The Fifth-class soils include rough gullied land (Mimosa soil material), rough stony land (Mimosa soil material), and limestone outcrop. Like the soils of the Fourth class, they are characterized by one or more extremely unfavorable soil or land feature and therefore are not physically suited for growing cultivated crops; but unlike the Fourth-class soils, the Fifth-class soils are also unsuitable for pasture.

Although forest trees grow more slowly on these than on the soils of any other group, they probably are physically adapted to forest if the term "adapted" is used in the broad sense implying that use of land which best serves conditions as they exist. It is clearly understood, however, that factors arising from other existing conditions, either of the locality or of the individual farm unit, may in some instances overshadow physical land adaptations.

Although all the Fifth-class soils are characterized by features that disqualify them for any of the preceding classes, they differ from one another in several respects and each possesses its individuality. On the basis of such differences they are classified in three miscellaneous land types.

**Rough gullied land (Mimosa soil material).**—This land type includes the Mimosa and Cumberland soils, having a slope of 7 to 30 or more percent, that have been reduced to a network of gullies, which have destroyed the former soil layers. It can no longer be considered a soil but rather represents a condition. The land has become so eroded that the individual owner ordinarily cannot afford to reclaim it except through slow processes. It requires diversion terraces or ditches, revegetation, and planting for restoration through natural vegetative and other processes.

An area aggregating 3,136 acres of this land type is mapped. Small bodies are widely scattered throughout the Central Basin. Some of the larger ones are within the triangle cornered by Carmel Church, Red Oak, and McBurg. Fairly large areas are about 2 miles northeast of East Cyruston.

Most of this land was once fertile and productive. It was cleared, put under cultivation, and allowed to erode almost to destruction. It has been abandoned to practically worthless pasture or idle land or has become naturally seeded to cedar and pine with smaller proportions of other trees.

In its present condition this land is wholly unsuitable for the production of crops and so poorly suited to pasture that it is considered uneconomical for the owner to attempt such use. Forestry is probably the best adapted use at present. Black locust, cedar, and pine are trees that appear to be adapted to this land.

**Rough stony land (Mimosa soil material).**—The land included in this separation is known locally as rock land, glady land, and limestone land. It is characterized by numerous outcrops of limestone, shallow soil between the outcrops, and steep slope. The rocks composing this type of land are similar to those of rolling stony land (Mimosa soil material).

This land type differs from rolling stony land (Mimosa soil material) chiefly in having a steeper and rougher relief. In most places the slope exceeds 30 percent.

Because of the steeper slope, runoff is greater and more rapid, more geologic erosion has taken place, more of the bedrock is exposed, and the proportion of soil material on the surface is less, as compared with rolling stony land (Mimosa soil material). It is chiefly because of these differences, incident to the steeper gradient, that these land types are separated. Such stony land types necessarily are variable from place to place.

This land type occurs in rather large bodies throughout the entire Central Basin, and its total area is 3,776 acres. It is associated with rolling stony land (Mimosa soil material), the Dellrose and Mimosa soils of the uplands, the Greendale soils of the colluvial lands, and most of the soils of the terraces and bottom lands. Its variations include some few small scattered bodies having outcrops of sandstone among the limestones.

All the original timber has been removed, and the present forest is second growth. A large part, however, probably as much as 25 percent, is cleared and used for pasture. Owing to the large proportion of the surface occupied by outcrops, the shallowness of the soil between such outcrops, and the steep slope, this land is not physically well suited to pasture. Its best use is probably forestry.

**Limestone outcrop.**—Exposed limestone occupies the greater part or nearly all of the surface in areas classified as limestone outcrop. Here and there is a shallow covering of soil material, but generally such material is found only in cracks and crevices of the rocks. In some places enough soil material has accumulated to support a few trees. This material varies considerably as to color, texture, and structure. The predominant slope ranges from 10 to 30 percent. This land is practically worthless for the production of crops or for pasture, and in many places it has no value even for forestry.

Limestone outcrop occupies a small total area—960 acres. About 800 acres of this land occurs at the foot of Stovall Mountain (Cumberland escarpment) in the extreme southeastern corner of the county. The rest occupies small bodies scattered throughout the Central Basin. Apparently many of the bodies in the Central Basin originally had a considerable amount of soil material on them, which was later removed by accelerated erosion, after the land had been cleared. The areas at the foot of Stovall Mountain have a little more soil material than those in Central Basin and support deciduous trees including various species of oaks, birch, hickory, and elm. Cedars predominate in the Central Basin.

## PRODUCTIVITY RATINGS AND PHYSICAL LAND CLASSIFICATION

In table 7 the soils of Lincoln County are rated according to their productivity for the various crops grown in the county and are grouped according to their physical suitability for agricultural use.

**Table 7.**—*Productivity ratings of soils and physical classification of land in Lincoln County, Tenn.*

| Soil [1] | Crop productivity index [2] for— | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Corn (100=50 bu.) | | | Oats (100=50 bu.) | | | Wheat [6] (100=25 bu.) | | | Rye [6] (100=25 bu.) | | | Barley (100=40 bu.) | | |
| | A [3] | B [4] | C [5] | A | B | C | A | B | C | A | B | C | A | B | C |
| Huntington silt loam | 90 | 90 | 110 | 100 | 100 | 110 | 100 | 100 | 110 | 70 | 70 | 90 | 100 | 100 | 110 |
| Huntington silty clay loam | 90 | 90 | 110 | 100 | 100 | 110 | 100 | 100 | 110 | 70 | 70 | 90 | 100 | 100 | 110 |
| Huntington silt loam, dark-subsoil phase | 90 | 90 | 105 | 90 | 90 | 110 | 100 | 90 | 100 | 70 | 70 | 90 | 100 | 100 | 110 |
| Abernathy silt loam | 90 | 100 | 110 | [10] 75 | 80 | 110 | [10] 75 | 80 | 90 | [10] 65 | [10] 65 | [10] 75 | 85 | 85 | 100 |
| Cumberland silt loam | 70 | 80 | 100 | 70 | 80 | 100 | 65 | 70 | 90 | 40 | 60 | 70 | 75 | 75 | 100 |
| Maury loam | 70 | 75 | 95 | 75 | 80 | 100 | 65 | 80 | 100 | 50 | 60 | 75 | 75 | 85 | 110 |
| Dewey silt loam | 55 | 65 | 85 | 60 | 70 | 90 | 55 | 60 | 90 | 40 | 50 | 65 | 65 | 75 | 95 |
| Etowah silt loam | 55 | 70 | 85 | 60 | 70 | 90 | 55 | 65 | 90 | 40 | 50 | 65 | 60 | 70 | 95 |
| Egam silt loam | 70 | 75 | 85 | [10] 70 | [10] 70 | [10] 80 | [10] 70 | [10] 70 | [10] 80 | [10] 55 | [10] 55 | [10] 65 | 85 | 85 | 95 |
| Greendale silt loam | 55 | 65 | 85 | 60 | 70 | 85 | 60 | 75 | 90 | 50 | 60 | 75 | 60 | 65 | 80 |
| Mimosa silt loam, undulating phase | 60 | 65 | 85 | 60 | 70 | 85 | 50 | 60 | 75 | 40 | 50 | 60 | 55 | 65 | 80 |
| Lindside silt loam | 65 | 65 | 85 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Greendale cherty silt loam | 50 | 55 | 70 | 50 | 60 | 75 | 50 | 65 | 80 | 40 | 50 | 70 | 55 | 60 | 75 |
| Maury loam, rolling phase | 45 | 55 | 70 | 60 | 70 | 90 | 55 | 70 | 85 | 50 | 60 | 70 | 50 | 60 | 75 |
| Cumberland silt loam, slope phase | 45 | 50 | 70 | 50 | 60 | 80 | 40 | 55 | 80 | 35 | 50 | 65 | 45 | 55 | 70 |
| Sequatchie very fine sandy loam | 50 | 60 | 75 | 40 | 50 | 60 | 35 | 45 | 60 | 30 | 40 | 50 | 35 | 45 | 60 |
| Mimosa silt loam | 40 | 50 | 65 | 40 | 50 | 65 | 35 | 40 | 55 | 30 | 40 | 50 | 45 | 50 | 65 |
| Burgin silty clay loam, drained phase | 55 | 55 | 65 | 25 | 35 | 45 | 40 | 50 | 65 | 30 | 40 | 50 | 45 | 55 | 65 |
| Ennis silt loam | 50 | 50 | 65 | 40 | 50 | 60 | 40 | 50 | 60 | 30 | 35 | 45 | 40 | 50 | 60 |
| Humphreys silt loam | 50 | 60 | 70 | 35 | 40 | 55 | 35 | 40 | 55 | 30 | 35 | 50 | 45 | 50 | 65 |
| Cumberland silt loam, eroded phase | 40 | 45 | 60 | 35 | 45 | 60 | 30 | 40 | 55 | 30 | 40 | 50 | 40 | 50 | 65 |
| Baxter silt loam | 40 | 50 | 65 | 30 | 35 | 50 | 30 | 40 | 55 | 30 | 40 | 55 | 35 | 45 | 60 |
| Mercer silt loam | 40 | 50 | 60 | 35 | 45 | 55 | 40 | 50 | 65 | 30 | 40 | 55 | 30 | 40 | 50 |
| Baxter cherty silt loam, undulating phase | 30 | 45 | 60 | 25 | 30 | 45 | 25 | 35 | 50 | 25 | 30 | 45 | 25 | 35 | 50 |
| Baxter silt loam, eroded rolling phase | 25 | 45 | 55 | 15 | 25 | 40 | 20 | 30 | 45 | 20 | 30 | 45 | 25 | 35 | 45 |
| Dickson silt loam | 25 | 35 | 55 | 15 | 20 | 35 | 20 | 30 | 45 | 20 | 30 | 45 | 25 | 35 | 45 |

| Soil [1] | Crop productivity index [2] for— | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Timothy and clover (100=2 tons) | | | Alfalfa [6] (100=4 tons) | | | Lespedeza hay (100=1.5 tons) | | | Lespedeza seed (100=450 lbs.) | | | Crimson clover seed (100=10 bu.) | | |
| | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C |
| Huntington silt loam | 110 | 110 | 120 | 60 | 70 | 80 | 160 | 160 | 170 | 120 | 120 | 130 | ---- | ---- | ---- |
| Huntington silty clay loam | 110 | 110 | 120 | 60 | 70 | 80 | 160 | 160 | 170 | 120 | 120 | 130 | ---- | ---- | ---- |
| Huntington silt loam, dark-subsoil phase | 110 | 110 | 120 | 60 | 70 | 80 | 150 | 150 | 160 | 110 | 110 | 125 | ---- | ---- | ---- |
| Abernathy silt loam | 80 | 80 | 100 | 60 | 70 | 80 | 145 | 145 | 160 | 90 | 100 | 110 | 70 | 85 | 100 |
| Cumberland silt loam | 80 | 80 | 95 | 55 | 70 | 100 | 120 | 135 | 160 | 75 | 80 | 100 | 65 | 80 | 95 |
| Maury loam | 65 | 75 | 95 | 90 | 100 | 110 | 120 | 135 | 160 | 85 | 90 | 110 | 75 | 90 | 105 |
| Dewey silt loam | 65 | 75 | 90 | 55 | 70 | 90 | 105 | 120 | 145 | 70 | 80 | 100 | 55 | 70 | 85 |
| Etowah silt loam | 65 | 75 | 90 | 50 | 65 | 95 | 105 | 120 | 145 | 70 | 80 | 95 | 50 | 60 | 75 |
| Egam silt loam | 100 | 100 | 110 | 60 | 70 | 80 | 120 | 130 | 145 | 80 | 90 | 110 | 85 | 100 | 120 |
| Greendale silt loam | 65 | 75 | 90 | 30 | 45 | 60 | 100 | 110 | 145 | 75 | 80 | 95 | 60 | 75 | 95 |
| Mimosa silt loam, undulating phase | 65 | 75 | 85 | 60 | 75 | 90 | 95 | 110 | 130 | 65 | 80 | 110 | 50 | 65 | 80 |
| Lindside silt loam | 90 | 100 | 110 | ---- | ---- | ---- | 115 | 125 | 145 | 75 | 80 | 95 | 75 | 90 | 110 |
| Greendale cherty silt loam | 65 | 70 | 80 | 30 | 40 | 55 | 100 | 105 | 135 | 70 | 75 | 90 | 55 | 70 | 90 |
| Maury loam, rolling phase | 60 | 70 | 85 | 65 | 75 | 85 | 85 | 100 | 125 | 65 | 75 | 90 | 50 | 65 | 80 |
| Cumberland silt loam, slope phase | 60 | 70 | 85 | 50 | 65 | 85 | 95 | 105 | 135 | 60 | 70 | 85 | 45 | 65 | 80 |
| Sequatchie very fine sandy loam | 60 | 70 | 80 | 45 | 50 | 65 | 95 | 100 | 120 | 60 | 70 | 85 | 50 | 70 | 85 |
| Mimosa silt loam | 50 | 55 | 65 | 45 | 65 | 80 | 85 | 105 | 135 | 60 | 70 | 95 | 40 | 60 | 75 |
| Burgin silty clay loam, drained phase | 70 | 75 | 90 | 45 | 55 | 65 | 95 | 105 | 120 | 60 | 70 | 85 | 40 | 60 | 75 |
| Ennis silt loam | 50 | 60 | 75 | 30 | 40 | 50 | 80 | 100 | 125 | 60 | 70 | 85 | 50 | 65 | 85 |
| Humphreys silt loam | 50 | 60 | 70 | 45 | 55 | 70 | 80 | 90 | 105 | 55 | 60 | 70 | 55 | 70 | 85 |
| Cumberland silt loam, eroded phase | 45 | 60 | 70 | 40 | 55 | 70 | 80 | 100 | 120 | 50 | 65 | 75 | 40 | 60 | 75 |
| Baxter silt loam | 40 | 50 | 60 | 30 | 40 | 50 | 80 | 100 | 120 | 55 | 65 | 80 | 40 | 60 | 75 |
| Mercer silt loam | 50 | 60 | 70 | 30 | 50 | 70 | 85 | 100 | 120 | 65 | 80 | 100 | 40 | 60 | 75 |
| Baxter cherty silt loam, undulating phase | 30 | 40 | 50 | 20 | 30 | 45 | 65 | 85 | 105 | 45 | 60 | 75 | 35 | 55 | 70 |
| Baxter silt loam, eroded rolling phase | 25 | 40 | 50 | 20 | 30 | 40 | 65 | 85 | 105 | 35 | 50 | 60 | 30 | 50 | 65 |
| Dickson silt loam | 25 | 35 | 45 | 15 | 25 | 35 | 65 | 85 | 105 | 35 | 50 | 65 | 30 | 50 | 65 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mimosa stony silt loam, undulating phase | 30 | 40 | 60 | 30 | 35 | 45 | 35 | 40 | 50 | 30 | 35 | 45 | 35 | 40 | 55 | 45 | 50 | 65 | 30 | 40 | 50 | 75 | 85 | 105 | 50 | 60 | 75 | 30 | 50 | 70 |
| Greendale silt loam, slope phase | 40 | 45 | 65 | 40 | 50 | 70 | 45 | 60 | 75 | 30 | 40 | 60 | 40 | 50 | 60 | 40 | 50 | 65 | 30 | 40 | 50 | 65 | 85 | 105 | 45 | 60 | 70 | 30 | 60 | 70 |
| Dellrose cherty silt loam | 55 | 60 | 75 | 25 | 30 | 40 | 25 | 35 | 45 | 20 | 30 | 40 | 45 | 55 | 65 | 35 | 40 | 45 | 20 | 30 | 40 | 60 | 75 | 95 | 35 | 45 | 60 | 50 | 65 | 80 |
| Frankstown cherty silt loam | 45 | 50 | 65 | 25 | 30 | 45 | 25 | 35 | 45 | 20 | 30 | 45 | 25 | 35 | 50 | 25 | 30 | 40 | 20 | 30 | 40 | 45 | 60 | 80 | 30 | 40 | 50 | 30 | 50 | 65 |
| Cumberland silt loam, eroded slope phase | 35 | 40 | 55 | 25 | 35 | 50 | 25 | 35 | 50 | 25 | 35 | 50 | 30 | 45 | 55 | 40 | 55 | 70 | 20 | 35 | 55 | 65 | 85 | 105 | 35 | 50 | 60 | 25 | 50 | 65 |
| Frankstown stony silt loam | 45 | 50 | 65 | 25 | 30 | 40 | 30 | 35 | 45 | 20 | 30 | 40 | 25 | 35 | 45 | 20 | 30 | 40 | 20 | 30 | 40 | 40 | 60 | 75 | 30 | 40 | 50 | 30 | 50 | 65 |
| Ooltewah silt loam | 40 | 40 | 55 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 45 | 50 | 60 | ---- | ---- | ---- | 75 | 95 | 110 | 45 | 60 | 75 | 45 | 65 | 75 |
| Sequatchie loamy fine sand | 30 | 35 | 45 | 25 | 30 | 40 | 25 | 35 | 45 | 20 | 35 | 45 | 25 | 35 | 45 | 35 | 45 | 55 | 20 | 30 | 35 | 80 | 95 | 110 | 45 | 60 | 70 | 35 | 55 | 70 |
| Greendale cherty silt loam, slope phase | 30 | 35 | 50 | 30 | 40 | 60 | 30 | 40 | 60 | 30 | 40 | 60 | 25 | 40 | 55 | 35 | 45 | 60 | 20 | 35 | 40 | 65 | 85 | 105 | 35 | 50 | 60 | 30 | 55 | 65 |
| Wolftever silt loam | 30 | 30 | 40 | 15 | 30 | 40 | 30 | 30 | 40 | 20 | 30 | 40 | 20 | 30 | 40 | 50 | 55 | 65 | 15 | 30 | 35 | 50 | 65 | 80 | 25 | 60 | 80 | 40 | 60 | 70 |
| Mercer silt loam, rolling phase | 30 | 40 | 50 | 20 | 30 | 40 | 30 | 40 | 50 | 25 | 35 | 45 | 20 | 35 | 45 | 25 | 35 | 40 | 15 | 35 | 60 | 50 | 65 | 85 | 30 | 45 | 55 | 20 | 40 | 50 |
| Humphreys gravelly silt loam | 30 | 40 | 50 | 15 | 25 | 35 | 20 | 30 | 40 | 20 | 30 | 40 | 20 | 30 | 40 | 25 | 35 | 45 | 20 | 35 | 45 | 45 | 50 | 65 | 20 | 30 | 40 | 30 | 50 | 60 |
| Baxter cherty silt loam, eroded phase | 25 | 35 | 45 | 15 | 20 | 30 | 20 | 30 | 40 | 20 | 30 | 40 | 20 | 30 | 45 | 20 | 30 | 40 | 10 | 20 | 30 | 30 | 45 | 65 | 20 | 30 | 45 | 20 | 40 | 55 |
| Dickson cherty silt loam | 20 | 30 | 45 | 15 | 20 | 30 | 20 | 25 | 35 | 20 | 25 | 35 | 15 | 25 | 35 | 20 | 30 | 40 | 10 | 20 | 30 | 50 | 65 | 85 | 20 | 35 | 50 | 20 | 40 | 55 |
| Burgin silty clay loam | 40 | 40 | 45 | 10 | 20 | 25 | 30 | 30 | 35 | 20 | 25 | 30 | 15 | 25 | 30 | 70 | 80 | 95 | ---- | ---- | ---- | 70 | 75 | 80 | 40 | 45 | 50 | 35 | 50 | 60 |
| Frankstown cherty silt loam, shallow phase | 25 | 30 | 40 | 10 | 20 | 30 | 15 | 25 | 35 | 15 | 25 | 35 | 15 | 25 | 35 | 20 | 25 | 35 | 10 | 20 | 25 | 25 | 40 | 50 | 15 | 25 | 30 | 20 | 40 | 50 |
| Dickson silt loam, rolling phase | 20 | 25 | 40 | 10 | 15 | 25 | 15 | 25 | 35 | 15 | 25 | 35 | 15 | 25 | 35 | 25 | 30 | 40 | 10 | 20 | 30 | 40 | 50 | 65 | 20 | 30 | 40 | 20 | 40 | 50 |
| Dickson cherty silt loam, rolling phase | 20 | 25 | 35 | 10 | 15 | 25 | 15 | 20 | 30 | 15 | 20 | 30 | 10 | 20 | 30 | 15 | 25 | 35 | 10 | 20 | 25 | 35 | 45 | 60 | 15 | 25 | 35 | 20 | 35 | 45 |
| Mimosa stony silt loam | 20 | 25 | 30 | 20 | 20 | 25 | 20 | 20 | 25 | 20 | 20 | 25 | 20 | 20 | 25 | 30 | 35 | 40 | 20 | 35 | 40 | 40 | 50 | 65 | 25 | 40 | 50 | 25 | 45 | 60 |
| Dellrose cherty silt loam, steep phase | 25 | 30 | 40 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 10 | 20 | 30 | 25 | 40 | 50 | 15 | 25 | 30 | ---- | ---- | ---- |
| Mimosa silt loam, hill phase | 10 | 15 | 20 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 10 | 20 | 30 | 40 | 50 | 65 | 15 | 30 | 40 | ---- | ---- | ---- |
| Colbert stony silty clay loam | 25 | 30 | 30 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 15 | 25 | 35 | 35 | 40 | 45 | 25 | 30 | 35 | 25 | 30 | 35 |
| Colbert stony silty clay loam, rolling phase | 20 | 25 | 25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 15 | 25 | 35 | 30 | 35 | 40 | 20 | 25 | 30 | 20 | 25 | 30 |
| Smooth stony land (Mimosa soil material) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 25 | 30 | 35 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Colbert stony silty clay loam, hilly phase | 20 | 20 | 20 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 10 | 20 | 30 | 20 | 25 | 30 | 15 | 20 | 25 | 15 | 20 | 25 |
| Robertsville silt loam | 20 | 30 | 35 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 20 | 25 | 30 | ---- | ---- | ---- | 45 | 50 | 60 | 30 | 35 | 40 | 20 | 25 | 30 |
| Lawrence silt loam | 15 | 20 | 25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 15 | 20 | 25 | ---- | ---- | ---- | 35 | 40 | 45 | 10 | 15 | 20 | 15 | 20 | 25 |
| Melvin silt loam | 20 | 20 | 25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 30 | 35 | 45 | ---- | ---- | ---- | 40 | 50 | 60 | 15 | 30 | 35 | 30 | 40 | 50 |
| Alluvial soils, undifferentiated | 20 | 20 | 25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 25 | 40 | 50 | 10 | 15 | 20 | 20 | 30 | 40 |
| Rolling stony land (Mimosa soil material) | 15 | 15 | 20 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Guthrie silt loam | 10 | 10 | 15 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 30 | 35 | 40 | 15 | 20 | 25 | ---- | ---- | ---- |
| Rough gullied land (Mimosa soil material) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Rough stony land (Mimosa soil material) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Limestone outcrop | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

