Series 1937, No. 10 Issued June 1944

Soil Survey

Tishomingo County Mississippi

By
A. C. ORVEDAL
United States Department of Agriculture, in Charge
and
THOMAS FOWLKES
Mississippi Agricultural Experiment Station

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
Bureau of Plant Industry, Soils, and Agricultural Engineering
In cooperation with the
Mississippi Agricultural Experiment Station

For sale by the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. - Price 55 cents

This publication is a contribution from

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

ROBERT M. SALTER, *Chief*

DIVISION OF SOIL SURVEY

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

MISSISSIPPI AGRICULTURAL EXPERIMENT STATION

CLARENCE DORMAN, *Director*

Series 1937, No. 10 Issued —— 1944

SOIL SURVEY OF TISHOMINGO COUNTY, MISSISSIPPI

By A. C. ORVEDAL, Division of Soil Survey,[1] Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture, in Charge, and THOMAS FOWLKES, Mississippi Agricultural Experiment Station

Area inspected by J. W. MOON, Senior Soil Scientist

United States Department of Agriculture in cooperation with the Mississippi Agricultural Experiment Station[2]

CONTENTS

[1] The field work for this survey was done while the Division was a part of the Bureau of Chemistry and Soils.

[2] The Tennessee Valley Authority also cooperated by supplying a part of the funds and materials used in this survey.

HOW TO USE THE SOIL SURVEY MAP AND REPORT

The soil survey map and report of Tishomingo County, Miss., contain information—both general and specific—about the soils, crops, and agriculture of the county. They are prepared for the general public and are designed to meet the needs of a wide variety of readers. The individual reader may be interested in some particular part of the report or in all of it. Ordinarily he will not have to read the whole report to gain the information he needs.

Readers of the soil survey reports may be considered as belonging to three general groups: (1) Those interested in limited areas, such as small communities, farms, and fields; (2) those interested in the county as a whole; and (3) students and teachers of soil science and related agricultural sciences. An attempt has been made to satisfy the needs of these three groups by making the report a comprehensive reference work on the soils and their relation to crops and agriculture.

The readers whose chief interest is in limited areas, such 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. The first step of a reader in this group is to locate on the map the tract with which he is concerned. The second step is to identify the soils on the tract. This is done by locating in the legend on the margin of the map the symbols and colors that represent the soils in the area. The third is to locate the name of each soil in the table of contents, which refers the reader to the page or pages in the section on Soils where each soil is discussed in detail. Under the soil type heading he will find a description of the soil and information as to its suitabilty for use and its relations to crops and agriculture. He will also find useful information in the sections on Productivity Ratings and Physical Land Classification, Land Uses and Soil Management, and Water Control on the Land.

As an example, let it be assumed that the reader is interested in the SE¼ sec. 5, T. 2 S., R. 10 E. He first needs to become familiar with the symbols used on the map to show soil boundaries, roads, houses, streams, section lines, and with the scale of the map. Then he locates the tract on the map. He sees that the locality is well developed, as evidenced by a rather complete system of roads and the frequency of houses, schools, and churches characteristic of a settled agricultural community. Examination of that part of the map covering the tract shows that an improved road bounds the area on the north and east, that two creeks cross the western part, and that several different kinds of soil occur on the tract. He identifies each of these soil types in the map legend and reads the description of each soil type in the section on Soils. Here, each soil is described as to its internal characteristics, such as color, texture, depth, and reaction, and as to external characteristics, such as slope, stoniness, and erosion. It is also discussed in its relation to farming, including use, management, and productivity.

The reader will learn that Savannah silt loam and Iuka fine sandy loam are the more extensive soils on this tract, and that there are a number of other soils of minor extent.

Savannah silt loam occurs on the gently sloping uplands, and has a mellow light yellowish-gray silt loam surface soil, a friable yellow silty clay loam subsoil and a gray hardpan about 20 to 24 inches below the surface. It is normally very strongly acid and low in natural fertility. Surface drainage is good, but internal drainage is slow. It is well suited to production of cotton and fairly well suited to most of the other common crops. It lies favorably for cultivation and conservation and is easily worked. It is, however, low in organic matter and natural fertility and is moderately erodible. The hardpan is nearly impermeable to both water and plant roots. Suggestions for soil management emphasize the importance of proper fertilization, manuring, crop rotations that include grasses and legumes, and proper control of runoff.

Iuka fine sandy loam is very different from Savannah silt loam, both in physical characteristics and in relation to farming. It lies in creek bottoms, is occasionally flooded, and is imperfectly drained. It is not suitable for the production of cotton but is well suited to corn, particularly if the drainage is slightly improved by artificial means. In its natural condition it is one of the best soils in the county for hay and pasture.

If the reader desires further information concerning the management of these soils, he can refer to the sections on Land Uses and Soil Management and Water Control on the Land. Estimates of the productivity of these soils and a general appraisal of their physical suitability for use is contained in the section Productivity Ratings and Physical Land Classification. By estimating the acreage of each soil on the tract, the reader can ascertain from the productivity table that the soils on none of this tract are considered as First-class soils (good cropland), that the soils on about 95 acres are considered as Second-class soils (fair to good cropland), those on about 15 acres as Third-class soils (poor to fair cropland), those on about 30 acres as Fourth-class soils (poor cropland but fair pasture and hay land), and those on about 20 acres as Fifth-class soils (very poor cropland, poor pasture and hay land, and generally best suited to forestry). From these figures he can readily deduce that the soils on about 110 acres, the total acreage of the Second- and Third-class soils, are physically suitable for crop production in the present agriculture. This acreage, however, should be reduced somewhat, probably to about 95 acres, in order to allow for unfavorable distribution and inconvenient location of soil areas.

The second group of readers includes persons that are interested in the county as a whole, such as those concerned with general land-use planning, or the placement and development of highways, power lines, docks, urban sites, industries, community cooperatives, resettlement projects, private or public forest areas, recreational areas, and wildlife projects. The following sections are intended for such users: (1) County Surveyed, in which such topics as physiography, vegetation, water supply, population, and cultural developments are discussed; (2) Agriculture, in which a brief history of the agriculture is given and the present agriculture is described; (3) Productivity Ratings and Physical Land Classification, in which the productivity of the soils is given, a grouping of soils according to their relative physical suitability for agricultural use is presented, and a generalized land map is included; (4) Land Uses and Soil Management, in

which the present use and management of the soils are described, their management requirements are discussed, and suggestions for improvement in management are made; and (5) Water Control on the Land, in which the problems pertaining to drainage and control of runoff, including control of accelerated erosion, are treated.