See footnotes at end of table.

TABLE 7.—*Productivity ratings of soils and physical classification of land in Lincoln County, Tenn.*—Continued

| Soil[1] | Crop productivity index [2] for— | | | | | | | | | | | | | | | | | | | | | | | | Physical land classification [9] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cowpea hay (100=1 ton) | | | Soybean hay (100=2.5 tons) | | | Soybean seed (100=25 bu.) | | | Tobacco[6] (burley) (100=1,500 lbs.) | | | Potatoes [7] (100=200 bu.) | | | Sweet-potatoes [7] (100=150 bu.) | | | Cotton [6] (100=400 lbs.) | | | Pasture [7] (100=100 cow-acre-days)[8] | | | |
| | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | |
| Huntington silt loam | 100 | 100 | 110 | 100 | 100 | 110 | 100 | 100 | 110 | [10] 50 | [10] 60 | 70 | [10] 70 | [10] 80 | 90 | [10] 70 | 80 | 90 | 60 | 70 | 80 | 120 | 120 | 120 | First-class soils (good to excellent cropland). |
| Huntington silty clay loam | 100 | 100 | 110 | 100 | 100 | 110 | 100 | 100 | 110 | [10] 50 | [10] 60 | 70 | [10] 70 | [10] 80 | 90 | [10] 70 | 80 | 90 | 60 | 70 | 80 | 120 | 120 | 120 | |
| Huntington silt loam, dark-subsoil phase | 95 | 95 | 105 | 95 | 95 | 100 | 90 | 90 | 100 | [10] 40 | [10] 50 | 60 | [10] 65 | [10] 75 | 85 | [10] 65 | 75 | 85 | 65 | 75 | 85 | 120 | 120 | 120 | |
| Abernathy silt loam | 85 | 100 | 120 | 85 | 95 | 105 | 80 | 90 | 100 | [10] 50 | [10] 60 | 70 | [10] 70 | [10] 80 | 90 | [10] 70 | 80 | 90 | 65 | 75 | 85 | 90 | 90 | 120 | |
| Cumberland silt loam | 85 | 100 | 120 | 80 | 90 | 115 | 70 | 80 | 90 | 50 | 70 | 85 | 65 | 80 | 95 | 80 | 95 | 110 | 75 | 90 | 115 | 90 | 90 | 120 | |
| Maury loam | 90 | 110 | 130 | 75 | 85 | 110 | 65 | 80 | 95 | 45 | 65 | 80 | 65 | 75 | 95 | 80 | 95 | 110 | 70 | 85 | 110 | 90 | 100 | 110 | |
| Dewey silt loam | 75 | 90 | 110 | 65 | 80 | 95 | 50 | 70 | 85 | 40 | 60 | 75 | 65 | 75 | 90 | 70 | 90 | 100 | 60 | 80 | 100 | 75 | 85 | 110 | |
| Etowah silt loam | 75 | 90 | 110 | 65 | 80 | 95 | 50 | 70 | 85 | 45 | 60 | 80 | 55 | 70 | 85 | 65 | 85 | 95 | 60 | 80 | 110 | 75 | 85 | 110 | |
| Egam silt loam | 110 | 120 | 130 | 80 | 85 | 95 | 70 | 85 | 100 | [10] 30 | [10] 40 | [10] 50 | [10] 50 | [10] 60 | [10] 70 | 50 | 60 | 70 | 50 | 60 | 70 | 110 | 110 | 130 | Second-class soils (Fair to good cropland). |
| Greendale silt loam | 85 | 100 | 120 | 60 | 70 | 85 | 55 | 70 | 80 | 55 | 70 | 85 | 50 | 60 | 80 | 70 | 85 | 100 | 50 | 70 | 90 | 90 | 100 | 115 | |
| Mimosa silt loam, undulating phase | 85 | 100 | 120 | 55 | 65 | 80 | 50 | 65 | 75 | 40 | 60 | 75 | 40 | 55 | 65 | 60 | 80 | 95 | 50 | 65 | 80 | 85 | 90 | 110 | |
| Lindside silt loam | 95 | 110 | 120 | 70 | 80 | 95 | 60 | 70 | 80 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 110 | 110 | 120 | |
| Greendale cherty silt loam | 75 | 90 | 110 | 50 | 60 | 75 | 45 | 60 | 75 | 40 | 60 | 80 | 50 | 60 | 75 | 65 | 80 | 95 | 50 | 70 | 90 | 85 | 90 | 110 | |
| Maury loam, rolling phase | 70 | 90 | 110 | 45 | 60 | 75 | 40 | 60 | 75 | 35 | 50 | 65 | 40 | 50 | 65 | 60 | 80 | 95 | 60 | 70 | 90 | 70 | 80 | 100 | |
| Cumberland silt loam, slope phase | 60 | 80 | 100 | 45 | 60 | 75 | 30 | 50 | 65 | 35 | 55 | 70 | 40 | 55 | 70 | 60 | 80 | 95 | 60 | 75 | 95 | 75 | 85 | 100 | |
| Sequatchie very fine sandy loam | 60 | 80 | 95 | 45 | 55 | 70 | 30 | 50 | 65 | 35 | 55 | 70 | 35 | 50 | 75 | 60 | 75 | 90 | 50 | 65 | 85 | 60 | 70 | 90 | |
| Mimosa silt loam | 60 | 80 | 95 | 45 | 60 | 75 | 25 | 50 | 60 | 35 | 50 | 60 | 30 | 45 | 55 | 55 | 75 | 90 | 40 | 55 | 75 | 75 | 80 | 95 | |
| Burgin silty clay loam, drained phase | 80 | 100 | 110 | 55 | 70 | 85 | 45 | 60 | 75 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 55 | 70 | 90 | 100 | 110 | |
| Ennis silt loam | 60 | 75 | 95 | 50 | 60 | 75 | 35 | 50 | 65 | [10] 30 | [10] 45 | [10] 60 | [10] 40 | [10] 45 | [10] 60 | 55 | 65 | 80 | 50 | 65 | 75 | 60 | 70 | 85 | |
| Humphreys silt loam | 55 | 70 | 85 | 50 | 60 | 70 | 35 | 50 | 65 | 40 | 55 | 80 | 35 | 45 | 55 | 50 | 65 | 80 | 50 | 75 | 95 | 65 | 75 | 90 | |
| Cumberland silt loam, eroded phase | 40 | 60 | 70 | 40 | 55 | 70 | 30 | 40 | 50 | 30 | 50 | 65 | 30 | 40 | 55 | 50 | 65 | 80 | 50 | 70 | 80 | 65 | 70 | 90 | |
| Baxter silt loam | 45 | 60 | 75 | 45 | 60 | 75 | 35 | 45 | 55 | 40 | 55 | 70 | 35 | 45 | 55 | 50 | 65 | 80 | 40 | 65 | 90 | 50 | 60 | 80 | |
| Mercer silt loam | 55 | 70 | 85 | 45 | 60 | 70 | 35 | 50 | 60 | 30 | 50 | 65 | 30 | 40 | 50 | 40 | 55 | 70 | 35 | 50 | 65 | 65 | 75 | 90 | |
| Baxter cherty silt loam, undulating phase | 30 | 50 | 70 | 35 | 55 | 70 | 25 | 40 | 50 | 25 | 45 | 60 | 25 | 35 | 45 | 40 | 50 | 65 | 35 | 55 | 75 | 40 | 55 | 70 | |
| Baxter silt loam, eroded rolling phase | 25 | 40 | 60 | 30 | 50 | 65 | 20 | 35 | 45 | 20 | 45 | 55 | 30 | 40 | 50 | 35 | 45 | 55 | 30 | 50 | 70 | 30 | 50 | 65 | |
| Dickson silt loam | 20 | 40 | 55 | 30 | 50 | 60 | 20 | 40 | 60 | 20 | 40 | 55 | 25 | 35 | 50 | 35 | 50 | 65 | 35 | 50 | 65 | 35 | 45 | 60 | |
| Mimosa stony silt loam, undulating phase | 40 | 55 | 65 | 40 | 50 | 65 | 30 | 45 | 55 | 25 | 45 | 60 | ---- | ---- | ---- | ---- | ---- | ---- | 35 | 50 | 65 | 75 | 75 | 90 | Third-class soils (poor to fair cropland). |
| Greendale silt loam, slope phase | 50 | 70 | 80 | 40 | 55 | 65 | 30 | 45 | 60 | 25 | 50 | 65 | 30 | 45 | 60 | 40 | 60 | 75 | 35 | 55 | 75 | 60 | 70 | 85 | |
| Dellrose cherty silt loam | 35 | 50 | 65 | 40 | 50 | 60 | 20 | 30 | 40 | 20 | 40 | 50 | 30 | 45 | 55 | 40 | 60 | 70 | 30 | 50 | 60 | 60 | 70 | 85 | |
| Frankstown cherty silt loam | 25 | 40 | 55 | 35 | 50 | 60 | 20 | 30 | 40 | 15 | 35 | 50 | 30 | 45 | 55 | 40 | 60 | 70 | 30 | 45 | 60 | 50 | 60 | 75 | |
| Cumberland silt loam, eroded slope phase | 35 | 55 | 65 | 35 | 50 | 60 | 20 | 30 | 40 | 15 | 30 | 45 | 25 | 35 | 50 | 40 | 55 | 65 | 30 | 55 | 70 | 50 | 55 | 75 | |
| Frankstown stony silt loam | 25 | 40 | 55 | 30 | 45 | 55 | 20 | 30 | 40 | 15 | 30 | 45 | 30 | 40 | 50 | 40 | 60 | 70 | 30 | 45 | 60 | 40 | 50 | 65 | |
| Ooltewah silt loam | 30 | 45 | 55 | 50 | 65 | 75 | 30 | 50 | 60 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 65 | 80 | 45 | 60 | 75 | |
| Sequatchie loamy fine sand | 50 | 70 | 85 | 35 | 50 | 60 | 20 | 35 | 45 | 30 | 45 | 60 | 30 | 45 | 60 | 45 | 60 | 75 | 35 | 55 | 70 | 35 | 50 | 60 | |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Greendale cherty silt loam, slope phase | 45 | 60 | 75 | 30 | 45 | 55 | 20 | 30 | 45 | 15 | 40 | 55 | 25 | 40 | 55 | 30 | 50 | 65 | 30 | 50 | 65 | 50 | 60 | 75 | Third-class soils (poor to fair cropland). |
| Wolftever silt loam | 40 | 50 | 60 | 40 | 50 | 60 | 40 | 50 | 60 | ---- | ---- | ---- | 20 | 30 | 40 | 25 | 35 | 45 | 30 | 40 | 50 | 60 | 70 | 85 | |
| Mercer silt loam, rolling phase | 55 | 70 | 85 | 30 | 40 | 50 | 20 | 30 | 40 | 15 | 30 | 40 | 25 | 35 | 45 | 30 | 50 | 55 | 20 | 35 | 45 | 50 | 60 | 75 | |
| Humphreys gravelly silt loam | 20 | 40 | 60 | 25 | 45 | 60 | 15 | 30 | 40 | 15 | 30 | 45 | 25 | 45 | 60 | 35 | 50 | 60 | 30 | 50 | 75 | 35 | 50 | 65 | |
| Baxter cherty silt loam, eroded phase | 25 | 40 | 60 | 20 | 35 | 50 | 20 | 30 | 40 | 15 | 35 | 45 | 20 | 30 | 40 | 20 | 40 | 45 | 25 | 40 | 60 | 35 | 50 | 65 | |
| Dickson cherty silt loam | 20 | 35 | 45 | 25 | 35 | 50 | 20 | 30 | 45 | 15 | 30 | 45 | 20 | 30 | 40 | 20 | 40 | 45 | 25 | 40 | 55 | 30 | 40 | 55 | |
| Burgin silty clay loam | 50 | 60 | 70 | 40 | 45 | 50 | 25 | 25 | 30 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 25 | 30 | 35 | 95 | 100 | 110 | |
| Frankstown cherty silt loam, shallow phase | 15 | 30 | 40 | 15 | 30 | 40 | 15 | 20 | 30 | 10 | 25 | 35 | 20 | 30 | 40 | 30 | 50 | 60 | 20 | 30 | 45 | 30 | 40 | 55 | |
| Dickson silt loam, rolling phase | 15 | 30 | 40 | 20 | 30 | 40 | 20 | 30 | 40 | 10 | 25 | 35 | 20 | 25 | 30 | 20 | 35 | 50 | 25 | 35 | 50 | 30 | 40 | 60 | |
| Dickson cherty silt loam, rolling phase | 15 | 30 | 40 | 20 | 25 | 35 | 15 | 25 | 35 | 10 | 20 | 30 | 20 | 25 | 30 | 15 | 30 | 45 | 20 | 30 | 45 | 25 | 35 | 55 | |
| Mimosa stony silt loam | 35 | 45 | 55 | 30 | 40 | 50 | 25 | 30 | 35 | 10 | 20 | 30 | ---- | ---- | ---- | ---- | ---- | ---- | 30 | 35 | 45 | 65 | 70 | 85 | Fourth-class soils (generally best suited to pasture). |
| Dellrose cherty silt loam, steep phase | 20 | 25 | 35 | 20 | 30 | 40 | 15 | 15 | 20 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 50 | 60 | |
| Mimosa silt loam, hill phase | 15 | 20 | 35 | 15 | 25 | 35 | 15 | 20 | 25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 50 | 70 | |
| Colbert stony silty clay loam | 20 | 25 | 30 | 20 | 25 | 30 | 10 | 15 | 20 | 15 | 25 | 35 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 75 | 75 | 80 | |
| Colbert stony silty clay loam, rolling phase | 20 | 25 | 30 | 20 | 25 | 30 | 10 | 15 | 20 | 15 | 20 | 30 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 70 | 70 | 75 | |
| Smooth stony land (Mimosa soil material) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 50 | 50 | 55 | |
| Colbert stony silty clay loam, hilly phase | 15 | 20 | 25 | 15 | 20 | 25 | 10 | 10 | 15 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 65 | 65 | 70 | |
| Robertsville silt loam | 25 | 30 | 35 | 25 | 30 | 40 | 15 | 20 | 25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 45 | 50 | 60 | |
| Lawrence silt loam | 20 | 25 | 30 | 25 | 30 | 35 | 10 | 15 | 20 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 35 | 45 | 55 | |
| Melvin silt loam | 25 | 35 | 40 | 25 | 30 | 40 | 15 | 20 | 25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 70 | 70 | 90 | |
| Alluvial soils, undifferentiated | 20 | 30 | 35 | 25 | 30 | 40 | 15 | 20 | 25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 70 | 70 | 90 | |
| Rolling stony land (Mimosa soil material) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 40 | 55 | |
| Guthrie silt loam | 20 | 25 | 30 | 20 | 25 | 30 | 15 | 20 | 25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 30 | 35 | 40 | |
| Rough gullied land (Mimosa soil material) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 15 | 15 | 25 | Fifth-class soils (generally best suited to forest). |
| Rough stony land (Mimosa soil material) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | |
| Limestone outcrop | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | |

1 Soils are listed in the approximate order of their general productivity under prevailing current practices and their relative suitability for growing crops, pasture, or forest.