The third group of readers includes students and teachers of soil science and allied subjects, such as crop production, forestry, animal husbandry, economics, rural sociology, geography, and geology. The teacher or student of soils will find the section on Morphology and Genesis of Soils of special interest. He will also find useful information in the section on Soils, the first part of which presents the general scheme of classification and a discussion of the soils from the point of view of the county as a whole, and the second part of which presents a detailed discussion of each soil. If he is not already familiar with the classification and mapping of soils, he will find these subjects discussed in Soil Survey Methods and Definitions. The 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 in the county. Soil scientists or students of soils as such will find their special interest in the section on Morphology and Genesis of Soils.

COUNTY SURVEYED

LOCATION AND EXTENT

Tishomingo County is in the extreme northeastern corner of Mississippi (fig. 1). It borders Tennessee on the north and Alabama on the east. The Tennessee River (Pickwick Landing Reservoir) forms the northeastern boundary line between this county and Lauderdale and Colbert Counties, Ala. The county is roughly rectangular in shape, about 37 miles from north to south, and 15 miles from east to west at the widest point. Iuka, the county seat, is about 210 miles northeast of Jackson, Miss., about 170 miles north of Meridian, Miss., and about 105 miles southeast of Memphis, Tenn. The total land area is 436 square miles, or 279,040 acres.

PHYSIOGRAPHY, RELIEF, AND DRAINAGE

The physiography of the county can be better understood when it is realized that at one time this area was a part of the Gulf of Mexico when an arm of the gulf extended as far north as the southern part of Illinois. Gravel, sand, and clay were washed in from the adjoining upland areas. The coarser materials, particularly the gravel, were deposited nearest the shore, and the finer materials, particularly the silt and clay, were deposited farther out in the old gulf. Comparatively recently, geologically speaking, this part of the old gulf bottom emerged from the water and subsequently became subject to natural geological erosion. As these unconsolidated sediments had but little resistance to geological erosion, stream dissection proceeded rapidly and at present is fairly complete over most of the county.

The county lies in the northeastern hill section of Mississippi, an extension of the fall line hills of Alabama and Georgia. Fenneman

(*2*)[3] includes most of the county in the West Gulf Coastal Plain section of the Coastal Plain physiographic province, but he includes a narrow belt in the northeastern part of the county parallel to the Tennessee River in the Highland Rim section of the Interior Low Plateaus physiographic province.

The elevation of most of the county is between 400 and 600 feet above sea level. The surface of the water in Pickwick Landing Reservoir has an elevation of 413 feet.[4] The elevation at Iuka is 569 feet.[5] According to information furnished by the Chief Engineer of the Illinois Central Railroad system, the elevation at Tishomingo is 503.1 feet, at Dennis 599.5 feet, at Belmont 573 feet, at Golden 549.5 feet, at Paden 454.5 feet, and at Holcut 504.5 feet.[6]

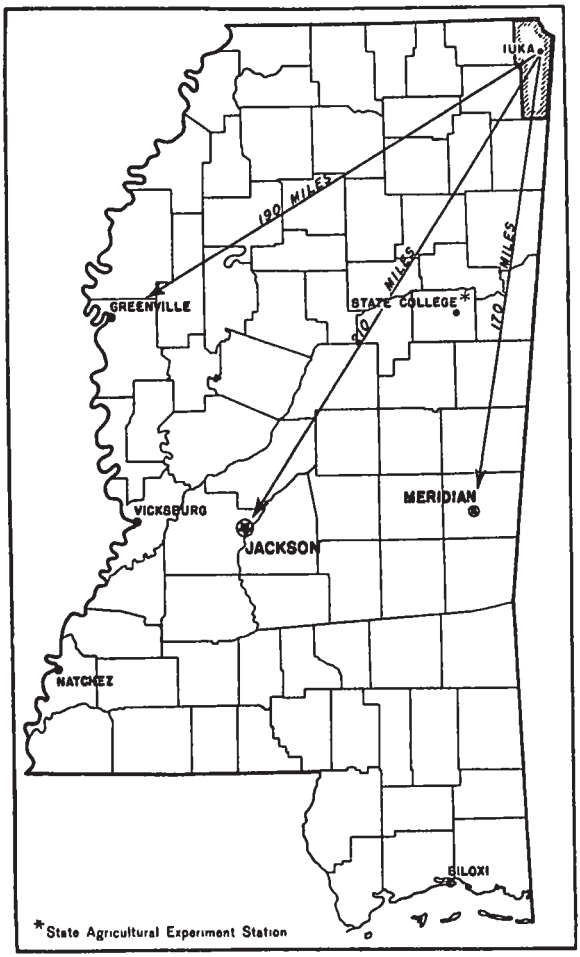

FIGURE 1.—Location of Tishomingo County in Mississippi

Except for a nearly level area in the southeastern part, the entire county is rather thoroughly dissected and the relief is prevailingly hilly. Narrow winding ridges or divides separate the drainage areas of the numerous creeks. The difference in elevation between the tops of the hills or ridges and the adjoining stream bottoms generally ranges between 75 and 150 feet, but in a few places it is as much as 200 feet. Although the general relief is hilly, differences exist. In a rather narrow belt extending from the vicinity of Iuka to the vicinity of Belmont the land is predominantly

[3] Italic numbers in parentheses refer to Literature Cited, p. —.
[4] Information furnished by the Engineering Division of the Tennessee Valley Authority.
[5] UNITED STATES GEOLOGICAL SURVEY. TOPOGRAPHIC MAP, IUKA, MISSISSIPPI, ALABAMA-TENNESSEE QUADRANGLE. 1914.
[6] Figures represent top of rail elevations at the depot.

undulating and rolling; and in the general vicinity of Belmont and Golden—an area of about 9 square miles—it is nearly level to undulating. Along the streams there are nearly level flood plains that are rather wide considering the size and length of the streams. In addition along most of the larger creeks there are nearly level to gently undulating stream terraces lying from 2 to 15 feet above the adjoining bottoms.

Natural drainage in Tishomingo County is good. Except for an area of about 9 square miles in the extreme southeastern part, streams and drains are everywhere abundant, a dendritic drainage pattern is well developed, the land is rather thoroughly dissected, and the relief is rolling, hilly, or steep. In the small area mentioned, streams are relatively few, the land is undissected, and the relief ranges from nearly level to undulating. About three-fourths of the county lies in the drainage basin of the Tennessee River and about one-fourth in that of the Tombigbee River. No large rivers run through the county, but the Tennessee River forms about 9 miles of the northeastern boundary. The main creeks are Bear, Indian, and Yellow Creeks, which flow into the Tennessee River (now the Pickwick Landing Reservoir), and Mackys Creek, which flows into the Tombigbee River. Bear Creek enters the county at a point northeast of Golden and flows northward and out of the county into Colbert County. Here it merges with the Pickwick Landing Reservoir and reenters the county northeast of Iuka. This body of water continues northward and joins the main body of the Pickwick Landing Reservoir near Eastport.

GEOLOGY

Geologically, nearly the entire land surface is underlain by unconsolidated material composed of sand and gravel, with a small admixture of silt and clay. The Eutaw formation, which underlies the land surface in the approximate western two-thirds of the county, consists chiefly of sands and clays, the sands greatly predominating. The Tuscaloosa formation, which underlies the approximate eastern one-third of the county, consists chiefly of gravel and sands. Vast gravel beds occur in the latter formation. Both the Tuscaloosa and Eutaw formations (*8*)[1] belong to the Upper Cretaceous period. The gravel, sand, silt, and clay rest upon consolidated sedimentary rocks—sandstone, shale, and limestone—of Mississippian and Devonian periods of the Paleozoic era. These rocks outcrop only on the bluffs along the larger streams, such as the Tennessee River, Bear Creek and its larger tributaries, Mackys Creek and its larger tributaries, Indian Creek, Yellow Creek, and some of the short branches in the northeastern part of the county (*13*). The area of the outcrops of these consolidated rocks, however, is negligible.

This county has three geological resources considered to be of commercial importance, namely, clay (*12*), gravel (*9*), and sandstone (*14*). Much gravel has been and is being shipped, but the quarrying of sandstone and the mining of clay are not yet of commercial importance.

[1] UNITED STATES GEOLOGICAL SURVEY. GEOLOGIC MAP OF THE UNITED STATES. (4 sheets). 1932.

WATER SUPPLIES

All parts of the county are amply supplied with water. Springs and streams are abundant, and they provide an ample supply of water for livestock on most farms. Some of them, however, cease flowing during extended dry periods. Water for home use is obtained from springs and shallow wells. Most of the wells are not more than 25 feet deep.

There are no natural lakes, but the Pickwick Landing Reservoir is an important artificial lake. This reservoir covers all the former Tennessee River flood plain lying within this county, which ranged from one-fourth to one-half mile in width. It also extends up Yellow Creek about 8 miles, up Indian Creek about 3 miles, and covers all the Bear Creek flood plain lying in the northeastern part of the county. This reservoir provides recreational opportunities—fishing, boating, and swimming—for the people of the county. A few small dams have been built across small streams by the residents, thereby creating small ponds or lakes, most of them not over an acre or two in size, that are used chiefly for recreational purposes. The larger creeks also provide recreational opportunities for fishing, swimming, and boating. One of the most beautiful areas is that along Bear Creek which has been developed recently as Tishomingo State Park (*15*). Situated approximately 4 miles southeast of Tishomingo, this park includes about 1,350 acres.

VEGETATION

About two-thirds of the county is forested. Extensive forested areas are in the eastern one-fourth, in the western one-half, and on the northern border of the county. A little more than half of the woodland is included in farms.

The forest consists of a mixture of coniferous and deciduous trees with blackjack oak, post oak, and shortleaf pine predominating (*11*, *17*). These are particularly conspicuous on the narrow ridge tops, whereas hickories, red oak, white oak, and pines predominate in the coves. Other common trees are cottonwood, hackberry, ash, maple, ironwood, dogwood, beech, tuliptree (poplar), cedar, persimmon, black walnut, black tupelo (black gum), sweetgum, water oak, willow oak, cypress, and willow.

Owing to the fact that all the forested areas have been logged one or more times, the associations that originally existed between different types of forest and the different soil types are no longer obvious, but a few associations are, nevertheless, still discernible. One of the more conspicuous is that of post oak and blackjack oak with the Cuthbert soils. Although these trees grow on all the soils in the uplands, and although other species native to the well-drained soils also grow on the Cuthbert soils, the significant fact is that post oak and blackjack oak are considerably more abundant and the other species less abundant on the Cuthbert soils than on other soils. A soil-vegetation relationship also appears to exist on the Savannah soils, where pines seem to predominate over oaks and hickories. Another rather conspicuous association is that of water-tolerant trees with the poorly drained soils, namely, the Myatt soils of the terraces and the Bibb soils of the bottoms. On these soils the vegetation

consists chiefly of water oak, willow oak, sweetgum, willow, and cypress. With the exception of sweetgum, few of these trees grow on the well-drained soils, but they grow on the Iuka soils, which are intermediately drained soils of the bottom lands. The vegetation on the Iuka soils, however, differs rather consistently from that on the Bibb and Myatt soils in that less water tolerant species grow as well as the highly water tolerant ones. A conspicuous difference is the presence of numerous beech trees on the Iuka soils and the absence of them on the Bibb and Myatt soils.

The distribution of forest over the county is rather closely correlated with the distribution of the different soils. In general, the proportion of woodland is small on those soils that are naturally adapted to the production of farm crops but high on those that are unsuited or poorly adapted to the production of farm crops. Accordingly, woodland is of small extent on the Atwood, Savannah, Prentiss, Cahaba, and Ochlockonee soils and of great extent on the Guin, Cuthbert, Ruston, Myatt, and Bibb soils.

ORGANIZATION AND POPULATION

Tishomingo County was established February 9, 1836, from a part of the Chickasaw Indian cession of 1832. Originally both Alcorn and Prentiss Counties were included, but in 1870 the present boundaries were established (*16*). The date of the arrival of the earliest settlers is not known precisely, but according to the old residents they came soon after the Chickasaw cession of 1832. A heavy influx of settlers took place in the period between 1830 and 1850 (*16*), most of whom came from Tennessee, Alabama, Georgia, North Carolina, South Carolina, and Virginia. According to the United States General Land Office survey made in 1836 and 1837, several important stagecoach trails crossed the county, the most famous of which was the Natchez Trace.