2 The soils are given indexes that give the approximate average production of each crop to the nearest 5 percent of the standard of reference. The standard represents the approximate average yield obtained without the use of fertilizer or other amendments on the more extensive and better soil types of those regions of the United States in which the crop is most widely grown. Many of the ratings are the results of estimates, as supporting data are incomplete. Absence of an index, according to position, indicates either that the crop is not commonly grown because of poor adaptation, or that amendments are not commonly used.

3 These indexes refer to yields commonly obtained without the use of manure, commercial fertilizers, lime, or soil-improving crop rotation. (For further details see text, p. 96.)

4 These indexes refer to yields obtained under commonest practices of management. (For further details see text, p. 96.)

5 These indexes refer to yields that may be expected under the best practices of management. (For further details see text, p. 96).

6 Wheat, rye, alfalfa, burley tobacco, and cotton are rarely grown on soils of the first bottoms and depressions. For this reason yield data are extremely scarce, and the indexes in this table were arrived at inductively.

7 These indexes for potatoes, sweetpotatoes, and permanent pasture are largely comparative for the soil types of this and adjoining counties, since substantiating yield data are particularly scarce for these items. Although not based on quantitative yield data or used strictly in reference to the standards, it is believed they are fairly comparable.

8 The term "cow-acre-days" is used to express the carrying capacity or grazing value of pasture land. It represents the number of days that 1 animal unit can be supported on 1 acre without injury to the pasture, or the product of the number of animal units to the acre multiplied by the number of days of grazing. The animal unit is a means of measuring the feed requirements of livestock. It is the equivalent of a mature cow, steer, or horse, or 5 hogs, or 7 sheep, or 8 goats. For example, a soil that would provide grazing for 1 cow (or 1 animal unit) to the acre for 100 days, or for 2 cows for 50 days, would rate 100 cow-acre-days; and a soil that would provide grazing for 1 cow to 4 acres for 100 days would rate 25 cow-acre-days.

9 This is a grouping of the soil types and phases according to their relative physical use adaptation. (For further details see text, p. 98.)

10 The quality of these crops is relatively somewhat inferior, taking the average of the county as a standard.

The rating compares the productivity of each of the soils for each crop to a standard of 100. This standard index represents the approximate average acre yield obtained, without the use of fertilizers and other amendments, on the more productive soils of the region in the United States where the crop is most extensively grown. An index of 50 indicates that the soil is about half as productive of the specified crop as is the soil with the standard index. Soils given amendments, such as lime or commercial fertilizers, or unusually productive soils of small extent may have productivity indexes of more than 100 for some crops.

The soils of Lincoln County differ widely in productivity and in their response to different methods of management. In the long run the potential productivity of a soil under feasible farming practices is more significant than that intangible quality that has sometimes been called natural or inherent productivity. For this reason the soils of Lincoln County are rated as to their productivity according to three different kinds of management.

In column A, the indexes refer to expected yields without special practices to rehabilitate, maintain, or increase productivity. No manure or commercial fertilizers and no lime or other amendments are used, and no special effort is made in the selection and rotation of crops or to return organic matter to the soils.

In column B, the indexes refer to expected yields under present prevailing practices of soil management. The present general practice on the soils of the uplands is to make moderate applications of complete commercial fertilizers for tobacco, cotton, and vegetables, and light applications, or on some farms no application, for corn and small grains to be followed by hay crops. Phosphate alone or phosphate and potash are frequently used for corn and small grains. Lime is used on the uplands by some of the farmers, and the quantities of lime and phosphate used are rapidly increasing. Neither terracing nor contour tillage is a common practice. Crops are rotated, but generally speaking, neither the selection nor the rotation of crops is well adjusted to soil needs. On the soils of the bottom lands the prevailing practices for many crops are the same as those shown in column A, although some crops, such as tobacco and vegetables, are fertilized.

In column C, the indexes refer to yields that may be expected under the best practices of soil management. Little of the land is being managed in this way, and the indexes in this column are largely estimates. Although accurate or mathematical data are not sufficient to support adequately these indexes, it is hoped that by comparing them with the indexes of columns A and B the relative responses of each soil to management practices will be brought out. The term "best practices of management" refers to the choice and rotation of crops, the use of commercial fertilizers, lime, and manure, proper tillage methods, the return of organic matter to the soil, and mechanical means of controlling water and erosion where necessary, all carried on toward the end of maintaining and increasing soil productivity but not to an extent that would make farming unprofitable. On some of the fertile soils of the first bottoms, such as Huntington silt loam, the best feasible practices for several crops are the same as the prevailing practices; in fact, the more intensive farming practices produce little response in the way of increased yields, and the indexes in columns A, B, and C are identical.

As sufficient data are not available to appraise accurately and measure mathematically either the exact significance of a crop in local agriculture or the importance and suitability of certain soils for particular crops, no attempt has been made to compute a mathematical general productivity rating.

The soils are listed in table 7 in what is thought to be the approximate order of their general adaptability to the production of important crops of the present agriculture under current practices. Because of lack of more definite data, this has been done chiefly on the basis of information acquired through field observation, local literature, and consultations with farmers in the county and competent agricultural specialists in the State.

In the column headed "Physical land classification," the soil types, phases, and miscellaneous land types are grouped according to their relative physical suitability for use into First-class soils, Second-class soils, Third-class soils, Fourth-class soils, and Fifth-class soils. This grouping is not to be taken as a recommendation for use. Its purpose is to provide information as to the relative physical adaptation of the various soils in the present agriculture of the locality. Information on a number of additional factors is necessary in order to make even general recommendations for land use; and specific recommendations to apply on any one farm would require knowledge and consideration of a number of factors applying to that specific farm.

It may be said that, in general, under present conditions, First-class soils constitute good to excellent cropland; Second-class soils, fair to good cropland; Third-class soils, poor to fair cropland; Fourth-class soils, poor land for crops but better suited to pasture; and Fifth-class soils, land best suited to forest, although some may be used for crops and pasture.

Only ratings for the unprotected conditions from flooding have been given to the soils of the flood plains, as no areas are definitely protected by dikes or levees. As these floods usually occur in the winter and early spring, they affect only the winter crops to any great extent.

Factors influencing the productivity of land are mainly climate, soil (including drainage and relief), and management. Crop yields over a long period of years furnish the best available summation of those factors contributing to productivity, and they are used whenever available. In Lincoln County most of the productivity ratings are based largely on observations, interviews, local available literature, and local expert advice. Because of a lack of definite information and yield data by soil types in some instances, however, the indexes in this table represent inductive estimates rather than established yields. This is especially true of the indexes for potatoes, sweetpotatoes, timothy and clover, and permanent pasture.

Productivity tables do not present the relative roles that soil types, because of their extent and the pattern of their distribution, play in the agriculture of the county. The tables give a characterization to the productivity of individual soil types. They cannot picture the total quantitative production of crops by soil areas without the additional knowledge of the acreage of the individual soil types devoted to each of the specified crops. Economic considerations play no part in determining the productivity indexes; therefore there

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indexes cannot be interpreted into land values, except in a very general way. Distance to market, relative prices of farm products, and other factors influence the value of land.

## GENERALIZED PHYSICAL LAND CLASSIFICATION MAP

The soil map of Lincoln County graphically shows the extent and distribution of the 54 soil types and phases and 6 miscellaneous land types that cover the county. Since these 60 units of mapping are differentiated on a basis including both internal and external soil characteristics significant to land use, each unit possesses individuality significant to land use capabilities and management requirements for agricultural purposes. With such detailed physical land data logically assembled and graphically recorded in the form of a soil map, a considerable number of land classification maps can be interpreted or lifted readily from the soil map.

Figure 3 is an example of such a land classification map interpreted from the soil map. This land classification map is of necessity somewhat generalized because of its small scale.

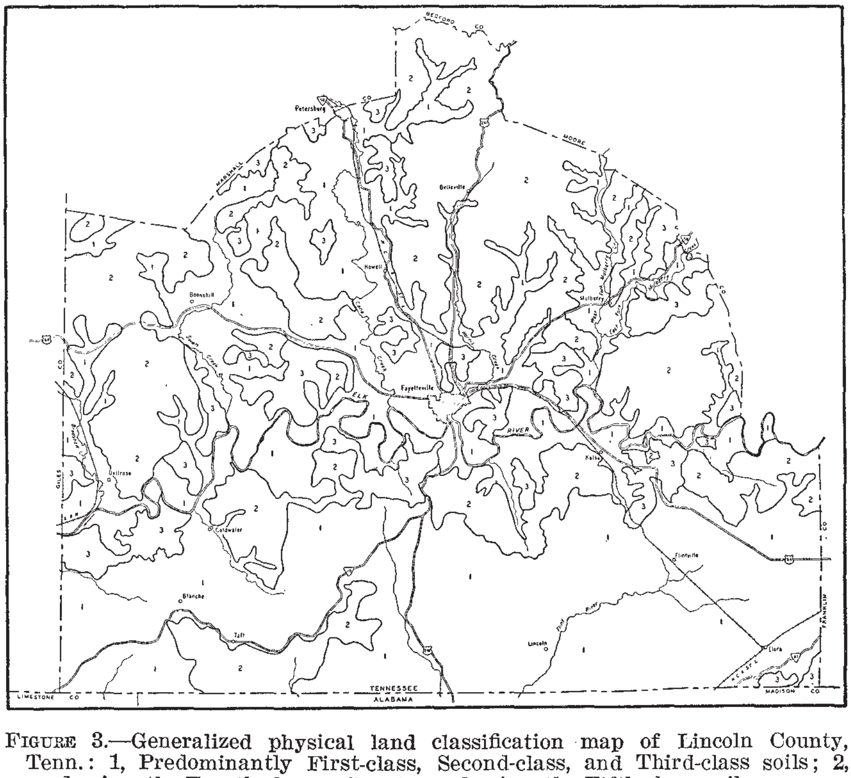


FIGURE 3.—Generalized physical land classification map of Lincoln County, Tenn.: 1, Predominantly First-class, Second-class, and Third-class soils; 2, predominantly Fourth-class soils; 3, predominantly Fifth-class soils.

Figure 3 shows the land of Lincoln County divided into three types. For convenience these may be referred to as land type 1, land type 2, and land type 3. These three land types are differentiated chiefly on a basis of the predominating conditions of physical suitability of the soils for use in the present agriculture. Land type 1 consists predominantly of soils characterized by relatively favorable conditions of productivity, workability, and conservability. Land type 2 consists predominantly of soils characterized by moderate to high productivity but unfavorable conditions of workability, conservability, or both. Land type 3 consists predominantly of soils of low to very low productivity and unfavorable conditions of workability, conservability, or both.

Land type 1 is composed chiefly of First-class, Second-class, and Third-class soils, as previously discussed. Although small areas of Fourth- and Fifth-class soils are necessarily included because of the generalized character of the map, probably as much as 90 percent of the land in this type is physically adapted to crops requiring tillage. Somewhat more than one-half of the total area of the county is included in this type. The larger areas and the greater part of the total of land type 1 are on the Highland Rim and along the Elk River, West and East Forks of Mulberry Creek, and Cane, Swan, and Bradshaw Creeks in the Central Basin. Most of the corn, wheat, hay, and cotton are produced on this land type.

Land type 2 consists predominantly of Fourth-class soils according to the soil grouping discussed previously. The greater part of this land is being used for pasture, and it is thought advisable, so far as the physical character of the land is concerned, to devote considerably more to that use where such use is consistent with feasible farm management. A small part of this land type is now in forest, most of which is second growth. Some of the land included in this type is now being cultivated, much of which is not well adapted physically to crops requiring tillage. This land type, most of which is in the Central Basin, includes somewhat less than one-half of the area of the county.

Land type 3 consists chiefly of Fifth-class soils previously described in this report. The greater part of this land is in forest, and it is thought that the physical character of most of it suggests this use under present conditions. Although there are a number of exceptions because of the generalized character of the map, this land type consists chiefly of soils low in productivity and having rugged relief. A part of the land is severely gullied and a part is extremely stony. In short, this land is low in productivity, possesses poor qualities of workability, and has difficult problems of conservation. This land, most of which is in the Central Basin, is of small extent; it is estimated to include only about 2 percent of the county.

Boundary lines separating these land types are generalized. In each land type as indicated on the map, small areas conforming to the other two land types are necessarily included. This applies particularly to land type 1, more than 5 percent of which may be composed of isolated areas consisting largely of soils that conform to land types 2 and 3. Similar inclusions are in land type 2, but to a less extent Land type 3 includes little land physically adapted to pasture or other crops.

The foregoing discussion is concerned with the predominant physical character prevailing in the respective delineated areas. This map is not to be taken as a recommendation for land use, as factors other than those of the physical character of the land are involved in such recommendations.

## LAND USES AND SOIL MANAGEMENT

Properly adjusted land use [8] and soil management [9] are basic problems in the agriculture of Lincoln County. In general, land use and soil management have been guided in this county with considerable regard for the capabilities and needs of the respective soils. For example, most of the soils physically suitable for the production of crops have been so used; most soils not suitable for crops, but suitable for pasture, have been used for pasture; and likewise most soils unsuitable for either crops or pasture have been used for forest. In regard to adjustments in soil management, similar broad generalities apply. For example, corn has been grown year after year without lime or fertilizers on most of the well-drained productive soils of the stream bottoms, such as the Huntington and Egam soils; on the other hand, corn is generally rotated with close-growing crops and lime and fertilizers are often used on most of the sloping soils of the uplands.

Although the different soils have been used and managed with considerable regard for their respective capabilities and needs, evidence of imperfect adjustments is common. Low yields, erosion, and idle fields are indications that use and management of soils have not been well adjusted to their respective physical peculiarities.

So far as the physical potentialities of the soils are concerned, the productivity of nearly all of them could be increased and maintained at a much higher level; first, by the adjustment of the use of each soil to its physical limitations, where this has not already been done; and, second, by the adjustment of the management to the needs of each soil under the selected use. It is to be remembered, however, that the soils of Lincoln County are used and managed on individual farms by individual farm operators; and any adjustments in the use and management of soils must be made through and by farm operators within individual farm units. As any readjustments in the use and management of the soils are interrelated with and interdependent on a great number of other factors in the farm operation, such readjustments must be brought about gradually and with full consideration of all the factors concerned. Also, any specific recommendations for the use and management of soils on the farm must be made with full consideration of all the factors concerned; therefore the following discussion of the use and management of soils is not to be taken as recommendations in any sense, but rather as a discussion of the adjustment of use and management to the physical peculiarities of the various soils.

The physical suitability for use and the management requirements are closely related, and the latter can be discussed only in reference to the former. In the section on Soils, the various types and phases are grouped for discussion according to their suitability for the production of the chief crops in the agriculture of the area. This grouping is also shown in table 7, which gives the productivity of the soils under different management practices. In this section, therefore, the soils will be treated according to their management requirements under certain uses.

[8] The term "land use" as used in this section refers to the broad uses of land on the farm, such as for (1) tilled crops, (2) permanent pasture, and (3) forest.

[9] The term "soil management" as used in this section refers to such practices as (1) the choice and rotation of crops, (2) application of amendments, (3) tillage methods, and (4) mechanical means of water control.

Although each soil has its individuality as regards management needs for specified uses, they may be placed into a relatively small number of groups, the members of each group being similar both in physical adaptation and in management requirements. Accordingly, all the soil types and phases, a total of 60, are placed in ten groups, which for convenience will be referred to as groups 1, 2, 3, etc., and the requirements of each group are discussed as to (1) maintenance of tilth, (2) control of water, (3) fertilization, and (4) selection of crops. In general, these groups present progressively more difficult problems of management.

The following publications contain additional information that may be helpful:

Tennessee Agricultural Experiment Station Circulars 6, The Value of Farmyard Manure; 9, Nitrogenous Fertilizer Materials; 12, Alfalfa and Sweet Clover Culture; 18, New Fertilizers on the Market for 1928: Suggestions for Their Use; 27, A Select List of Varieties of Vegetables (Revised); 30, Three New Varieties of Lespedeza; 34, Increasing the Profits from Phosphates for Tennessee Soils; 45, Balbo Rye; 49, Korean Lespedeza; and 52, Rye for Pasture and Seed in Tennessee.

Tennessee Agricultural Experiment Station Bulletins 110, A Survey of Sheep and Lamb Production in 1914; 112, The Small Grains in Tennessee; 126, Varieties of Corn and Their Adaptability to Different Soils; 129, Dark Tobacco Fertility Experiments at the Clarksville Station—Results from a Ten-year Period—1913–1922; 136, The Oat Crop; 141, The Comparative Values of Different Phosphates; 154, Lespedeza Sericea; and 158, Cotton Varieties and Related Studies.

Tennessee Agricultural Experiment Station Information Circulars (Mimeographed) 4, Compost for Leaves or Straw; 9, Burley Tobacco Culture; and 14, Austrian Winter Peas.

Tennessee College of Agriculture Extension Publications 161, Burley Tobacco Culture; and 188, Winter Cover Crops for Pasture and Soil Conservation.

## GROUP 1

Group 1 comprises Huntington silt loam; Huntington silt loam, dark-subsoil phase; Huntington silty clay loam; Egam silt loam; Ennis silt loam; Lindside silt loam; and Abernathy silt loam.

The soils of this group are physically suited to the intensive production of clean-cultivated summer crops, including corn in particular; and for the production of such crops, as well as other summer crops, the management requirements are simple. Little is required in addition to the preparation of the seedbed and the amount of cultivation necessary to eradicate weeds.

All the soils of this group are naturally productive, have good tilth, and are easy to conserve. All are on stream bottoms except Abernathy silt loam, which is in depressions. All are subject to occasional flooding. All the soils are well drained except Lindside silt loam, which is intermediately drained. All consist of alluvial material, most of which has been washed from the uplands underlain by limestone. All have a comparatively high content of organic matter and mineral plant nutrients except Ennis silt loam, which is only moderately supplied with these constituents.

The good tilth of these soils is easily maintained. No special practices are required to maintain tilth, but cultivation when the soil is wet, particularly of Egam silt loam and Huntington silty clay loam, should be avoided.

Fertilization is not ordinarily required for the common crops, as these soils are comparatively well supplied with both organic matter and mineral plant nutrients. Furthermore, the deposition of material during the occasional floods tends to maintain or increase the content of mineral plant nutrients. Some response can usually be expected from fertilization, but for the common crops such response will probably be low, compared with the response from equivalent fertilization on the soils of groups 2, 4, 5, 6, 7, and 8. An exception to this generalization, however, is Ennis silt loam, which is considered to be only moderately supplied with plant nutrients and which therefore would be expected to require fertilization and respond to it.

All the soils except Lindside silt loam and Egam silt loam have highly favorable moisture relationships, and special measures for moisture conservation, drainage, or control of runoff are not necessary. On Lindside silt loam, the intermediately drained soil, some crops, such as corn, may suffer from too much moisture, and the soil would be improved by artificial drainage. The natural drainage condition is satisfactory, however, for grasses and several legumes. On Egam silt loam, which is well drained but has a heavy, difficultly penetrable subsoil, crops may suffer from lack of available moisture during extended dry periods. Apparently, little can be done to improve this condition, although the growing of deep-rooted plants might be effective. The moisture conditions of the other soils are optimum or near optimum for the common field crops.

The soils of this group are not exacting in regard to the selection of summer crops, but are exacting in regard to the selection of winter crops and perennial crops. Owing to the temporary wet condition that persists for a short period after floods, which usually occur in the winter and early spring, the selection of alfalfa and other perennials and winter annuals that are susceptible to injury from wet conditions needs to be avoided. Winter grains, especially wheat, tend to lodge heavily, and they are considered more susceptible to disease when grown on these soils than on most of the well-drained soils of the uplands. Tobacco is likely to grow rank and be of inferior quality, and it is also considered more susceptible to disease when grown on these soils than on many of the well-drained soils of the uplands. Cotton is likely to grow more rank, mature later, and be more susceptible to disease when grown on these soils than on most of the well-drained soils of the uplands. For these reasons it might be well to avoid so far as practicable the selection of small grains, tobacco, and cotton. On the other hand, corn and many hay crops are remarkably well adapted to these soils and under ordinary conditions should be selected in preference to other crops. Although corn can be grown successfully year after year, higher yields are certainly to be expected by growing it in a rotation. A short rotation of corn and a grass-legume mixture probably would be well adapted to these soils, which are so well suited to the production of these crops.

### GROUP 2

Group 2 includes Humphreys silt loam, Humphreys gravelly silt loam, Sequatchie very fine sandy loam, and Sequatchie loamy fine sand.

Like the soils of group 1, the soils of group 2 are physically suited to the intensive production of clean-cultivated crops, but they differ in their management requirements for such use. Their chief difference is in their fertilizer requirements. The soils of group 1 require little or no fertilization, whereas the soils of group 2 require considerable fertilization and liming for the production of medium to high yields of the common crops.

All the soils of group 2 occupy low terraces and range from medium to low in organic matter and plant nutrients. They are rather open and porous, particularly Humphreys gravelly silt loam and Sequatchie loamy fine sand; hence, such soluble constituents as potassium and nitrogen are readily lost. It is thought, therefore, that fertilizers need to be applied rather frequently. Incidentally, the soils respond quickly to such treatments. Complete fertilizers are required for most crops under ordinary conditions, but nitrogen might be omitted under certain management practices.

Like the soils of group 1, the soils of group 2 present but a minor problem of control of runoff. The surface is nearly level to gently sloping, and water penetrates freely. Humphreys gravelly silt loam and Sequatchie loamy fine sand, however, do not retain moisture well.

In view of the fact that the soils range from medium to low in content of plant nutrients, are readily leached, and range from medium to low in water-holding capacity, they require the rather careful selection and rotation of crops if they are to be used to their best advantage. In order to minimize the loss of valuable plant nutrients by leaching, and in order to take advantage of the moisture when the rainfall is generally abundant, that is, in the winter and spring, winter crops need to be grown. Winter grains and winter legumes are suggested for this purpose. During the summer the selection of crops highly susceptible to injury from drought needs to be avoided, particularly for Humphreys gravelly silt loam and Sequatchie loamy fine sand. Summer crops should be planted rather early in the spring. Unless crops of high acre value, such as tobacco or truck crops, are to be grown, it would seem advisable to select crops that will grow successfully on soils with a medium to low nutrient level, in order to keep the fertilizer requirements at a minimum. Among such crops are lespedeza, crimson clover, redtop, orchard grass, rye, wheat, and cotton. Although rotation of crops is not necessary in most places for the control of runoff and erosion, it is generally needed for the efficient use of fertilizers and maintenance of fertility. A suitable rotation would be: Corn or cotton 1 year, small grain 1 year, grass-legume mixture 1 year. These soils are considered well adapted to the production of tobacco and truck crops. Such crops, however, need to be heavily fertilized. If tobacco or truck crops are selected, it might be advisable to rotate them with other crops that require soils with a medium to high nutrient level. Among such crops are barley, oats, and red clover; and even alfalfa might be considered under certain conditions, although this crop is not thought to be well adapted to soils such as these.

### GROUP 3

Group 3 includes only two soils—Burgin silty clay loam and Burgin silty clay loam, drained phase.

These soils are physically very well suited to the production of hay, moderately well suited to the production of corn, and rather poorly suited to the production of small grains. When used for the production of crops, the chief management problems are (1) the maintenance of good tilth and (2) the improvement of drainage.

These soils, which occupy nearly level, low terracelike positions adjacent to streams or stream bottoms, are characterized by a heavy texture, tough, sticky, and plastic consistence, dark color, and slow drainage.

These two soils require considerable attention for the maintenance of favorable tilth. If cultivated when wet or rather moist they will puddle and become hard and cloddy on drying. When dry they are difficult to till. Care needs to be taken, therefore, to work them only when the moisture content is optimum or nearly optimum. Maintenance of the high content of organic matter is necessary, and for this the growing of fibrous-rooted plants is suggested.

If crops are grown that require preparation of the seedbed in the spring, it would be well to plow these soils in the late fall or early winter, in order to derive the greatest benefit from alternate freezing and thawing.

These soils are not thought to require fertilization for the production of adapted crops. Their dark color indicates that they are high in organic matter, and apparently they are also comparatively high in content of mineral plant nutrients, including lime (available calcium). Lack of plant nutrients, therefore, is not likely to be the factor limiting plant growth, except under special circumstances. These soils would be expected to respond to applications of fertilizers, but such response would be low compared with the response from similar fertilization on the soils of groups 2, 4, 5, 6, 7, and 8.

These soils require improvement of drainage, as neither is well drained. Drainage of Burgin silty clay loam is barely adequate for the production of corn and is in general inadequate for small grains. Drainage of the drained phase is good for the production of corn but is barely adequate for small grains. Drainage of both soils is adequate for the production of hay, a use to which both are very well adapted. Artificial drainage, tiling, or open ditching would be expected to improve these soils; but, owing to their heavy texture and plastic and sticky consistence, they would tend to drain rather slowly, and the tiles or ditches would have to be rather closely spaced.

As these soils lie on nearly level areas, runoff is slow, and susceptibility to accelerated erosion is negligible. In a few places, however, they may receive considerable runoff from the slopes above; and in such places the diversion of runoff may be necessary, not so much to prevent erosion as to prevent further impairment of drainage.

Managing these soils in such a manner as to use them to best advantage requires a careful selection of crops. So far as control of erosion is concerned, they are suitable for the intensive production of clean-cultivated crops, such as corn; but loss of organic matter and impairment of tilth is likely to result from the intensive production of such crops. They are not well suited to small grains and cotton, although such crops can be successfully grown on the drained phase. Neither are they well suited to alfalfa, tobacco, nor truck crops. On the other hand, they are very well suited to grasses and certain legumes and fairly well suited to corn. It seems, therefore, that good management requires the selection of such crops as grasses, adapted legumes, and corn. Among the adapted legumes are lespedeza, red clover, cowpeas, and soybeans. A rotation consisting of corn, 1 year, and a legume-grass mixture for 1, 2, 3, or 4 years would be well suited to the requirements of these soils.

### GROUP 4

Members of the Greendale series compose group 4. They are Greendale silt loam; Greendale silt loam, slope phase; Greendale cherty silt loam; and Greendale cherty silt loam, slope phase.

The soils of this group are physically well suited to the production of nearly all crops commonly grown in this county, and under such use they are managed with comparative ease.

All the soils of this group have developed from local wash accumulated at the foot of slopes. They are fairly well drained, have a friable grayish-brown or brownish-gray surface soil and a brownish-yellow or yellowish-brown subsoil. They differ somewhat in slope. That of Greendale silt loam and Greendale cherty silt loam is generally less than 8 percent, whereas that of the slope phases ranges from 8 to 15 percent. These soils have good tilth and are fairly easy to work, although Greendale cherty silt loam and its slope phase contain enough fragments of chert to interfere somewhat with tillage, and the two slope phases included in the group are sufficiently sloping to impair slightly their workability. The slope is not steep enough, however, to hamper the use of heavy machinery.

The tilth of these soils is good and is easily maintained, and the range in moisture content that will allow tillage is wide. Ordinary practices of management will maintain the tilth.

These soils usually require fertilization and liming in order to return high yields, although they are fairly well supplied with plant nutrients and moderate yields of most crops can be obtained without fertilization. Continued cropping without fertilization, however, will deplete the fertility of the soils, a fact that is evident in certain areas. For most crops, except legumes and nonlegumes that immediately follow legumes turned under, complete fertilizers probably will be required. Preliminary observations have indicated, however, that some of the areas of the Greendale soils, particularly those at the foot of the slopes occupied by the Mimosa and Maury soils, are fairly well supplied with lime and phosphate. If the crops are properly rotated, little fertilization will be required in such areas. Except for those areas where the soils are higher than normal in content of plant nutrients, good response from fertilization is to be expected. Along with fertilization, these soils require some care for the maintenance of organic matter, with which they are moderately well supplied.

The soils of this group require a little care for the control of runoff and erosion, but such control is not a serious problem. Greendale silt loam and Greendale cherty silt loam, both occupying gentle slopes, are not significantly susceptible to accelerated erosion; soils of the slope phase, on the other hand, are slightly susceptible. In most places, however, it is thought that erosion can be adequately controlled by cultivation on the contour; but in some areas special practices such as contour strip cropping or terracing may be necessary. In a number of places these soils receive an excess of runoff from the higher slopes, and in such places terraces or ditches may be necessary in order to divert this excess runoff. In a few places these soils need to be protected from excessive deposition if the soils on the slopes above are eroding severely, but such protection resolves itself into the stabilization of the soils on the slopes above.

In regard to the selection and rotation of crops, the soils of this group are not very exacting. Nearly all crops common to the area will grow well. For the efficient use of commercial fertilizers and the maintenance of organic matter, however, crops need to be rotated systematically. The rotation common to the area, consisting of corn or cotton 1 year, small grain 1 year, and clover-grass mixture 1 or 2 years, is well suited to these soils.

### GROUP 5

Group 5 includes Etowah silt loam; Cumberland silt loam; Maury loam; Mimosa silt loam, undulating phase; Mercer silt loam; Dewey silt loam; Baxter silt loam; and Wolftever silt loam.

The soils of this group are physically suited to the production of nearly all crops common to the area, and like the soils of group 4, they are rather easy to manage. They are, however, somewhat more exacting in their management requirements.

All these soils are well drained. None is significantly eroded, but a part of the original surface soil has been lost in many areas. The surface soils of all are friable and mellow and are moderately well supplied with organic matter. The subsoils of all except the Mimosa, Mercer, and Wolftever are firm but friable and are readily penetrable by water and plant roots. The subsoils of the Mimosa, Mercer, and Wolftever are rather compact, plastic, and sticky and are less easily penetrated by water and roots. This is particularly true of Wolftever silt loam. None of the soils is very low in plant nutrients, but they differ from each other somewhat in this regard, especially in the content of phosphorus. Maury loam is comparatively high in this element, the Mimosa soil is about medium, and the others are relatively low. The relief of all is gentle, the slope generally being less than 8 percent.

The tilth of these soils is good, and its maintenance requires no special practices. It is not necessary, for example, to plow the soil in the fall or early winter so that it can receive the beneficial effects of alternate freezing and thawing. The soils can be safely cultivated within a fairly wide range of moisture content, but cultivation when the soil is wet should be avoided. For the maintenance of tilth, the content of organic matter needs to be maintained.

In fertilizer requirements the soils differ somewhat because of differences in their natural content of mineral plant nutrients. Maury loam, which is comparatively high in phosphorus, does not require applications of this element. The Mimosa soil, which is variable in this respect, is likely to require only light applications of phosphorus for most crops; but certain crops, such as alfalfa, may require moderate to heavy applications. The other soils of this group, however, are generally low in phosphorus and will require applications according to management and the needs of the crops grown. All the soils are acid in reaction, although the degree of acidity of the surface soil in most places is not high. Most of the soils are likely to require lime, especially for grasses and legumes. Although the potash content of these soils is not considered especially low and applications may not be required for certain crops, a deficiency in this element is likely to develop under continuous cropping.

When bare, all the soils are slightly to moderately susceptible to accelerated erosion, and runoff requires some attention. This requirement can usually be met, however, through proper tillage and a well-planned choice and rotation of crops. Cultivation should be on the contour. The soils should not be allowed to lie bare for extended periods, nor should clean-cultivated crops be grown in successive summers unless protective cover crops are grown in the winter. Contour strip cropping ordinarily is not necessary, but such a practice is likely to prove beneficial. Mechanical structures for the control of runoff should not be necessary unless the soils are used intensively for clean-cultivated crops.

These soils are not very exacting in regard to the choice and rotation of crops, but they are more exacting in this respect than the soils of group 4. As these soils are either fairly fertile or responsive to fertilization, rather exacting crops might well be included in the rotation. Alfalfa is one of such crops. As the soils are fairly deep and well drained, it would be a good practice to grow a deep-rooted crop periodically. This would be beneficial to all the soils, particularly the Mimosa, Mercer, and Wolftever which are heavy in both the subsoil and the substratum. Among such deep-rooted crops are alfalfa and sweetclover. Red clover also is fairly deep rooted. So far as practicable, shallow-rooted crops should be alternated with deep-rooted ones. For the maintenance of organic matter and nitrogen, grasses and legumes should take a prominent place in the rotation. A rotation consisting of corn or cotton 1 year, small grain 1 year, and a legume-grass mixture 1 year would be well suited to the soils of this group.

### GROUP 6

In group 6 are the following soils: Cumberland silt loam, eroded phase; Cumberland silt loam, slope phase; Cumberland silt loam, eroded slope phase; Maury loam, rolling phase; Mimosa silt loam; Mimosa stony silt loam; Mimosa stony silt loam, undulating phase; Mercer silt loam, rolling phase; and Baxter silt loam, eroded rolling phase.

Like the soils of group 5, these are physically suited to the production of nearly all crops common to the area, but they have considerably more exacting management requirements for such use. They require more attention especially for the control of runoff and erosion, maintenance of tilth, and the choice and rotation of crops.

These soils as a group differ from those of group 5 chiefly in occupying steeper slopes and in being more or less eroded. Except the eroded phase of Cumberland silt loam and the undulating phase of Mimosa stony silt loam, both of which have a slope of less than 8 percent, all the soils of this group have a slope ranging from 8 to 15 percent. In most places all have lost a significant part of their original surface soil, although they differ from each other in this respect. Generally speaking, those designated as eroded phases have lost two-thirds or more of their original surface soil; the others have lost less. All are well drained. The subsoils of all except the Mimosa and Mercer soils are firm but friable and are rather easily penetrated by water and plant roots. Those of the Mimosa and Mercer soils are rather heavy and compact and are therefore less easily penetrated by water and roots. The soils range from moderate to high in susceptibility to accelerated erosion. They differ from each other in content of organic matter and mineral plant nutrients, particularly phosphorus.

These soils, particularly those designated as eroded phases, require considerable care for the maintenance of good tilth. They are likely to puddle when plowed wet or to clod when plowed too dry, and they should not be cultivated under such conditions. As they are susceptible to erosion when bare, fall or early winter plowing requires caution. The growing of fibrous-rooted plants, such as grasses, would decrease erosion and improve the tilth. Green manuring and barnyard manure are effective.