Before the War between the States, a little town called Eastport was situated where Bear Creek joins the Tennessee River. This was a prosperous trading center and served as the shipping point for much cotton and lumber produced in northeastern Mississippi. Much of the Tennessee River bottom in the vicinity of Eastport was cleared and supported a prosperous agricultural community. At one time the town had a college. In 1857 the Memphis & Charleston Railroad (now a part of the Southern Railway system) completed its line through Tishomingo County. This railroad, however, did not pass through Eastport. Iuka soon sprang up and grew at the expense of Eastport, and the latter passed out of existence.[8]

According to the United States census data, the population has increased steadily since 1880. At that time the population was 8,774, and in 1940 it was 16,974, an average density of 38.9 persons to the square mile (1940 census). The total population consisted of 15,949 whites and 1,025 Negroes. All were classed as rural. Almost all of the inhabitants are native-born Americans, mostly of English, Scotch, and Irish descent.

There are no large towns. Iuka, the county seat, is the largest, and its population in 1940, as reported by the census, was 1,664.

[8] Historical information furnished by Mrs. Lyla McDonald, local historian of Iuka.

Belmont, with a population of 594 reported in 1940, is the second largest town. It is in the southeastern part of the county in what is probably the best agricultural district. Other towns, villages, and trading centers are Burnsville, Tishomingo, Paden, Golden, Leedy, and Holcut. These towns and villages are supported mainly by agriculture but are also supported to a considerable extent by lumbering, as lumber is shipped from every town.

Although the farm population is distributed over the entire county, its density varies somewhat from place to place, largely according to the relative extent of soils suitable for the production of farm crops. Where such soils represent a large proportion of the land, the density is generally high; where they represent a small proportion, the density is low. Accordingly, the density of rural population is relatively high in a belt extending from the vicinity of Iuka to the southeastern corner of the county and along Yellow and Mackys Creeks; whereas it is low along the eastern boundary, in the northwestern part, and in certain areas in the southwestern quarter.

TRANSPORTATION AND MARKETS

Two railroads cross the county, the main line of the Southern Railway from Memphis, Tenn., to Chattanooga, Tenn., and the main line of the Illinois Central Railroad from Chicago, Ill., to Jacksonville, Fla. The building of what is now the Southern Railway was completed through the county in 1857. It was 50 years later, 1907, that the Illinois Central completed its line through this area. As regards transportation, the Tennessee River has been more important to this county in the past than it is now, but some freight, particularly lumber, is still shipped on it. United States Highway No. 72, which is paved, crosses the county from east to west; and a graveled State highway crosses from north to south. Most of the secondary roads are graded and graveled and are passable by automobiles throughout the year. Practically all parts are well supplied with secondary roads.

Most of the cotton, the chief agricultural product, and much of the lumber, the chief forest product, are shipped on railroads to markets on the Mississippi River and the Gulf coast, although some of the lumber and a little cotton are shipped on the Tennessee River. Auto trucks are becoming important in the transportation of these products, particularly lumber. The less important products, such as chickens, eggs, cream, and livestock, are sold and necessary supplies are purchased at local trading centers and at Corinth, Alcorn County. Considerable farm equipment is purchased at Corinth. Some trading is also done at the tri-cities of Alabama—Florence, Sheffield, and Tuscumbia.

CULTURAL DEVELOPMENT AND IMPROVEMENT

Churches and common schools are well distributed. The length of the common school term ranges from 4 to 9 months a year for different schools. High schools are in all the larger towns, and school busses provide transportation for rural students, so that a high-school education is available to almost every farm youth. There are no colleges in the county. All communities have rural mail de-

livery, and a few communities have telephone service. Very few farms have electricity.

Generally speaking, the farmhouses are unpretentious. Nearly all of them are constructed of lumber of local origin. Most houses have two to five rooms, and only a very few have more than five rooms. Most of the houses have open foundations, without basements or cellars. Practically all of them have fireplaces, which constitute the principal means of heating. Farmhouses generally are unpainted, and many are in need of repairs.

The other farm buildings—barns and sheds—are also quite unpretentious. Nearly all of them are constructed of lumber, very few are painted, and many are in need of repairs. Fences generally are in a fair condition, but some are in need of repairs.

INDUSTRIES

Lumbering is the only important industry in the county. In 1940, 180 farms reported income from forestry products, chiefly lumber, totaling $28,251; but this represents only a part of the total income in the county from this source. About 48 percent of the forested land is not in farms, and the income from such land is not represented in this figure. About 60 percent of the county is still in forest. Numerous small sawmills give employment to a considerable number of people during seasons when work on farms is slack. Cotton ginning is an industry of slight importance in the county, but it provides some seasonal employment. Considerable gravel is shipped by rail to Alabama and to other points in Mississippi.

CLIMATE

The climate of Tishomingo County is of the humid continental type with rather hot summers, mild winters, and an average annual rainfall of about 52 inches.

Rather uniform climatic conditions prevail over the entire county. There are no nearby bodies of water large enough or nearby mountains high enough to cause any significant differences in climatic conditions within the area. The climatic data compiled at the United States Weather Bureau station at Corinth, Miss., which is about 20 miles northwest of Iuka, the county seat of Tishomingo County, are thought to be fairly representative of conditions in this county. All figures subsequently quoted in this section are taken from data compiled at the Corinth station. Table 1 gives the normal monthly, seasonal, and annual temperature and precipitation at this station.

The difference between the mean winter and summer temperatures is only about 36° F. Winters generally are mild and open, allowing outdoor work the greater part of the time. The maximum recorded temperature in winter is 82° and the minimum is −8°. Winter temperatures above 70° or below 5°, however, are uncommon. Freezes are frequently severe enough to injure leguminous cover crops and winter grains, particularly on soils that are poorly drained or that have heavy-textured surface layers. Summers are generally rather hot. The maximum recorded temperature in summer is 111°, and the minimum is 42°. Summer temperatures over 100°

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Corinth, Alcorn County, Miss.*

[Elevation 470 feet]

Month	Temperature			Precipitation		
	Mean	Absolute maximum	Absolute minimum	Mean	Total for the driest year (1925)	Total for the wettest year (1932)
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*
December	43.3	78	4	5.77	2.89	7.46
January	42.0	78	−8	4.98	3.74	14.19
February	43.5	82	−1	4.26	2.66	7.05
Winter	42.9	82	−8	15.01	9.29	28.70
March	52.3	92	14	5.51	1.09	4.14
April	61.0	91	27	4.79	2.98	3.94
May	69.3	100	35	4.50	.82	1.34
Spring	60.9	100	14	14.80	4.89	9.42
June	77.0	105	42	3.76	3.24	7.04
July	80.0	111	50	4.77	2.82	9.90
August	79.3	110	49	4.02	2.12	3.73
Summer	78.8	111	42	12.55	8.18	20.67
September	74.1	106	38	3.10	7.86	8.90
October	62.3	95	26	3.28	4.70	7.51
November	51.2	84	11	3.72	2.15	3.34
Fall	62.5	106	11	10.10	14.71	19.75
Year	61.3	111	−8	52.46	37.07	78.54

or below 60°, however, are uncommon. Spring and fall are generally pleasant.