Like the soils of group 5, the soils of group 6 differ somewhat in their fertilizer requirements, owing to differences in their natural content of plant nutrients. The Maury soil, which is high in phosphorus, requires no application of this element for ordinary crops. The Mimosa soils, which are variable in phosphorus, might require little or none for the production of most crops, except those that have high phosphate requirements, such as alfalfa and certain other legumes. The other soils of this group are low in phosphorus and require application of this amendment according to the needs of the crops grown. Although the potash content of these soils is not thought to be especially low, and potash therefore may not be required for certain crops, a general deficiency in this element is likely to develop under continuous cropping. All the soils need lime, although they differ somewhat in their relative needs for this constituent. The Maury and Mimosa soils appear to contain a fair quantity of lime; hence they are unlikely to require much for the common crops. The other soils, however, are low in lime and require rather heavy applications, particularly for grasses and legumes.

All these soils are susceptible to accelerated erosion and require considerable care for its control. Tillage should be on the contour, and the soils should not be allowed to lie bare for extended periods. If other management practices, particularly tillage and fertilization, are reasonably good, it seems that erosion will be automatically controlled by the adoption of a 4- or 5-year rotation in which clean-cultivated crops are grown 1 year and close-growing crops are grown 3 or 4 years. It might prove advisable to include such deep-rooted crops as alfalfa and sweetclover, particularly on the Mercer and Mimosa soils. Where special measures for control of runoff and erosion are adopted, the rotation may be shortened somewhat. Mechanical measures, such as terracing, may prove beneficial, particularly on those soils with the more friable subsoils. Contour strip cropping might prove advisable where the slopes are comparatively long and uniform. The necessity of such special practices as terracing and contour strip cropping, however, depends to a large extent on the other management practices.

### GROUP 7

The following soils compose group 7: Frankstown cherty silt loam; Frankstown stony silt loam; Frankstown cherty silt loam, shallow phase; Baxter cherty silt loam, undulating phase; Baxter cherty silt loam, eroded phase; and Dellrose cherty silt loam.

The soils of this group are somewhat similar to those of group 6 in regard to management requirements; but their requirements for the maintenance of tilth and control of runoff are less exacting, whereas their requirements for fertilization are more exacting. In regard to the selection of crops, their requirements are somewhat similar to the soils of group 2.

These soils as a group are characterized by comparatively rapid internal drainage and low water-holding capacity, although the Dellrose soil has some advantage over the others in this respect. All contain enough fragments of chert to interfere materially with cultivation. They differ from each other in slope; the undulating phase of Baxter cherty silt loam ranges from about 3 to 7 percent, the Dellrose soil from 15 to 30 percent, and the others from 8 to 15 percent. They are somewhat susceptible to accelerated erosion but are not so susceptible on such slopes as one would ordinarily expect. They range from medium to comparatively low in plant nutrients, although the Dellrose soil probably contains more than the others. They are about medium in organic matter, except that the Baxter soils probably contain less than the others. All are acid in reaction.

None of these soils, except the eroded phase of Baxter cherty silt loam, requires any special care to avoid clodding and puddling. The eroded phase of Baxter cherty silt loam, however, might puddle and become rather cloddy if tilled when wet, and tillage under such condition therefore should be avoided.

These soils are generally rather low in plant nutrients, and fertilization is ordinarily required in order to obtain moderate to high yields. Complete fertilizers are usually required for most crops except legumes and nonlegumes that immediately follow legumes turned under, for which crops nitrogen presumably can be omitted from the fertilizer mixture. It is probable that the Dellrose soil will differ from the other soils in regard to fertilizer requirements, because it receives the runoff as well as some local wash from the slopes above, and because it also appears to receive a little seepage from the underlying level-bedded limestones. The moderate to low yields of corn, however, indicate that this soil probably needs fertilization, but such need might vary from place to place.

As these soils are rather porous and contain a considerable quantity of chert fragments, they are not highly susceptible to accelerated erosion and ordinarily do not require special practices for runoff and the control of erosion. Some care needs to be exercised, however, particularly on the eroded phase of Baxter cherty silt loam, which is already eroded. Cultivation should be done on the contour. Close-growing crops should be grown in rotation with clean-cultivated crops. Mechanical structures, such as terraces or ditches, ordinarily should not be necessary, although ditches to divert some of the excess runoff from the slopes above might be needed on some areas of the Dellrose soil. Contour strip cropping might be advisable, particularly on the Dellrose soil, which is well adapted to such a practice because of its long uniform slopes. The eroded phase of Baxter cherty silt loam will probably require somewhat more care than the other soils for the control of erosion.

These soils require a rather careful selection of crops. In order to utilize the moisture when the rainfall is abundant and in order to minimize the loss of plant nutrients from leaching, it is rather important that winter crops, such as winter grains or winter legumes, be grown. For summer crops, those that are resistant to drought should be selected in preference to those that are not. As the soils are medium to comparatively low in content of plant nutrients, and as they leach readily, it would seem advisable to select crops that will grow fairly well on soils possessing a medium or low nutrient level. Among such crops are lespedeza, crimson clover, rye, redtop, orchard grass, wheat, corn, and cotton. For the maintenance of organic matter and also for the prevention of erosion, it would seem desirable to grow grass periodically. In view of the above facts, a rotation consisting of corn or cotton 1 year, small grain 1 year, and a grass-legume mixture 1 or more years would meet the requirements of these soils. If it is desired to hold fertilization to a minimum, rye or wheat is suggested for the small grain, and lespedeza and redtop for the legume-grass mixture. With heavy fertilization, oats or barley is suggested for the small grain, and red clover and orchard grass or timothy as the legume-grass mixture. With heavy fertilization even alfalfa might succeed; but ordinarily this crop should not be selected for these soils. Owing to the steepness and chertiness of the Dellrose soil, the use of the ordinary machinery for planting and harvesting small grains and hay is difficult; and for this reason it may be practicable on many farms to select a pasture mixture in place of small grains and hay and to alternate corn with pasture.

## GROUP 8

Group 8 includes the Dickson soils—Dickson silt loam; Dickson silt loam, rolling phase; Dickson cherty silt loam; and Dickson cherty silt loam, rolling phase.

The soils of this group, all of which are physically suited to the production of crops, have rather exacting management requirements. As compared with the soils of the groups previously discussed, these soils are in greater need of organic matter, commercial fertilizers, and lime. In requirements for the selection of crops and the sequence in which they need to be grown, these soils are similar to those of groups 2 and 7, although they differ in certain respects.

The soils of this group are distinguished by a hardpan at a depth of about 2 feet. This hardpan apparently is nearly impervious to both water and plant roots. The soils are strongly acid in reaction, low in organic matter, and low in plant nutrients. They are not very susceptible to clodding and puddling. They differ somewhat in slope; Dickson silt loam and Dickson cherty silt loam range from about 2 to 8 percent, and the rolling phases range from about 8 to 15 percent. They are susceptible to erosion when bare, the extent varying according to slope gradient and chert content. Internal drainage, although retarded by the hardpan, is adequate for most of the crops commonly grown.

These soils require fertilization and liming in order to obtain medium to high yields of practically any crop. They require complete fertilizers for nearly all crops, except legumes and nonlegumes immediately following legumes that have been turned under, for which crops nitrogen can presumably be omitted from the fertilizer mixture. If soils such as these are adequately supplied with calcium, phosphorus, potassium, and nitrogen, deficiencies in certain minor elements might be detected. These soils are in great need of organic matter and are benefited greatly by applications of this constituent. They respond quickly to fertilization; but soluble fertilizer constituents apparently are lost readily by leaching, and fertilizers may therefore need to be applied rather frequently.

These soils require attention for the control of runoff and erosion, but they differ somewhat in this requirement, owing to differences in slope and in content of chert. The control of erosion is not particularly difficult on any of the soils, however. Tillage should follow the contour; the soils should not be allowed to lie bare for extended periods, particularly in the winter; and close-growing crops, including a sod-producing crop, need to be grown in rotations that include clean-cultivated crops. Mechanical measures, such as terracing, are not likely to be necessary where good soil management is practiced. The question of the advisability of terracing requires full consideration of the hardpan in these soils. Contour strip cropping might be advisable under certain conditions.

As these soils are low in fertility and leach readily, it might be advisable to select crops that grow fairly well on poor soils and avoid the necessity of heavy fertilization. On the other hand, exacting crops would be expected to succeed if the soils were heavily fertilized. In order to maintain or increase the organic matter, fibrous-rooted plants, such as grasses, need to be grown periodically. In view of the above facts, it seems that a rotation such as corn or cotton 1 year, small grain 1 year, and legume-grass mixture 1, 2, or 3 years would be suitable for these soils. If fertilization is to be held to a minimum, rye or wheat is suggested for the small grain and a mixture consisting chiefly of lespedeza and redtop for the legume-grass combination. If the fertilization is to be heavy, oats or barley may be grown for the small grain and red clover and orchard grass for the legume-grass mixture. If heavily fertilized, tobacco and truck crops may also be selected for these soils.

## GROUP 9

The following soils are in group 9: Lawrence silt loam; Guthrie silt loam; Robertsville silt loam; Melvin silt loam; Ooltewah silt loam; and alluvial soils, undifferentiated.

Most of the soils of this group are too wet for the production of the ordinary crops of the area, but they are considered suitable for pasture. Ooltewah silt loam and Lawrence silt loam, however, are sufficiently well drained to warrant limited use for the growing of crops. Included with alluvial soils, undifferentiated, are both poorly drained and well-drained soils. A compact layer, claypan or hardpan, is characteristic of the Guthrie, Robertsville, and Lawrence soils. The Guthrie, Lawrence, and Robertsville soils are strongly acid in reaction, low in organic matter, and low in plant nutrients. The other soils, particularly Ooltewah silt loam and alluvial soils, undifferentiated, are somewhat more favorable in these respects.

If used for pasture, the chief requirements of these soils center in the selection of plants. The grasses and legumes must not only tolerate wet conditions but must be able to succeed on soils possessing a low or medium nutrient level. Most of the soils need fertilizers, including lime; but where the subsoil is heavy and compact the response from fertilization may be low. Hence the selection of plants that will grow on soils of a medium to low nutrient level, so that fertilization may be kept at a minimum, is important.

These soils would be improved by artificial drainage, but the feasibility of such an undertaking varies according to soil character and outlet problems. Water percolates slowly through the Robertsville, Lawrence, and Guthrie soils; and the Ooltewah, Lawrence, and Guthrie soils occupy depressions where drainage outlets are difficult. Melvin silt loam and alluvial soils, undifferentiated, could probably be drained.

If Lawrence silt loam and Ooltewah silt loam are to be used for the production of crops, summer crops that are moderately tolerant of wet conditions need to be selected. As most winter crops are likely to fail, or at any rate make a poor growth, such crops should not ordinarily be selected.

Sorgo is a crop that warrants consideration for production on all the soils of this group, as it is a summer crop tolerant of wet conditions and will grow on soils low in plant nutrients. One would expect sorgo to produce a light-colored sirup of good quality on most of these soils.

## MISCELLANEOUS GROUP

In the miscellaneous group are the following: Mimosa silt loam, hill phase; Dellrose cherty silt loam, steep phase; Colbert stony silty clay loam; Colbert stony silty clay loam, rolling phase; Colbert stony silty clay loam, hilly phase; smooth stony land (Mimosa soil material); rolling stony land (Mimosa soil material); rough stony land (Mimosa soil material); rough gullied land (Mimosa soil material); and limestone outcrop.

The soils and miscellaneous land types of this group are generally considered physically unsuitable for the production of tilled crops, but all except three are considered physically suitable for permanent pasture. The three considered unsuitable for pasture, or at best very poorly suited for pasture, are rough stony land (Mimosa soil material), rough gullied land (Mimosa soil material), and limestone outcrop. These three are probably best suited to forestry under present conditions.

The hill phase of Mimosa silt loam, much of which is gullied, lies at the foot of long slopes, where it receives much excess runoff from above. If the soil is to be used for pasture, in many places at least a part of the excess runoff should be diverted. The maintenance of a good sod in order to control erosion is highly important everywhere. Some phosphate and lime are likely to be needed for this.

The steep phase of Dellrose cherty silt loam apparently needs some lime and phosphate for the production of fairly good pasturage.

The other members of this group, which are characterized by limestone outcrops, have between the outcrops a comparatively shallow soil that is heavy in texture and tough and plastic in consistence. The application of phosphate and lime is probably the chief requirement of these soils, although in some places they may not require lime and in a few places they may require neither lime nor phosphate. Grazing, of course, needs to be controlled, and weeds should be kept out.

## WATER CONTROL ON THE LAND

Water control on the land consists of practices having to do with the regulation of runoff and with the maintenance of favorable soil-moisture conditions. These practices may be grouped as follows: (1) Control of runoff and erosion, (2) protection from floods, (3) drainage, and (4) irrigation.

In Lincoln County the control of runoff and resulting erosion is the most important of these measures to control water, although artificial drainage is of some importance. Protection from overflow and irrigation are of little or no importance at present, although irrigation doubtless would increase production of crops in dry seasons and might prove to be economically feasible at times, especially on gardens and on small areas of high-priced crops, such as vegetables, fruits, and tobacco.

Soil erosion is of two kinds, normal and accelerated. Normal erosion is that "characteristic of the land surface in its natural environment, undisturbed by human activity, as under the protective cover of the native vegetation" (*19, p. 1167*). Accelerated erosion refers to that "Erosion of the soil or rock over and above normal erosion brought about by changes in the natural cover or ground conditions, including changes due to human activity and those caused by lightning and rodent invasion" (*19, p. 1167*). As water is the only active natural agent of soil erosion in Lincoln County, and as we are concerned here primarily with accelerated or man-induced soil erosion, the simple term "erosion" as used hereafter in this section refers to accelerated erosion by water.

Because water is the chief agent of erosion here, the farmers' problem may be more correctly that of the proper use, conservation, and control of water on the fields, pastures, and woodland where it falls. Proper use and control of water where it falls is an effective measure for conserving the soil. Such control of water brings about a number of desirable effects. One is the checking of erosion. Others include a more uniform and adequate supply of moisture for growing crops; improved tillage conditions or working properties of the soil, particularly during periods of low rainfall; better conditions for biological activity; and improved conditions for the formation and conservation of humus. These desirable effects in turn facilitate the problem of further conservation and control of the water.

Most of the land in the county suitable for cultivation has been cleared about 100 years. The mean annual rainfall of about 50 inches and the prevailing undulating to hilly relief in the uplands have been conducive to erosion throughout this period. More than

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90 percent of the cultivated uplands has become sufficiently eroded to injure productivity or workability, and in many places both. About 1 percent of the area of the county has been reduced to a close network of destructive gullies, incapacitating the land for use for crops or pasture, at least for the present. Considerable land physically adapted for cultivation has been eroded to the extent that ordinary tillage turns up heavy-textured subsoil material. About 20 percent of the area of the county is characterized by limestone outcrops sufficiently numerous to prevent feasible tillage, and it is reported by old residents that some of this stony condition has resulted from removal of the original stone-free surface soil by erosion.

It should be emphasized that soil erosion in Lincoln County is not an isolated problem; it cannot be treated or dealt with as such. It is a conspicuous symptom of more deeply seated disorders in land use and soil management.[10]

As loss of water and soil by erosion has resulted from such physical maladjustments, the remedy is to be sought through corrective redirection of land use and soil management.

The land in Lincoln County is subdivided into comparatively small operating units, and each unit is controlled and operated by an individual farmer. Such readjustments must be effected, therefore, on these individual farms, and the approach is through each individual operator. It may be said, therefore, that in the last analysis the problem of water-erosion control is one of farm operation.

The farmer who attempts to readjust the operation of his land in order to control water and erosion is confronted with a number of problems, over some of which he as an individual has no control. Among such factors to be dealt with are size and type of farm; physical character of his land, including the soil pattern of the farm; surrounding social and economic conditions, such as transportation, market, church, and school facilities; immediate cash demand on the farm income for such items as taxes, indebtedness, and support of family; relation between prices of farm products and other commodities; farm operator's facilities and resources for operating purposes, including buildings, farm equipment, seed, kind and number of livestock, cash, and credit; farm operator's ability, aptitude, versatility, and preference; community cooperation, labor, farm machinery, drainage, water disposal, marketing, and buying; and farm tenure and labor conditions.

Important as it may be to adjust the use and management of the land to its physical capabilities and character, it is apparent that such adjustments cannot be effected rapidly on all farms under existing conditions. On some farms the physical use capabilities and management requirements of the soil conflict with immediate requirements of the farm, which are determined by other factors. Compromises are not only expedient but inevitable on many such farms. Readjustments of land use and soil management to effect better control of water and thus check erosion are involved and complicated undertakings, and

[10] The terms "land use" and "soil management" as used here refer to the use and management of land for the production of plants only. Land use refers to broad farm uses, such as growing intertilled or clean-cultivated crops, growing close-growing crops (small grains, grasses, and legumes), permanent pasture, and forest. Soil management includes such practices as the choice and sequence of crops, tillage practices, green manuring, liming, fertilization, and mechanical measures for the control of water.

thorough familiarity with all factors is essential to any rational approach.

Since control of erosion is one result of proper control of water on the land where it falls, and since such control is effected through the adjustment of land use and soil management to the physical capability and character of the soils, the problem is reduced to correcting land use and soil management. Certain mechanical means of controlling runoff and erosion, such as contour tillage, terracing, or strip cropping, should be thoroughly considered if steep erodible land is to be cultivated; but wherever feasible such land should be used for close-growing crops, pasture, or trees.