The average frost-free period of 214 days extends from March 29 to October 29. The latest recorded date of a killing frost in the spring is April 26 and the earliest in the fall is October 10. The long frost-free period allows ample time for the growing and maturing of most common farm crops. Injury to crops from unusually late spring frosts or early fall frosts is uncommon except for fruits, which occasionally may be injured by late spring frosts.

The mean annual rainfall of 52.46 inches is fairly well distributed throughout the year, and normally there are no prolonged dry or wet periods. Occasionally, dry periods prevail long enough in the summer and fall to injure crops and pastures, especially on the Cuthbert, Savannah, and Myatt soils. On the other hand, wet periods sometimes prevail long enough during the growing season to injure crops, particularly on soils that are not well drained. Spring rainy periods sometimes delay the preparation of the seedbed and the planting of the crops. The heaviest precipitation comes in the winter and spring, and most of the creek bottoms are flooded one or more times during these seasons. Much of the winter precipitation comes in the form of slow drizzling rains with occasional light snowfalls, but the snow seldom remains on the ground for more than a day or two. Only 3.6 inches of snow falls on the average during the year. In contrast with this, the late spring and summer precipitation usually comes in the form of heavy showers. Fortunately, fall is a season of relatively light precipitation, coinciding

with the harvest season; consequently, damage to mature crops or interference with harvesting operations by rains is not common.

As in most of the humid section of the southeastern United States, the relative humidity is rather high. Seasonal differences are slight. The average relative humidity at 8 a. m., 75th meridian time, in April is 70 to 80 percent and in October is 80 to 90 percent; the average relative humidity at 8 p. m., 75th meridian time, in April is 50 to 60 percent and in October is 60 to 70 percent; and the average minimum relative humidity for both April and October is 40 to 50 percent (*6*).

The average number of hours of sunshine per day in January is 4.5 to 5; in July it is 8.5 to 9.0. The average percentage of possible sunshine actually received in the winter is 40 to 50 percent, whereas in the summer it is 60 to 70 percent (*7*).

A gentle breeze blows most of the time. Strong winds are uncommon, except for a few days during the early spring. Damaging tornadoes and hailstorms are rare.

Winter weather frequently manifests the following cycle: A slow rain; clearing and colder; frost; increasing humidity and cloudiness; and rain again. This cycle usually covers a period of 3 to 7 days. The summer days are characterized by bright sunshine, an occasional cloud in the sky, a rather high temperature, and relatively small changes in temperature during the day. Thundershowers in the afternoon and evening are common. The days in the fall and spring are pleasant and comfortable.

AGRICULTURE

EARLY AGRICULTURE

Very little is known about the early agriculture of this area. The Indians who lived here prior to the coming of the white men apparently practiced a crude form of agriculture consisting chiefly of the production of corn. The abundance of Indian relics, such as broken or imperfect arrowheads, indicates that the Indian population probably was relatively high. Although it might be purely coincidental, it is interesting to note that these relics are most commonly found on the Cahaba soils, are less commonly found on the Prentiss soils, and are seldom found on any of the other soils in the county. Both the Cahaba and the Prentiss soils occupy stream terraces, and they are both among the most productive and the most desirable soils for agriculture in the county. The Cahaba soils, however, are somewhat more productive than the Prentiss. It appears, therefore, that the Indians rather carefully selected their places for abode and the pursuit of agriculture, as they chose sites on the most productive soils near or adjacent to the streams.

Authentic information pertaining to the agricultural development from 1832, the year of the Chickasaw Indian cession, to 1880, the year of the first United States census in this county, is meager. A heavy immigration of settlers is reported for this period (*16*), and it is reasonable to assume that considerable agricultural development took place simultaneously. These early settlers were largely self-sustaining. The forest furnished logs and lumber for the necessary shelter and fuel for the necessary heat, and the wild game furnished

some of their food. On the land that they cleared, corn was the chief crop and vegetables and cotton were of secondary importance. Nearly all of the corn was consumed locally as human food and as feed for livestock. Vegetables were grown almost exclusively for home consumption. Old residents report that some small grains, chiefly wheat and oats, also were produced for consumption on the farm.

Cotton was the crop marketed for cash with which to buy the few necessities that could not be produced on the farm. Some livestock were raised and livestock products were produced on nearly every farm, but ordinarily production did not exceed consumption on the farm.

The long distances to markets and the rather poor transportation facilities were important factors in causing the early agriculture to be self-sustaining. According to old residents, however, some cotton was grown and was hauled by wagon to ports on the Tennessee River, where it was loaded into boats or barges and shipped down the river. Completion of a railroad (now the Southern Railway) through the county in 1857 improved the transportation facilities. The main contemporary effect of this on the agriculture apparently was to stimulate the production of cotton. Thus, as more land was cleared, the proportionate acreage of cotton increased, and the prevailing system of agriculture—corn for food and feed and cotton for cash—was gradually established.

The early agricultural practices were generally rather wasteful of the soil resources. Little attention was given to crop rotations, growth of cover crops, or prevention of runoff and accelerated erosion. Erosion must have been severe, as remnants of old gullies may still be seen in some of the areas that are now in forest and that once were used for the production of corn and cotton. Land was cheap and plentiful. As cultivated fields were depleted of their fertility and eroded, or as they proved unsuitable for crops, new fields were cleared to replace them.

CROPS

Corn and cotton are the chief crops grown in the county. The total acreage in corn has been nearly double the acreage in cotton, except about 1929. In comparison with the total acreages of corn and cotton, the acreages of hay and other crops, such as peas, beans, sweetpotatoes, potatoes, small grains, and sorgo, have been small. There was a general increase in total crop acreage until 1929. This increase was associated with an increase in total number of farms, which, in turn, was associated with an increase in rural population. The total value of all crops has been very much greater than the value of livestock and livestock products. Cotton has been the most important cash crop; its value far exceeds that of any other agricultural product or class of products.

The production of the different crops in the county and the value of the agricultural products are shown in tables 2 and 3 and in figure 2.

Cotton is one of the staple crops on practically every farm. According to census data, the total acreage in cotton almost doubled from 1879 to 1939, when the average per farm reporting was about 6 acres. This expansion followed the trend in population and total acreage under cultivation. The peak in production, however, was reached in

TABLE 2.—*Acreage of principal crops in Tishomingo County, Miss., in stated years*

Crop	1879	1889	1899	1909	1919	1929	1939
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Cotton	7,555	7,443	10,566	13,617	16,535	24,644	13,901
Corn, for grain	15,965	16,628	18,942	21,406	27,758	20,808	20,617
Dry peas (mostly cowpeas)	------	------	875	336	163	274	1,826
Dry edible beans (mostly soybeans)	------	------	12	3	16	442	2,524
Peanuts	------	40	64	113	362	442	652
Potatoes	------	70	44	109	158	221	370
Sweetpotatoes and yams	332	249	96	350	458	331	333
Sorgo for sirup	------	268	311	390	427	434	319
All hay	32	520	371	1,574	3,528	[1] 3,442	[1] 5,744
Lespedeza and sweetclover	------	------	------	------	[2] 83	339	1,187
Legumes cut for hay	------	------	------	------	2,120	1,600	3,370
Other tame hay	------	------	248	870	849	475	401
Wild, salt, or prairie grasses	------	------	123	704	476	1,028	786
	Trees	*Trees*	*Trees*	*Trees*	*Trees*	*Trees*	*Trees*
Apples [3]	------	10,701	20,443	14,771	13,396	8,594	10,197
Peaches [3]	------	14,694	37,766	37,718	26,127	16,283	21,956

[1] Exclusive of sorghums.
[2] All clover alone.
[3] Trees are for years 1890, 1900, 1930, and 1940, respectively.

TABLE 3.—*Value of certain agricultural products by classes in Tishomingo County, Miss., for 1909, 1919, 1929, and 1939*

Item	1909	1919	1929	1939
Crops:				
Cereals	$265,434	$731,447	$330,968	$129,585
Other grains and seeds	5,854	15,809	10,578	15,094
Hay and forage	21,756	88,006	57,667	45,953
Vegetables (including potatoes and sweetpotatoes)	94,566	249,214	63,079	36,833
Fruits and nuts	20,983	79,230	34,006	34,006
All other field crops (mostly cotton)	446,013	1,335,416	1,042,952	204,144
Farm garden vegetables (excluding potatoes and sweetpotatoes) for home consumption only	------	------	121,726	117,978
Forest products sold	------	------	58,682	28,251
Livestock products:				
Animals sold and slaughtered	187,715	(1)	(1)	87,517
Dairy products sold	5,381	8,211	18,729	22,644
Poultry and eggs produced	56,679	174,459	146,014	87,503
Wool, mohair, and goat hair	1,063	[2] 380	[2] 9	(1)
Honey and wax produced	597	3,543	[3] 532	[3] 582

[1] Not reported. [2] Wool only. [3] Honey only.

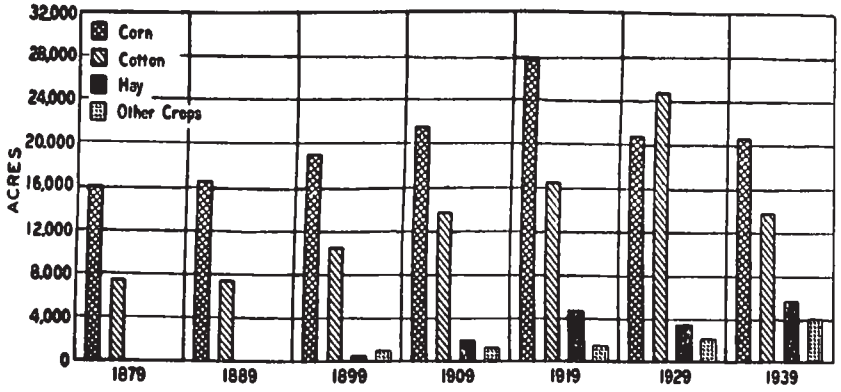

FIGURE 2.—Acreages of principal crops in Tishomingo County, Miss., in stated years. (Hay includes all tame or cultivated grasses, legumes, grains, and (except in 1939) coarse forage cut for hay. Other crops include peas, beans, peanuts, potatoes, sweetpotatoes, other vegetables, and sorgo for sirup.)

1929, but the acreage dropped in 1939. For the census years the average yields for the county as a whole have ranged from 0.24 bale an acre in 1889 to 0.41 bale in 1929.

Although cotton is produced in all parts of the county, the areas of greater production are where the predominant soils are naturally suited to this crop, such as the Savannah, Atwood, and Prentiss soils and the gentle slopes of the Ruston soils. A considerable amount of cotton is also grown on the Cuthbert soils, although it is not generally well adapted to these soils. Practically no cotton is produced on the Guin soils, as these are too gravelly and too hilly for feasible tillage. Neither is cotton produced on the Myatt, Bibb, and Iuka soils, as these are not adequatley drained for the production of cotton. Although it will grow on the Ochlockonee soils, very little cotton is grown on them, owing largely to greater susceptibility to injury from diseases and insects on these soils and to their special adaptability to the production of corn.

From an economic point of view, cotton is the most important agricultural product in the county. In table 3 it accounts for practically all of the item "All other field crops." As compared with other products or classes of products listed in this table, the values for cotton are very high. The importance of this product in the agricultural economy is, therefore, readily apparent. It is the only product that is extensively produced directly for market.

From the point of view of the agriculture of the county as a whole, corn is probably the most important single crop. Although the cash income derived from corn is much lower than that from cotton, corn is vital as feed for the livestock and food for the people. Corn bread and other foods made from corn are staple items in the people's diet. It is apparent from table 2 and figure 2 that the total acreage in corn has been many times as great as the total acreage of all other crops except cotton. The total acreage in corn has increased along with the substantial increases in population, total number of farms, total acreage under cultivation, and total acreage in cotton. An exception to this general relationship, however, is to be noted. From 1919 to 1929 the acreage in corn declined about 7,000 acres and has remained about the same according to the 1940 census. Apparently the temporarily high acreage in cotton in 1929 was at the expense of the acreage in corn. In most census years the county average corn yields have been close to 14 bushels an acre; but in 1879 the average yield was 17.5 bushels, in 1929 it was 17.7 bushels, and in 1939 it was 7 bushels.