As compared with the problem of controlling runoff, the problem of drainage is less important but nevertheless of considerable significance. In Lincoln County about 30,144 acres, or about 8 percent of the county, is too poorly drained for the production of ordinary crops. Such soils include Lawrence silt loam, Guthrie silt loam, Robertsville silt loam, Melvin silt loam, and alluvial soils, undifferentiated. All these soils would be improved by artificial drainage, but drainage of much of this land may be impracticable. Lawrence silt loam and Guthrie silt loam occur in depressions or on broad flat areas for which the establishment of outlets would be very difficult. Furthermore, in many places Lawrence silt loam and Guthrie silt loam have compact slowly permeable or nearly impermeable subsoils or substrata, and in such places they would be difficult to drain adequately, even where outlets have been provided. For the same reason Robertsville silt loam would be difficult to drain adequately, although outlets would be comparatively easy to provide in most places, as this soil lies on low terraces. On the other hand, Melvin silt loam and the poorly drained soils included in alluvial soils, undifferentiated, would be expected to drain well, and in most places artificial drainage of them probably would be mechanically feasible.

## FORESTS [11]

All this part of Tennessee, of which Lincoln County is a part, was forested before the coming of the white men. The forest consisted chiefly of oaks, but associated with them were basswood (linden), buckeye, hickory, tuliptree (yellow poplar), boxelder, mulberry, black walnut, cherry, common locust (black locust), chestnut, beech, black tupelo (black gum), red gum, dogwood, ironwood, hornbeam, sugar maple, hackberry, redcedar, and elm (*4*). The timber on the Highland Rim did not reach the large size of that in the Central Basin.

After white men entered the county and began to develop the land for agriculture, most of the soils well suited for crop production and pasture were gradually cleared. During this development lumbering was a rather important industry, and it is still of some significance in many parts of the county. Records reveal that the county court in 1811 granted Elias Lunsford permission to build a sawmill on Mulberry Creek, and this was built the following year (*5*). By 1909 there were 51 active sawmills and 2 stave mills. In 1940 there were 27 sawmills and 2 stave mills. The sawmill cut in 1939 was 2,443,000 board feet, all hardwood.[12]

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[11] Prepared by G. B. Shivery, farm forest specialist, University of Tennessee.
[12] Information furnished by the Department of Forestry Relations of the Tennessee Valley Authority.

According to the 1940 United States farm census, 92.2 percent of the land is in farms and 20.3 percent of the farm land is in woods. A large part of this woodland is used as pasture. If it is assumed that most of the land not in farms is in forest, an assumption that is probably true, the proportion of the county in woods is almost 30 percent. Most of the woodland is on the soils of the Dickson, Dellrose, Lawrence, Guthrie, Melvin, and Colbert soils, and on the miscellaneous land types—smooth stony land (Mimosa soil material), rolling stony land (Mimosa soil material), rough stony land (Mimosa soil material), and limestone outcrop.

Throughout the county certain forest types are associated with certain soils or different groups of soils. Some of these associations are conspicuous and distinctive; others are rather inconspicuous and indistinctive.

The Dellrose and Frankstown soils—predominant soils on the ridges and high hills in the Central Basin—support a distinctive forest type that can be designated as oak-chestnut. The chief species of oak are white, black, southern red, chestnut, and northern red. As the chestnut trees were almost entirely killed by disease a number of years ago, only dead chestnut trees, which are conspicuous in many places, and chestnut stumps remain. Many of these dead chestnut trees and chestnut stumps have young sprouts around the base. Associated with the species of oak and chestnut are such trees as hickory, tuliptree, basswood, black cherry, beech, and white ash. All these trees are generally more abundant on the east- and north-facing slopes—the more favorable sites. Chestnut and chestnut oak, sometimes referred to as frugal species, are generally most abundant on the south- and west-facing slopes—the less favorable sites.

The Dickson soils, which predominate on the Highland Rim, are characterized by such species as southern red oak, post oak, scarlet (spotted) oak, mockernut hickory, shagbark hickory (scalybark hickory), pignut hickory, black oak, northern red (mountain water) oak, white oak, and black tupelo (black gum). Where these soils are cherty, blackjack oak and sourwood are generally present. Chestnut sprouts manifest various degrees of infection from fruiting spores of the chestnut bark disease.

In contrast with the dry-ridge species abundant on the Dickson soils, water-enduring species are abundant on the poorly drained Melvin and Guthrie soils and the intermediately drained Lawrence soils, all of which occur on the Highland Rim in association with the Dickson soils. Blackjack oak is absent on the Melvin and Guthrie soils and scarce on the Lawrence soils. Black gum, willow oak, water oak, sweetgum, and red maple, all water-enduring trees, are the main species on Guthrie silt loam. As compared with the trees on the Dickson soils, those on the Guthrie soils are larger and spaced farther apart. In many places the trees are so far apart that grass has been able to establish itself between them. The Lawrence soils, which are intermediate in drainage between the poorly drained Guthrie and the fairly well drained Dickson soils, support a type of forest that is gradational between that on the Guthrie soils and that on the Dickson soils. The general forest type on the Melvin soils is somewhat similar to that on the Guthrie soils, but willow oaks and water oaks are less numerous. Sweetgum, red maple, swamp white oak, swamp chestnut oak, tuliptree, many of the oaks (except blackjack oak), and hickories, common on the Dickson soils, are ordinarily the predominant trees on the Melvin soils.

In the Central Basin, smooth stony land (Mimosa soil material), rolling stony land (Mimosa soil material), and rough stony land (Mimosa soil material) support fairly distinctive forest types. Where the soil between the limestone outcrops is comparatively deep and the timber is rather old, the stand consists chiefly of chinquapin oak, white oak, white ash, tuliptree, hackberry, sugar maple, and American elm with hophornbeam or ironwood (*Ostrya* sp.) conspicuous in the understory. Here and there are redcedar, basswood, and bur oak. Where areas of stony land, locally called glady land, have been cleared and allowed to erode, redcedar quickly establishes itself; and on such areas, and also on areas mapped as limestone outcrop, there are some nearly pure stands of redcedar. Where this stony land is cleared, chiefly redcedar but also hardwoods, such as dogwood, mulberry, locust, black walnut, and various oaks and hickories, tend to come in; and, where such land is used for pasture, sprouts of these trees have to be eradicated periodically, otherwise they will crowd out the grasses. At the foot of Stovall Mountain, most of which is characterized by many limestone outcrops, the tree stand consists chiefly of oaks, hickories, and associated species; here redcedar is comparatively scarce.

Good management of the woodland on farms is necessary if such land is to be utilized to best advantage. Protection from fire is essential. A conscious effort needs to be made to improve the stand by cutting the undesirable trees, such as those that are crooked, short and limby, unsound, or diseased, those that grow slowly, and poor kinds for which there is little or no sale. Farm woodland under management for the production of timber needs to be protected against grazing by livestock, because such grazing ordinarily prevents natural reproduction of desirable species. It is recognized, however, that on many farms good management of the farm as a whole may entail grazing the woodland at least part of the time, even though reproduction of desirable species may thereby be prevented. For example, in locust plantations where the trees are large enough so that they cannot be injured readily by livestock, to graze such woodland may be economical because the grass grows so well under these trees. The same is true of stands of black walnut. Proper growing conditions for most trees, except black locust and black walnut, are indicated by a heavy accumulation of leaves on the ground and the absence of grass. Black locust and black walnut, however, grow well in combination with grass if they are protected from grazing while small.

The planting of trees for the reclamation of badly eroded areas is worthy of serious consideration. Incidentally, some of the early experiments in the reclamation of such areas in Tennessee were carried on in Lincoln County (*9*). Badly eroded areas of Mimosa, Maury, Mercer, and Cumberland soils can be reclaimed by planting locust. However, preparatory work well in advance of actual setting of the trees is necessary. This advance preparation should include such measures as plowing the galled spots, mulching immediately with old straw or similar material, constructing contour furrows on sheet eroded slopes, and building low rock or cedar brush check dams in gullies. Loblolly pine would be the logical choice as a supplement to black locust on these soils. Shortleaf pine is recommended on badly eroded areas of the Dickson, Frankstown, and Baxter soils. On cleared land in the Central Basin, which is characterized by limestone outcrops and shallow soils, redcedar will ordinarily establish itself, and for such land redcedar probably is the best adapted species and should be allowed to establish itself where such land is to be returned to forest.

Planting of forest trees for the control of soil erosion has been stimulated during the last 5 years by several public agencies. During the period 1935–38, 1,267,692 trees were planted on 840 acres, which is the total area of 119 different project areas. The planting of trees for the control of erosion has been simplified, and farmers have been instructed how to perform the advance preparation for such planting. Landowners who prepare eroded areas for planting are provided with tree seedlings by the Tennessee Valley Authority. The county agricultural agent has been instrumental in having 14 projects of this kind, involving a total of 23 acres, completed in 1939, and 20, involving a total of 45 acres, completed in 1940.[13]

## MORPHOLOGY AND GENESIS OF SOILS

Soil is the product of forces of environment acting upon the parent soil material deposited or accumulated by geologic agencies. The characteristics of the soil at any given point depend on (1) the physical and mineralogical composition of the parent material; (2) the climate under which the soil material has accumulated and has existed since accumulation; (3) the plant and animal life in and on the soil; (4) the relief, or lay of the land; and (5) the length of time the climatic and biologic forces have acted upon the soil material.

External climate, although important in its effects on soil development, is less so than internal soil climate, which depends not only on temperature, rainfall, and humidity, but on the physical characteristics of the soil or soil material and the relief, which, in turn, strongly influences drainage, aeration, runoff, erosion, and exposure to sun and wind.

Stated more briefly, the soil at any given point is the product of five factors, namely, parent material, climate, vegetation, relief, and age. As the soils are classified on the basis of their characteristics—characteristics that are determined by the factors named—it follows that the development of the differences among series of soils should be explainable on the basis of differences of one or more of these factors.

A warm, humid, continental climate, with an average annual rainfall of about 51 inches, prevails over the entire area of Lincoln County. Although the Highland Rim is about 300 feet higher than the Central Basin, the difference in climate at this higher level is not considered significant in soil formation. In other words, the climate is practically the same over the entire county. Because the climate is practically uniform, local differences in the soils cannot be explained by differences in climate. On the other hand, general characteristics

[13] Information furnished by Department of Forestry Relations, Tennessee Valley Authority.

common to all the well-developed, well-drained soils, such as the leached condition and sequence in color from the A horizon through the C horizon, are probably a function primarily of climate aided by vegetation.

The forces of climate alone cannot bring about the development of soils. Operating alone, they can only produce the parent material from which the soils themselves can be developed. Without living organisms all soils would remain undeveloped and all would be azonal; they would be merely residual or transported products of rock weathering; therefore the action of living organisms is necessary for development to take place. Of the living organisms influencing soil development, plants and micro-organisms are the ones of primary importance. The general type of vegetation is controlled to a large extent by climate, and in this way climate exerts a powerful indirect effect. A well-developed soil is the result of the concomitant attack of both climate and vegetation upon the parent material. Where the variation in vegetation has been significant, the morphology of the soil would be expected to vary accordingly. In Lincoln County, however, the same general type of vegetation grew on all the well-developed, well-drained soils. Although there were probably differences as to the density of the stands and the relative proportion of each species, hardwoods prevailed over the entire area. Because no marked differences in vegetation were manifest on the well-developed, well-drained soils of the county, the differences in the development of these soils cannot be accounted for by differences in this factor.

By direct and indirect effects, climate tends to produce similar soils from different kinds of parent material; and if it were not for the inhibiting factors of parent material itself, or relief, drainage, and, in some places, vegetation, the same kind of soil would prevail over the entire area. Although such a uniform soil obviously does not exist, some general descriptive statements apply to all the well-developed, well-drained soils of the county.

Under forest vegetation all such soils have a dark $A_1$ horizon and an $A_2$ horizon that is generally lighter in color than either the $A_1$ or the B; the B horizon is generally uniformly colored yellow or red and is heavier textured and less friable than the $A_1$ or the $A_2$ horizons; and the C horizon is generally similar to the B in texture and consistence but is generally highly mottled or splotched with gray, red, yellow, and brown. As compared with the Chernozem and Prairie soils of the Great Plains, the soils of this county are low in organic matter, although they differ from one another in content of this constituent. All the soils have been leached; hence they are low in bases; but they also differ from one another in content of bases. All the soils are acid in reaction; most of them are strongly to very strongly acid.

The foregoing paragraph has brought out the characteristics that all well-developed, well-drained soils have in common, irrespective of parent material or relief. These characteristics, therefore, can be considered as those imposed by the forces of climate and vegetation and are characteristics that any well-developed, well-drained soil under similar climatic and vegetative conditions will exhibit. They can therefore be considered zonal characteristics, and all soils that exhibit them may be considered zonal soils.

In this environment of a warm, humid climate and a forest vegetation, zonal soils have developed that belong to the Red and Yellow Podzolic group. Lincoln County, however, lies in the northern part of the zone of Red and Yellow Podzolic soils (*10*, *19*), near the zone of Gray-Brown Podzolic soils; and several well-developed, well-drained soils in the part of the county included in the Central Basin resemble the Gray-Brown Podzolic soils, particularly in color.

In contrast with the climate and vegetation, both of which vary insignificantly over the county, the factors of parent material, relief, and age vary greatly. The parent material for nearly all of the soils has been directly or indirectly derived from limestones; nevertheless these rocks vary considerably from place to place, producing corresponding differences in the morphology of the soils. The relief ranges from nearly level to steep. On the Highland Rim, which is underlain by highly cherty and comparatively resistant limestones, the morphology of the soils is closely correlated with the character of the relief; but in the Central Basin, which is underlain by soluble and nearly chert-free limestones, the morphology of the soils is not closely correlated with the character of the relief. Age, as expressed by degree of profile development, varies greatly. Accordingly, some soils show practically no development, or highly immature profiles, on the one hand; other soils show extreme development, or postmature profiles, on the other.

The parent material, as just stated, has been derived directly or indirectly from limestones. The directly derived material is residual from the weathering of the limestones; the indirectly derived material has been transported, chiefly by water, from other places. Nearly all of this transported material, which constitutes the parent material for all the soils of the bottom lands, terraces, and colluvial lands, has been washed from soils of the uplands—soils developed from material that is residual from the weathering of limestones.

Throughout the entire uplands a striking and consistent relation exists between the soil and the kind of consolidated rock (limestone) underlying the parent material. In the Central Basin a less striking and less consistent relation exists between the soil and the type of relief, although this relation is close and consistent on the Highland Rim. The present relief, however, has been influenced to a considerable degree by the various kinds of limestones, chiefly because of differences in their rate of weathering and the content of insoluble impurities. This is particularly true in the Central Basin. Thus, not only the soil but also the type of relief is influenced to a considerable extent by the character of the underlying rocks. In other words, the consolidated rocks exert not only an obvious direct effect on the morphology of the soils, but also a marked indirect effect, by influencing to a large extent the character of the relief, which, in turn, is an important genetic factor.

In the humid region, soils occurring in broad depressions or on broad nearly level areas are generally poorly or imperfectly drained. On the Highland Rim, which is underlain by the highly siliceous, rather slowly soluble limestones, this relation holds true to a large extent; but in the Central Basin, which is underlain by more rapidly soluble limestones, this relation does not hold. In this area the limestones, even though they are level-bedded, apparently have enough subterranean channels to allow good underdrainage; hence the general relation of drainage condition to relief does not exist, and the soils of the level or nearly level areas are apparently as well drained and as well oxidized in many places as those on the sloping areas. This good subterranean drainage on nearly all slopes minimizes the influence of relief on the morphology of the soils and allows the consolidated rocks from which the parent material is derived to dominate the other factors in determining local differences in morphology.

From the foregoing, one would expect a close correlation between the soils of the uplands and the geologic formations, and such a correlation is fairly consistent over the entire county. In order to understand the distribution and development of the soils, it is necessary to know the general character and distribution of the various geologic formations. The general correlation of the various series of soils in the uplands with the underlying geologic formations is presented in table 8, in which the formations are listed in their stratigraphic order, the oldest and lowest at the bottom, and the youngest and highest at the top.

TABLE 8.—*General correlation of soils of the uplands with geologic formations in Lincoln County, Tenn.*

| Geologic age | Physiographic section | Soil series | Geologic formation |
|---|---|---|---|
| Mississippian | Highland Rim | Dewey | St. Louis limestone. |
| | | Baxter | Warsaw formation (chiefly limestone).<br>Fort Payne chert (highly cherty limestone). |
| | | Dickson<br>Lawrence<br>Frankstown | Fort Payne chert (highly cherty limestone). |
| Ordovician | Central Basin | Mimosa and Colbert. | Leipers formation (chiefly limestone).[1]<br>Catheys limestone.[1]<br>Cannon limestone.[1] |
| | | Maury | Bigby limestone.[2]<br>Upper part of Hermitage formation (chiefly limestone).[2] |
| | | Mercer and Colbert. | Lower part of Hermitage formation (chiefly limestone).<br>Lowville limestone. |

[1] Phosphatic in some horizons.
[2] Highly phosphatic.

The particular character of the rocks underlying the soils of each series is briefly described in the subsequent discussion of each series. The geologic formations, it is to be noted, are horizontally bedded; and as the distribution of the soils rather closely follows the belts of the outcropping formations, the soils of the uplands exhibit a vertical distribution as well as a horizontal distribution, according to the outcropping of the respective geologic formations. In the paragraphs that follow, the soils developed from residual material will be discussed according to their vertical sequence, the highest lying first.

Before discussing the various series of soils, however, a brief description of the two large physiographic sections of which Lincoln County forms a part should make it easier to understand the relation of one series to another. These two sections are (1) The Highland Rim and (2) the Central Basin. (See fig. 2, p. 5.) The Highland Rim is a plateau that completely encircles the Central Basin and which in the geologic past extended over the entire Basin. The

Central Basin is a large oval-shaped depression lying across the State but almost wholly within it. The Highland Rim is characterized by the comparatively resistant Mississippian rocks and a mild relief. Extensive areas are nearly level. The Central Basin, on the other hand, is characterized by the soluble Ordovician rocks, some of which are phosphatic, and rolling to undulating relief. The part of Lincoln County in the Central Basin, however, contains numerous steep hills and ridges, which are isolated remnants of the Highland Rim. In Lincoln County the elevation of the Highland Rim ranges between approximately 900 and 1,000 feet above sea level, and that of the floor of the Central Basin from 600 to 700 feet.