Corn is produced in all parts and on nearly all of the soils of the county. Probably half of it, however, is produced on the Ochlockonee and Iuka soils, but a considerable quantity is grown on the Prentiss, Savannah, Atwood, Ruston, and Cuthbert soils. Only a little of this crop is grown on the Guin, Myatt, and Bibb soils. Corn has a wide range in adaptability to soils, and this fact partly accounts for its production on so many different soils. At the same time there are great differences in yields on the various soils.

Corn is admirably suited to the Ochlockonee soils, and it generally makes the highest yields on them. Although it is likely to be injured by wet conditions on the Iuka soils, its yields on these soils rank second. Corn returns moderate yields on the Prentiss, Savannah, and Atwood soils and on the gentler slopes of the Ruston soils, and gen-

erally low yields on the Guin, Cuthbert, Myatt, and Bibb soils. Where the Myatt and Bibb soils are adequately drained by artificial means, however, the yields of corn are medium to high.

Most of the corn is consumed on the farm where it is produced. The majority of farms include small areas of stream bottoms on which more than half of the corn is grown. Ordinarily this is not sufficient, and enough corn is grown on the terraces and uplands to balance the feed requirement of the farm. On some of the farms that lie mainly in the larger creek bottoms in which Ochlockonee and Iuka soils predominate, corn is an important cash crop. Most of it is sold locally, chiefly to neighboring farmers. Henceforth, in areas adjoining the Pickwick Landing Reservoir, corn must either be purchased or be grown on the uplands, because the old cornfields in the bottoms are now under water.

In addition to cotton and corn, the following crops are generally grown on most farms: Sweetpotatoes, potatoes, peanuts, soybeans, cowpeas, and sorgo for sirup. With but few exceptions, the total acreage of any one of these crops has been less than 400 acres during any of the census years up to 1929. The census reports a substantial increase in the total acreage of all these crops in 1939. Nearly all of them are consumed on the farms where they are produced. Most farms have a small garden in which the following vegetables are commonly grown: String beans, butter beans, peas, squash, watermelons, pumpkins, tomatoes, turnips, onions, okra, eggplant, radishes, peppers, lettuce, mustard greens, and cucumbers. Nearly all of the vegetables grown are consumed on the farm, but some, chiefly watermelons, are sold at the local markets. In 1939, vegetables, including watermelons, were harvested for sale on 28 acres. A number of farmers raise a few peaches, and the peaches that are not consumed on the farm are marketed locally. Only a few apples, plums, and grapes are produced, and practically none of these are grown for market. Recently a few pecan trees have been planted.

The acreages of hay and forage crops and improved pasture have been small. In 1929, according to the census, a total of only 3,442 acres were devoted to hay (exclusive of sorghums), but by 1939 the acreage had increased to 5,744, an average of 2.4 acres to the farm. One reason for the relatively low hay and pasture acreage is the small number of livestock per farm, with the consequent low hay and pasture requirements; and another is that much of the woodland is used for pasture. The census of 1940 listed 76,430 acres as woodland, an average of nearly 32 acres to the farm.

The main plants grown for hay and improved pasture are lespedeza, Bermuda grass, soybeans, cowpeas, Dallis grass, carpet grass, and hop clover. The less important ones are vetch, kudzu, oats, and rye. Lespedeza, a legume that is fairly well suited to the soils of the county, has recently become the chief hay and pasture plant.

Although hay and pasture are produced on practically all of the soils in the county, they are grown chiefly on soils that are not well suited to cotton and corn. Much of the pasture (woodland pasture) is confined to strongly sloping areas of the Cuthbert, Ruston, and Guin soils that are still in woods. Many farmers burn such woodland pasture each winter, because they believe that this practice makes the grass come earlier in the spring and increases the stand. This prac-

tice prevents much natural reproduction of trees. The carrying capacity of woodland pastures is low. Some cleared pastures are on areas of depleted and eroded Savannah, Atwood, Ruston, and Cuthbert soils that have been abandoned for the production of crops. With several exceptions, the pastures on such soils are poorly managed, and both their quality and their carrying capacity are low. The greater proportion of improved pastures are on the poorly drained Myatt and Bibb soils and to a less extent on the intermediately drained Iuka soils. Likewise, the greater proportion of hay is produced on these soils. It is important to note that the soils of the county as a whole are not naturally productive of nutritious grasses and clovers. This fact is quite evident when they are compared with certain soils of the Black Belt in Alabama and Mississippi, of the central basin of Tennessee, and of the southwestern section of Virginia.

AGRICULTURAL PRACTICES

Practically all of the tillage operations, such as plowing, planting, and cultivating, are done by the use of one-mule or two-mule implements. Although much of the fertilizer is distributed by means of small spreaders, probably more than half is distributed by hand. The harvesting of almost all of the crops is done exclusively by hand, except hay, which is cut by mowers.

Land that is planted to cotton is generally plowed and fertilized in April or May just before the cotton is planted. The most common fertilizer application is 200 or 300 pounds of a 4–8–4 [9] mixture to the acre. When the cotton plants have two or four leaves, the plants are thinned to the desired stand or spacing. This practice, called chopping, is done with a hoe. During the growing season, considerable hoeing in the drill row is necessary to eradicate weeds, but one-mule implements are generally used to cultivate between the rows. The cotton is picked by hand, usually in September and October. If the weather in the fall is unfavorable, however, picking may not be completed until December. Cotton picking is the busiest season on the farm, and nearly all of the members of the farm family participate. The seed cotton is ginned locally, and the bales of fiber and the seed are then ready for sale.

The general practice is to prepare the seedbed for corn and to plant corn any time from March 15 to June 15. One reason for late planting of some of the corn is that it is grown in the creek bottoms, which frequently remain wet until late in the spring. Seedbed preparation, planting, and weed eradication are done in practically the same manner for corn as for cotton. Corn land is not so generally fertilized as cotton land, but a considerable part of it receives some kind of fertilizer. A number of farmers use the same kind of fertilizer for corn as they do for cotton, but the more common practice is to side-dress the corn with sodium nitrate at the rate of about 100 pounds to the acre. The mature corn is left in the field with the ears hanging on the stalks until late fall or early winter, when the ears are pulled. Many farmers utilize only the grain from the corn plant, whereas others strip the leaves from the stalk, a practice called pulling fodder, and utilize the leaves for fodder. Still others cut the plant off just above the top ear,

[9] Percentage of nitrogen, phosphoric acid, and potash, respectively.

a practice called topping, gather the tops into shocks, and subsequently use them for fodder.