On the Highland Rim, soils of the following series, listed in descending order of elevation, have developed from residual parent material: Dewey, Baxter, Dickson, Lawrence, and Frankstown. The difference in elevation between any two succeeding series, however, is not readily apparent, because the differences are only slight and not wholly consistent, and because all the soils nowhere occur on the same long slope. In the Central Basin the soils of the following series, listed in descending order of elevation, have developed from residual material: Mimosa, Maury, Mercer, and Colbert. In comparison with the slight and not readily apparent differences in elevation between the series of the Highland Rim, the differences in elevation between the series of the Central Basin are greater and more readily apparent; but in few if any places are all these soils present on the same long slope. The Dellrose soils, the surface layer of which consists of transported material and the subsoil of residual material, occupy the steep slopes of the basin-facing escarpment of the Highland Rim; and vertically they occur between the Frankstown soils of the Highland Rim and the Mimosa soils of the Central Basin.

The characteristics of the soils of all these series, as well as the other series of the county, are presented in a tabular form in table 5.

As previously indicated, the Dewey soils are the highest in the county. They have developed from material that is residual from the weathering of limestones that were comparatively low in both chert and clay. In most places the Dewey soils are underlain by the St. Louis limestone, the weathering of which apparently has given rise to the residual parent materials. The Dewey soils are well developed and well drained. They are generally considered as members of the zonal group of Red Podzolic soils. A typical profile of Dewey silt loam, as mapped in Lincoln County, is described as follows:

$A_1$. 0 to 2 inches, dark-brown mellow silt loam that falls readily into soft indistinct granules. It is high in organic matter and in some places contains a few small fragments of chert.

$A_2$. 2 to 12 inches, light-brown mellow silt loam containing a moderate quantity of humus in the upper part. Grass and shrub roots are numerous. On handling, the material breaks into soft, indistinct granules. It contains a few small chert fragments.

$B_1$. 12 to 17 inches, yellowish-brown friable heavy silt loam that breaks readily into soft coarse crumblike aggregates that crush to a smooth mass.

$B_2$. 17 to 36 inches, brownish-red or reddish-brown firm but moderately friable silty clay or silty clay loam that breaks into subangular aggregates of 1 inch or less in diameter, which crush readily into a smooth mass somewhat lighter in color. The surface of the aggregates is rather glossy. This material is slightly to moderately sticky and plastic when wet. A few chert fragments are present in most places. Shrub roots readily penetrate this layer.

$B_3$. 36 to 54 inches, firm but moderately friable silty clay. The color changes gradually from brownish red in the upper part to brownish yellow in the lower. A few splotches of red, yellow, and gray are present. The material is difficult to disrupt; but, when displaced, it breaks into subangular aggregates of different sizes, some of which are as much as 2 inches in diameter. With moderate pressure these can be crushed to a moderately plastic and sticky mass of modified reddish-yellow color. Chert fragments in various stages of decay are common.

C. 54 to 60 inches, heavy sticky and plastic reddish-yellow silty clay profusely mottled with yellow, red, and gray. When displaced the material breaks into subangular aggregates or lumps, some of which are as much as 4 inches in diameter. Decayed chert fragments in varying quantities are common.

Dewey silt loam is predominantly gently rolling. It has a high productive capacity for agricultural crops, and apparently it once supported a heavy forest growth, which may account in part for the brown color of the A horizon.

Like the Dewey soils, the Baxter soils apparently belong to the zonal group of Red Podzolic soils. Morphologically, the Baxter soils differ from the Dewey soils chiefly in being somewhat lighter in color throughout the profile and in containing more chert fragments. The Baxter soils have developed from material that is residual from the weathering of siliceous limestones of the Mississippian period. In most places these soils are immediately underlain by the rocks of the Warsaw formation from which most of the parent material is thought to be derived. Where they are immediately underlain by rocks of this formation, they generally lie slightly lower than the Dewey soils and slightly higher than the Dickson soils. In many places, however, the Baxter soils, the cherty types and phases in particular, are apparently underlain by the Fort Payne chert; and where this condition exists they generally lie at a slightly lower elevation than the Dickson soils, contrary to what has been previously indicated. The Baxter soils vary considerably in content of chert fragments; and on the basis of chert content they are classified into two types, namely, (1) silt loam and (2) cherty silt loam. In comparison with the silt loam, the cherty silt loam is generally lighter in color throughout, is more porous and more severely leached, and is lower in content of plant nutrients. The prevailing relief is rolling.

A description of a typical profile of Baxter silt loam follows.

$A_1$. 0 to 2 inches, brown mellow silt loam that falls readily into soft poorly defined granules. It contains a moderately large quantity of organic matter and a few small fragments of chert.

$A_2$. 2 to 10 inches, light grayish-brown friable silt loam that breaks readily into coarse crumblike aggregates. Many roots of grasses and shrubs and a few fragments of chert are present.

$B_1$. 10 to 30 inches, firm but friable silty clay loam or silty clay that grades from light brownish red in the upper part to light red in the lower part. It breaks into subangular aggregates, most of which are somewhat less than 1 inch in diameter. These aggregates can be readily crushed to a smooth mass, and the material becomes somewhat lighter colored when crushed. It is slightly sticky and plastic when wet and contains a few fragments of chert and numerous small soft black round concretions. Roots of plants readily penetrate this layer.

$B_2$. 30 to 55 inches, moderately tight and compact silty clay that is light red with a few faint splotches of bright red and yellow. It is rather difficult to disrupt, but when disrupted it breaks readily into subangular aggregates, some of which are as much as 3 inches in diameter. The aggregates have a glossy surface. When crushed the material becomes lighter colored. It is moderately sticky and plastic when wet and contains a few fragments of chert and numerous small soft black round concretions.

C. 55 to 70 inches, moderately compact sticky and plastic silty clay that is highly streaked, splotched, and mottled with ocherous gray, yellow, brown, and red. Chert fragments are numerous; the quantity increases with depth.

The Dickson soils, the most extensive soils on the Highland Rim, are characterized by a conspicuous hardpan that lies at a depth of about 30 inches. This hardpan is cementlike when dry, and it is impervious or nearly impervious to water and roots. These soils are further characterized by a gentle slope, a light-gray A horizon, and a yellow B horizon. They have developed from material that is residual from the weathering of highly siliceous Mississippian limestones. In Lincoln County the Dickson soils in most places are immediately underlain by Fort Payne chert, but in some places they may be immediately underlain by the rocks of the Warsaw formation. The native vegetation is forest, chiefly deciduous. The Dickson soils are severely leached; they are very low in bases and strongly to very strongly acid in reaction. With respect to age, they are very old, both in terms of years and in terms of morphological development. In view of the hardpan development, they quite likely should be considered as members of the Planosol group of intrazonal soils; but in this connection it is to be noted that the hardpan apparently differs greatly from the claypan in soils of the Middle West included in this group, as regards both composition and mode of formation.

The following is a description of a typical profile of Dickson silt loam:

$A_1$. 0 to 2 inches, dark brownish-gray smooth floury silt loam, stained with a small quantity of organic matter. Numerous roots and a few small fragments of chert are present.

$A_2$. 2 to 7 inches, yellowish-gray mellow smooth silt loam that readily falls apart. It contains numerous roots.

$B_1$. 7 to 20 inches, light brownish-yellow friable heavy silty clay loam. When disturbed the material breaks into soft crumblike aggregates, which, when crushed, become decidedly yellow.

$B_2$. 20 to 30 inches, grayish-yellow firm but brittle silty clay loam. When disturbed it breaks readily into large and small soft crumblike aggregates. It generally has scattered mottlings of brown, yellow, and light gray. A few small chert fragments in various stages of decomposition are present. Apparently this is a zone of saturation in wet seasons.

$B_3$. 30 to 42 inches, a compact cementlike layer that is particularly hard when dry. The texture apparently is silty clay loam. The material is highly mottled with light gray, brown, red, and yellow. When disrupted it breaks into irregular-shaped lumps that have a characteristic brittleness. This layer is sufficiently impervious to remain comparatively dry while supporting free water.

C. 42 to 60 inches, compact silty clay or silty clay loam profusely mottled with red, yellow, and gray. The red material is claylike, whereas the gray and yellow materials are siltlike. Numerous fragments of chert in various stages of decomposition are present.

The Lawrence soils differ from the Dickson soils chiefly in being more poorly drained. With respect to drainage, they occupy a position between soils manifesting poor drainage and those manifesting fairly good drainage, such as the Dickson. The Lawrence soils occur in close association with the Dickson and have developed from the same kind of parent material, which is residuum from the weathering of highly siliceous Mississippian limestones. The Lawrence soils occupy shallow depressions or broad flat areas on the Highland Rim, where surface drainage is very poor. They are highly leached, light in color, low in bases, and strongly to very strongly acid in reaction.

Like the Dickson soils, the Lawrence also have a compact layer; hence they apparently should be considered as members of the Planosol group of intrazonal soils.

The A horizon of Lawrence silt loam ranges between 10 and 15 inches in thickness and consists of light-gray or light yellowish-gray mellow silt loam that generally contains a few faint splotches of yellow, gray, and rusty brown. The subsoil, or B horizon, extends to a depth of about 24 inches and consists of moderately friable silty clay or silty clay loam that is grayish yellow with a few mottlings of gray, yellow, and brown. Below this and extending to a depth of at least 40 inches is compact slowly permeable or nearly impermeable silty clay that is highly mottled and streaked with grayish blue, yellow, and light brown.

Like the Baxter, Dickson, and Lawrence soils, the Frankstown soils have developed from material that is residual from the weathering of highly siliceous Mississippian limestones; but the material from which the Frankstown soils have developed apparently contained more siliceous material. The Frankstown soils in most places are underlain by the lower part of the Fort Payne chert. They occur chiefly on the top of high hills and ridges scattered throughout the Central Basin—hills and ridges that are remnants of the Highland Rim. Morphologically the Frankstown soils somewhat resemble the Baxter soils, but they differ from the Baxter soils in having a deeper and somewhat darker A horizon, in being chiefly yellow instead of red in the B horizon, and in containing more chert. The content of chert is so high in some places that the soils might be considered Lithosols; but in most places the Frankstown soils exhibit a zonal profile and probably should be considered members of the zonal group of Yellow Podzolic soils, although they are very close to the Gray-Brown Podzolic group also. The Frankstown soils are highly leached; hence they are low in bases and strongly acid in reaction. They range from 3 to 8 feet in depth over a bed of chert fragments. Their prevailing relief is rolling. The following description of a profile is representative of Frankstown stony silt loam, the main type of the series:

A. 0 to 14 inches, dark-gray loose silt loam containing a large quantity of cherty stones many of which are as much as 8 inches across and 18 inches long. Plant roots are abundant. The upper part is stained dark with organic matter.

B. 14 to 30 inches, brownish-yellow firm but friable silty clay loam. On disruption it breaks into soft subangular aggregates, most of which are less than 1 inch in diameter. Roots are fairly numerous. Chert fragments constitute from 30 to 40 percent of the soil mass. Some of the fragments are as much as 12 inches in diameter.

C. 30 to 60 inches, material similar to that in the B horizon in texture and consistence but differing chiefly in containing a few splotches of red, yellow, and gray. The dominant color is light brownish yellow. The content of chert increases with increasing depth, and at a depth of 60 inches the material consists almost entirely of chert fragments.

The Mimosa soils, characterized by a heavy-textured subsoil and a comparatively slight depth to limestone, have developed from material that is residual from the weathering of slightly clayey Ordovician limestones. In Lincoln County, these soils in most places are underlain by the limestones of the Leipers, Catheys, or Cannon formations. These limestones contain a few phosphatic layers, and the soils are thought to contain a little more phosphorus than most soils of the county except the Maury soils. The members of the Mimosa series are well drained and have a rather young but fairly well developed profile; and the Mimosa soils have some characteristics of the zonal group of Yellow Podzolic soils and some of those of the Gray-Brown Podzolic soils. In most places the Mimosa soils range from 3 to 6 feet in depth over limestone, and in some places they contain fragments of limestone throughout the soil mass. They generally occupy undulating and rolling benchlike areas in the higher parts of the valleys in the Central Basin.

The description of the following profile is typical of Mimosa silt loam in Lincoln County:

$A_1$. 0 to 2 inches, light-brown mellow silt loam containing a moderate quantity of organic matter. It falls readily into soft granules.

$A_2$. 2 to 10 inches, grayish-brown friable silt loam. When disturbed the material breaks readily into soft crumblike aggregates, which can be easily crushed to a smooth mass. It contains a few tiny concretions.

B. 10 to 27 inches, brownish-yellow moderately tough silty clay or silty clay loam that is plastic and sticky when wet. When disrupted the material breaks into subangular nutlike aggregates having a glossy surface. The crushed material is dominantly yellow. Tiny concretions are numerous.

C. 27 to 40 inches, moderately tough compact silty clay that is sticky and plastic when wet. It is grayish yellow with numerous splotches of gray and yellow, and it breaks into angular and subangular aggregates, most of which are less than 1 inch in diameter. These are thickly coated with a glossy material, and they crush with moderate pressure into a smooth yellow mass.

Soils of the Maury series, which includes most of the highly phosphatic soils for which the Central Basin is well known, have developed from material that is residual from the weathering of phosphatic and, in this county, slightly sandy limestone. In Lincoln County the Maury soils are immediately underlain in some places by the Bigby limestone and in other places by the rocks (chiefly limestone) of the upper part of the Hermitage formation. They are well-drained, fairly well-developed, reddish-brown soils that occur on undulating and rolling areas in the Central Basin. They generally lie at a slightly lower elevation than the associated Mimosa soils and at a slightly higher elevation than the associated Mercer soils. They are unusually high in phosphorus and are moderately well supplied with organic matter. They have been leached of most of their bases, however, and are acid in reaction, but they are higher in bases and less acid than most of the soils of the county. Depth to bedrock ranges from about 3 to 9 feet, but in most places it is about 5 feet. Morphologically the Maury soils are similar to the Hagerstown soils that occur elsewhere in the Central Basin and in southwest Virginia, but they should probably be included with the zonal group of Red Podzolic soils.

A description of a typical profile of Maury loam in an uneroded cultivated field follows:

A. 0 to 10 inches, light-brown or brown mellow loam. When disturbed it falls into soft granular aggregates. It contains much organic matter and numerous plant roots.

$B_1$. 10 to 18 inches, yellowish-brown firm but friable clay loam or silty clay loam that breaks into fine crumblike aggregates. In most places a few small concretions and numerous plant roots are present.

$B_2$. 18 to 32 inches, reddish-brown silty clay or silty clay loam, rather firm and compact but apparently fairly easily penetrated by plant roots. It is moderately sticky and plastic when wet. Disrupted pieces break into fine nutlike to coarse crumblike aggregates, which can be crushed to a smooth mass. The crushed material is somewhat lighter in color than the aggregates. Small concretions are numerous.

C. 32 to 55 inches, silty clay loam or silty clay that is firm, but disrupted pieces break readily into nutlike aggregates, most of which are less than 1 inch in diameter. The color is reddish brown with a few splotches of yellow and gray.

Morphologically the Mercer soils are somewhat similar to the Mimosa soils, as the members of both series are characterized by a brownish-yellow heavy B horizon. The Mercer soils, which generally lie at slightly lower elevations than the Mimosa and Maury soils, occur in the lowest areas in the part of the Central Basin that extends into Lincoln County. Unlike the Mimosa soils, which are considered to be about medium in content of phosphorus, and the Maury soils, which are high in phosphorus, the Mercer soils are generally low in this element. The Mercer soils have developed from material that is residual from the weathering of Ordovician limestones and interbedded thin shale layers, and these limestones apparently contained little or no phosphorus. In most places in Lincoln County the Mercer soils are underlain by the Lowville limestone. The prevailing relief is undulating to rolling, drainage is fairly good, the content of bases is generally low, the acidity is generally high, the A horizon is brownish-gray mellow silt loam, the B horizon is brownish-yellow sticky plastic silty clay, and in most places the depth to bedrock ranges from 4 to 10 feet. It is questionable whether the Mercer soils in this county should be included in the zonal group of the Gray-Brown Podzolic soils or that of the Yellow Podzolic soils, but probably they are most nearly like the former.

A description of a typical profile of Mercer silt loam follows:

A. 0 to 10 inches, brownish-gray mellow silt loam that readily falls apart when handled. The topmost inch is lightly stained with organic matter. A few soft brown and black accretions are present.

$B_1$. 10 to 22 inches, light brownish-yellow silty clay or silty clay loam, containing a few faint mottles of gray, yellow, and brown. The material is moderately compact, sticky, and plastic. There are some small concretions.

$B_2$. 22 to 36 inches, compact sticky and plastic silty clay or silty clay loam that is grayish yellow with numerous splotches and mottlings of gray, yellow, and brown. It contains many small concretions.

C. 36 to 50 inches, rather tough and stiff silty clay or silty clay loam, profusely mottled with various shades of gray, yellow, and brown.

The soils in Lincoln County classified as members of the Colbert series have developed from material that is residual from the weathering of highly argillaceous limestone. These soils are characterized by an extremely plastic and sticky consistence of the subsoil and substratum, a slight depth to bedrock, and the presence of limestone fragments in the soil material. Largely because of the heavy character of the parent material, development of a profile has been retarded; and the Colbert soils of this county do not have well-developed profiles. The A horizon is fairly distinct, but the B horizon is not. The soils might therefore be considered as A–C soils, but in many places a faintly discernible B horizon has developed. The A horizon consists of a moderately friable brownish-gray or grayish-brown silty clay loam and ranges from about 5 to 8 inches in thickness. In woods and pastures the topmost inch or two is stained dark with organic matter.

Below this and extending to the bedrock, the material is tough, tight, sticky, and plastic silty clay. The upper part, or the incipient B horizon, is chiefly yellow but contains numerous mottlings of gray and olive green and a few of red and brown. The lower part, or the C horizon, is profusely mottled and splotched with gray, yellow, and olive green. Depth to bedrock generally ranges from 12 to 30 inches. Fragments of limestone are scattered throughout the soil mass, and a few outcrops of bedrock occur in most areas. The relief is predominantly undulating to gently rolling, but in some places it is strongly rolling.

A formation that is of little or no pedological significance in this county is the Chattanooga shale; but this formation is of interest because in most places in Lincoln County it separates the rather resistant highly siliceous Mississippian limestones of the Highland Rim from the soluble nearly silica-free Ordovician limestones of the Central Basin. The Chattanooga shale, therefore, serves as a convenient reference; above it the soils are cherty, at least in the C horizon, and below it the soils in general are chert free, except those that consist partly or wholly of material transported from above. It is below the Chattanooga shale that the phosphatic limestones with their overlying phosphatic soils, for which the Central Basin is famous, occur. The shale itself is covered by cherty material that has sloughed and rolled down from the slopes above.

The Dellrose soils occupy the steep slopes leading from the Highland Rim to the Central Basin. Most areas of these soils begin at the level of the Chattanooga shale and extend downward to or nearly to the immediate valley floor. The Dellrose soils are peculiar in several respects. Ordinarily they do not have a profile in which the layers are genetically related, and in a sense they are azonal soils. The surface layer consists of cherty soil material that has sloughed and rolled down from the Frankstown, Baxter, and Dickson soils above. The subsoil and substratum layers consist of material that is residual from the weathering of chert-free or nearly chert-free slightly clayey limestone, chiefly rocks of the Leipers, Catheys, and Cannon formations.

The surface layer of the Dellrose soils consists of grayish-brown or light yellowish-brown friable silt loam containing an abundance of angular fragments of chert. Such fragments constitute about 20 to 30 percent of the soil mass and range from ½ to 4 inches in diameter. The thickness of this layer ranges from about 6 to 30 inches, but in most places it ranges between 12 and 15 inches. The subsoil layer, extending to a depth of 24 to 45 inches, consists of moderately plastic and sticky silty clay or silty clay loam ranging in color from brownish-yellow to yellow. Light-gray splotches are generally present in the lower part.

The material below the subsoil consists of fairly compact sticky and plastic silty clay or silty clay loam that is yellow or grayish-yellow with numerous mottlings of gray and a few of red and brown. This material extends down to the limestone, which is probably reached at a depth of 4 to 30 feet. In most places this limestone is similar to that underlying the Mimosa soils of the Central Basin; and, were it not for the covering of sloughed material, the Mimosa soils or stony land types very likely would have developed where the Dellrose soils now occur.

The slope of the Dellrose soils is prevailingly steep; it ranges from about 15 to as much as 60 percent. Chiefly because of the open, porous, and cherty condition of the surface layer, these soils are surprisingly resistant to accelerated erosion. In many places they probably receive a small quantity of plant nutrients in seepage, apparently exuding from the underlying level-bedded limestones, some of which contain phosphatic layers.

In Lincoln County the soils that have developed from transported parent materials have been classified into 16 series; the members of 5 of these series occur on the so-called colluvial lands, 6 on the terraces, and 5 on the bottom lands. The parent materials for most of these soils originated in the nearby uplands, which are underlain by limestone.

As explained in the section on Soils, the term "colluvial lands" refers to accumulations of local wash at the foot of slopes. In many places the material is actually a mixture of colluvium and local alluvium; in others nearly all is local alluvium. Many of the areas are small alluvial fans at the mouth of short steep drains; but, on the other hand, many of the areas are depressions or sinks. The soils of the colluvial lands are classified into five series, namely, Greendale, Abernathy, Ooltewah, Guthrie, and Burgin. These series differ widely from each other.

The Greendale soils lie at the foot of slopes and have developed from local alluvium and colluvium, most of which has come from the Mimosa, Dellrose, and Maury soils of the uplands. The Greendale soils vary considerably in degree of profile development, the degree of development depending largely upon the length of time the parent material has lain in place. In those places where the material is of recent deposition, the soils show little or no development of a profile; but in those places where the parent material has lain in place for a considerable period, the soils show fairly good development of a profile. The latter condition is the predominating one in Lincoln County, and the Greendale soils manifest fairly well defined A and B horizons. The A horizon consists of grayish-brown or brownish-gray mellow silt loam and ranges in thickness from about 8 to 15 inches. The B horizon consists of brownish-yellow or yellowish-brown friable silty clay loam and ranges in thickness from about 10 to 20 inches. In most places the slope is mild, and drainage is generally good.

Abernathy silt loam, the only member of the Abernathy series mapped in Lincoln County, occurs chiefly in small depressions and has developed from material washed from the surrounding slopes. In this county the Abernathy soil is associated chiefly with the Dewey and Baxter soils and consists of recent local wash from these soils. The soil is young—azonal—and in most places no genetic profile has developed. It consists of brown or light-brown mellow silt loam, which extends to a depth of about 30 inches. Drainage is good.

Like Abernathy silt loam, Ooltewah silt loam, which is the only member of the Ooltewah series mapped in Lincoln County, occupies

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small depressions. It differs from the Abernathy soil chiefly in being imperfectly drained. Ooltewah silt loam is intermediate in drainage condition between Abernathy silt loam and Guthrie silt loam, which is poorly drained. In this county Ooltewah silt loam occurs chiefly in association with the Baxter soils and has developed from material washed from the surrounding slopes occupied by the Baxter soils. The Ooltewah soil is variable in profile characteristics; in most places it shows little or no development of a profile, although in some places it shows considerable. Where it shows little development of a profile, the prevailing condition in this county, it is light-brown silt loam to a depth of 8 to 14 inches. Below this the material gradually changes to silty clay loam, which becomes mottled with yellow and gray. Below a depth of 24 inches the material is chiefly light gray with mottlings of yellow. Where this soil shows considerable development, the two upper layers are approximately the same, but below a depth of about 24 inches compact highly mottled silty clay is reached.

Guthrie silt loam, the only member of the Guthrie series mapped in Lincoln County, is a poorly drained soil of shallow depressions, incipient drainageways, and flat areas on the Highland Rim. It occurs chiefly in association with the Dickson and Baxter soils. The parent material probably consists chiefly of local wash derived from the Dickson and Baxter soils, but in many places, especially where the material in the lower part of the profile is compact, at least some of the parent material is apparently residual from the weathering of cherty limestone. The soil is prevailingly poorly drained and mottled light gray in color, but it varies greatly from place to place in degree of profile development as expressed by differences in texture and consistence. In some areas it is friable silt loam or silty clay loam to a depth of 20 to 30 inches. In most places, however, it has a surface layer, from 10 to 16 inches thick, of friable silt loam that is very light gray, almost white, or yellowish gray with numerous faint mottlings of yellow and light brown and a subsoil layer, extending to a depth of about 30 inches, consisting of compact silty clay profusely mottled with gray, bluish gray, yellow, and light brown. The subsoil is nearly impervious to water, and, because of this, water may stand on the surface of the ground for considerable periods after prolonged heavy rains.

The Burgin soils in Lincoln County occupy low terracelike positions and have developed from material that consists of a mixture of local alluvium and general stream alluvium, and in some places a part of the material may be directly residual from the weathering of highly clayey limestone. The material from which these soils are developed has been washed from highly clayey limestone and from soils developed over such limestone. The Burgin soils are characterized by a dark color, heavy texture, and plastic and sticky consistence. As indicated by the dark color, they are high in organic matter, and they are also thought to be fairly high in lime. They drain slowly, both internally and externally. Apparently they are young and show comparatively little development of a profile except for the dark color. Burgin silty clay loam has a surface layer, between 12 and 15 inches thick, consisting of dark-gray or nearly black heavy silty clay loam that is fairly sticky and plastic when wet and hard when dry. Below this and extending to a depth of about 30 inches, the material is moderately compact silty clay that is plastic and sticky when wet and hard when dry. The color grades from steel gray in the upper part to light gray with numerous mottlings of bluish gray, yellow, and light brown in the lower part.

In Lincoln County the soils of the stream terraces are classified into six series, namely, Cumberland, Etowah, Wolftever, Robertsville, Humphreys, and Sequatchie.

The Cumberland soils lie on the old high terraces in the part of Lincoln County included in the Central Basin. The material comprising these terraces consists of general stream alluvium, most of which was washed from the uplands underlain by limestones, but apparently some was washed from the uplands underlain by sandstone and shale. From this old general alluvium the well-developed soil profiles of the Cumberland series have formed. The relief is gently sloping to gently rolling, and these soils have developed under conditions of good drainage, both externally and internally. Where uneroded they have a brown mellow silt loam A horizon ranging in thickness from 10 to 15 inches, and a brownish-red silty clay B horizon extending to a depth of 40 to 50 inches. The upper part of this horizon, or the $B_1$ layer, is somewhat lighter in color and lighter in texture than the lower part, or the $B_2$ layer.

The Etowah soils are similar to the Cumberland soils, but they occupy the lower, younger terraces and show less development of a profile. They are thought to have developed from the same kind of parent materials as those from which the Cumberland soils have developed. The A horizon of the Etowah silt loam, the only member of the Etowah series mapped in Lincoln County, consists of grayish-brown mellow silt loam and ranges between 10 and 15 inches in thickness; and the B horizon consists of yellowish-brown or brownish-yellow firm but friable silty clay loam and extends to a depth of 3 to 4 feet.

Wolftever silt loam, the only member of the Wolftever series mapped in Lincoln County, is characterized by a compact subsoil. It lies on nearly level, low, young terraces and is rather closely associated with Etowah silt loam, which generally occurs on slightly higher terraces. The Wolftever soil differs from the Etowah chiefly in having a compact subsoil, but it is also somewhat lighter in color and not so well drained. Both soils apparently have developed from the same general kind of parent material; that is, general stream alluvium, most of which has been washed from the uplands underlain by limestone; but it is not improbable that the parent material of the Wolftever soil was a little finer textured than that of the Etowah. As Wolftever silt loam lies on low, young terraces, the soil is young in terms of years. In view of this, it seems that the profile of the Wolftever soil is unlikely to be entirely a result of soil-forming processes, but it may be partly the result of stream deposition of very fine material on what is now the subsoil and substratum. Wolftever silt loam has a surface layer, about 10 inches thick, of grayish-brown mellow silt loam, and a subsoil layer, about 10 inches thick, of brownish-yellow silty clay or silty clay loam that is fairly tight and compact. These two layers vary somewhat in thickness from place to place. The substratum is dull brownish-yellow tight and compact silty clay or silty clay loam, with splotches and mottlings of gray, yellow, and brown. Drainage is rather slow, both internally and externally.

The Humphreys soils occupy low terraces along the streams on the Highland Rim or along the streams issuing from the Highland Rim. They have developed from general stream alluvium that has been washed chiefly from the cherty soils of the Highland Rim. They are well-drained comparatively young soils that show little development of a profile. They generally have a surface layer, between 9 and 14 inches thick, of light-brown friable silt loam. The subsoil, extending to a depth of 3 to 4 feet, gradually changes from light-brown friable heavy silt loam in the upper part to brownish-gray friable silty clay loam in the lower part. In most places the soil contains fragments of chert, and where these are very numerous the soil is lighter in color and shows less morphological development.

Robertsville silt loam, the only member of the Robertsville series mapped in Lincoln County, is a poorly drained, light-colored, acid, infertile soil occupying low, level terraces. Like the Humphreys soils, it occurs chiefly along streams in the Highland Rim or streams coming from the Highland Rim. It has developed from general stream alluvium, most of which has been washed from the soils of the Highland Rim. Although this soil varies considerably in degree of development of a profile, it generally has a surface layer, between 8 and 12 inches thick, of grayish-yellow or light-gray silt loam that is friable when moist but rather hard and brittle when dry. The subsoil, extending to a depth of about 24 inches, is silty clay loam or silty clay that is chiefly light gray or yellowish gray with numerous mottlings of bluish gray, yellow, and light brown. The substratum is bluish-gray silty clay or silty clay loam highly mottled with grayish blue, gray, yellow, and light brown. The consistence of the subsoil and the substratum varies from moderately friable, on the one extreme, to compact, plastic, and sticky on the other extreme. Concretions are abundant in most places in this soil.

The Sequatchie soils occupy nearly level to gently sloping young low terraces along the large streams in the Central Basin. Most of the general alluvium from which these soils are developed probably came from the uplands underlain by sandstone and shale, but a considerable part has undoubtedly come from the uplands underlain by limestone. The Sequatchie soils, which are lighter in texture than the other soils on terraces, range from very fine sandy loam to loamy fine sand. They are well-drained comparatively young soils that show little development of a profile. Sequatchie very fine sandy loam, which is the main type of the Sequatchie series in this county, has a friable very fine sandy loam surface soil about 10 inches thick. The subsoil, which extends to a depth of 24 to 32 inches, is slightly heavier in texture and slightly lighter in color than the surface soil.

The soils in the bottom lands have been classified into five series, namely, Huntington, Egam, Lindside, Ennis, and Melvin. Only one member, the silt loam type, of each of these series, except the Huntington, is mapped. Three members of the Huntington series are mapped.

In addition to these soils, a miscellaneous separation, alluvial soils, undifferentiated, is mapped. All the soils of the bottom lands consist of general stream alluvium, nearly all of which has been washed from the uplands underlain by limestone. All the soils are very young and show practically no development of a genetic soil profile. They are all azonal. They differ from each other chiefly in texture, consistence, and drainage. The differences in texture and consistence are chiefly due to differences in the character of the alluvium. The Huntington, Egam, and Ennis soils are well drained, the Lindside soils are intermediately drained, and the Melvin soils are poorly drained. The Huntington, Egam, and Lindside soils are mapped in the Central Basin, and they apparently consist chiefly of material washed from the local uplands underlain by the nearly silica-free Ordovician limestones. The Melvin and Ennis soils are mapped along the streams in the Highland Rim or along those streams issuing from the Highland Rim, and they consist chiefly of material washed from the local uplands underlain by the highly siliceous Mississippian limestones. The Huntington, Egam, and Lindside soils are considerably higher in organic matter and mineral plant nutrients than the Ennis and Melvin soils.

The Egam and Huntington soils are closely related. Huntington silt loam, the main type of the Huntington series, is brown mellow silt loam to a depth of about 30 inches. Egam silt loam differs from the Huntington chiefly in having a compact subsoil. To a depth of 18 to 30 inches the material is mellow silt loam or silty clay loam, which generally increases somewhat in firmness with increasing depth. This layer rests on tight compact silty clay or silty clay loam, which extends to a depth of 40 to 60 inches. The color of this compact layer gradually changes from dark brown to nearly black in the upper part to grayish brown with splotches of brown, yellow, and gray in the lower part. The dark color of this layer is apparently due to organic matter. The heavy texture and high content of organic matter indicate that this layer might at one time have been the surface soil of a poorly drained or swampy soil.

Ennis silt loam differs from Huntington silt loam chiefly in being lighter in color and in containing fragments of chert. In most places it is friable silt loam to a depth of 30 or more inches, light brown in the upper part and light yellowish brown or light brownish yellow in the lower part.

Lindside silt loam has a surface layer that ranges in thickness from about 12 to 20 inches and consists of mellow brown or grayish-brown silt loam. Below this the material is friable silt loam or silty clay loam profusely mottled with gray, yellow, and light brown.

Most areas of Melvin silt loam have a friable silt loam surface layer, 8 or 9 inches thick, that is brownish gray mottled with gray, yellow, and brown. This is underlain by light-gray material profusely mottled with bluish gray, gray, grayish yellow, and yellow. This material varies considerably in texture and consistence, but generally it is slightly sticky and plastic silty clay loam or silty clay.

Alluvial soils, undifferentiated, include various soils of the bottom lands that occur in such small areas and in such intricate association one with another that it is impracticable to delineate each separately.

Table 9 gives mechanical analyses for three soils in the county.

TABLE 9.—*Mechanical analyses of three soils in Lincoln County, Tenn.*

| Soil type and sample No. | Depth | Fine gravel | Coarse sand | Medium sand | Fine sand | Very fine sand | Silt | Clay |
|---|---|---|---|---|---|---|---|---|
| Maury loam: | *Inches* | *Percent* | *Percent* | *Percent* | *Percent* | *Percent* | *Percent* | *Percent* |
| 402713 | 0–6 | 0.7 | 1.0 | 0.9 | 20.5 | 7.7 | 48.4 | 20.8 |
| 402714 | 6–12 | 1.4 | 1.0 | .7 | 16.2 | 6.4 | 37.8 | 36.5 |
| 402715 | 12–30 | 1.1 | 1.2 | 1.0 | 22.3 | 7.5 | 33.1 | 33.8 |
| 402716 | 30–36 | .4 | 1.8 | 2.9 | 32.2 | 5.8 | 17.8 | 39.1 |
| 402717 | 36+ | .8 | 1.8 | 2.3 | 45.5 | 7.3 | 18.0 | 24.3 |
| Guthrie silt loam: | | | | | | | | |
| 402731 | 0–1½ | .0 | .2 | .4 | 8.4 | 10.4 | 73.8 | 6.8 |
| 402732 | 1½–4 | .0 | .2 | .5 | 8.1 | 9.8 | 74.4 | 7.0 |
| 402733 | 4–8 | .4 | .3 | .6 | 7.3 | 9.0 | 75.0 | 7.4 |
| 402734 | 8–14 | .2 | .2 | .5 | 5.2 | 6.6 | 71.6 | 15.7 |
| 402735 | 14–20 | .2 | .2 | .6 | 6.4 | 7.9 | 73.9 | 10.8 |
| 402736 | 20–30 | .2 | .2 | .5 | 5.6 | 6.9 | 72.2 | 14.4 |
| 402737 | 30+ | .3 | .3 | .4 | 5.0 | 6.3 | 73.2 | 14.5 |
| Lawrence silt loam: | | | | | | | | |
| 402738 | 0–1½ | .9 | .9 | .7 | 4.1 | 4.1 | 78.0 | 11.3 |
| 402739 | 1½–3 | .5 | .8 | .8 | 4.0 | 3.6 | 76.4 | 13.9 |
| 402740 | 3–17 | .5 | .6 | .6 | 3.1 | 3.2 | 74.7 | 17.3 |
| 402741 | 17–25 | .8 | .6 | .5 | 2.7 | 3.2 | 73.2 | 19.0 |
| 402742 | 25–40 | .9 | .5 | .4 | 2.6 | 3.2 | 74.0 | 18.4 |

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

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

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

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

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