Systematic rotation of crops is not common. Generally, corn is grown year after year on the soils of the bottom lands and cotton is produced year after year on the soils of the terraces and uplands. Although corn is grown about once every 5 or 6 years on land that is otherwise used for cotton, the rotation is not systematic. The interval between successive corn crops may be 3, 5, or 8 years. Instead of practicing a rotation of crops, many farmers prefer to let a part of their cropland lie idle, or "rest," for a period of several years, and then return it to cotton or corn production. The recent trend, however, is toward systematic rotation of crops. This is particularly true among the more progressive farmers in the county.

Although the growing of winter cover crops is not a common practice over the county as a whole, it has recently been adopted by many of the more progressive farmers. The chief winter cover crops are the legumes, vetch and Austrian Winter peas. These crops are planted in the fall and are usually plowed under in the spring before corn or cotton is planted. They serve a twofold purpose—one to decrease erosion during the winter, and the other to add organic matter to the soil. The general practice is to apply triple superphosphate to the winter legumes at the rate of about 100 pounds an acre. Occasionally some limestone is also applied.

Fertilizers are used for most of the cotton, much of the corn, and most of the winter legumes. According to the census reports, the total expenditure for fertilizers in the county increased from $1,378 in 1879 to $65,220 in 1939. Census reports also show that 85.7 percent of the farmers reported expenditures for fertilizers in 1939, and that the average expenditure per farm reporting was $31.68. Most of the fertilizer used has been of the 4–8–4 and 6–8–4 analyses. Some nitrate of soda and some superphosphate have also been used. The use of triple superphosphate has increased to significant proportions in the last few years. Very little lime is used in the county. It is probable that the use of both lime and phosphate will increase greatly in the next few years.

LIVESTOCK AND LIVESTOCK PRODUCTS

Raising cattle and producing dairy products are among the less important agricultural enterprises in Tishomingo County. According to the Federal census, the total number of cattle declined from 1920 to 1930 and increased only slightly from 1930 to 1940. The total number over 3 months of age on April 1, 1940, was 4,739, an average of only 2.3 for each farm reporting. Although the cattle are kept chiefly for meat and dairy products that are consumed on the farm, a significant cash income is realized from cattle on many farms. Most of the cattle in the county are grades of Jerseys and Guernseys.

Work animals consist chiefly of mules. According to the census figures, in 1940 the work animals over 3 months of age consisted of 2,749 mules and 782 horses, an average of 1.8 work animals to the farm reporting. In addition to the mules and horses, a few oxen are used as work animals. Most of the animals acquired to replace the work animals are obtained from outside the county.

Relatively few hogs are raised. The census reports a total of only 3,358 hogs and pigs over 4 months of age in the county in 1940, an

average of about 2.3 to the farm reporting. Most of the hogs and pigs are consumed on the farm where they are produced.

Nearly every farm has a flock of poultry. The 1940 census reports a total of 53,009 chickens over 4 months of age, an average of about 23 to the farm reporting. Although most of the poultry and poultry products are consumed on the farm, they also constitute a significant source of cash income.

According to the census data, the number of farms reporting expenditures for feed increased nearly twofold from 1910 to 1940. In 1940, 1,223 farms, which was 50.9 percent of all the farms, reported a total expenditure for feed of $38,881, an average of $31.79 for each farm reporting.

CHANGES IN LAND USE

The use of the land in the county has been gradually shifting from forestry to agriculture. The total acreage of improved land, as calculated from census data, increased from about 14.5 percent of the area of the county in 1880 to 28.1 percent in 1940. The total acreage used for crops increased steadily from 1879 to 1929 and then decreased. In 1939, 44,276 acres of cropland was harvested, which is about 15 percent of the area of the county.

Census figures show that the population of Tishomingo County about doubled between 1880 and 1940. During this period the average size of farms decreased from 188 acres to 74.8 acres, whereas the number of farms increased from 1,078 to 2,402. The percentage of land in farms decreased from 74.1 in 1880 to 62.2 in 1940. The acreage of improved land per farm decreased from 36.8 acres in 1880 to 33.8 acres in 1939. As would naturally follow a marked decrease in size of farms and only a slight decrease in acreage of improved land per farm, the percentage of improved land per farm increased from 19.6 percent in 1880 to 45.2 percent in 1939. Part of this percentage increase represents an expansion in the total area of improved land, which increased from 39,688 acres in 1880 to 81,095 acres in 1939.

FARM TENURE

According to the Federal census, the percentage of all farms operated by owners decreased from 75.2 in 1880 to 52.7 in 1940. According to the same data, the land in farms operated by owners in 1940 was 113,167 acres; by tenants, 66,373 acres. All the farms not operated by owners are operated by tenants, of which there are three main classes; namely, (1) the cash renters, (2) the "third and fourthers" (also called "share renters"), and (3) the sharecroppers (also called "half and halfers"). A cash renter pays the owner a stipulated cash rent per acre and manages the farm and furnishes all the equipment, work animals, seed, fertilizer, and labor. A "third and fourther" gives the owner one-third of the feed crops and one-fourth of the cotton, manages the farm, and furnishes all the labor, equipment, work animals, seed, and fertilizer. A sharecropper gives the owner one-half of the crops and furnishes all the labor, half of the seed, and half of the fertilizers; the owner manages the farm and furnishes the work animals, half of the fertilizer, and half the seed. Occasionally the sharecropper furnishes the work animals instead of the owner.

In this county, farm labor and tenancy are rather closely linked. Many of the tenants or the tenants' children work for their neighbors

part of the time. The supply of farm labor is generally sufficient to satisfy all the demands. In 1939, according to the census figures, 306 farms, which was 12.7 percent of all the farms, reported expenditures for farm labor totaling $10,980, or an average of $35.88 for each farm reporting. Common wages for farm labor range from $10 to $15 a month plus board.

FARM INVESTMENTS

The average value of all farm property increased from $714 in 1880 to a peak of $2,932 in 1920, and then decreased to $1,296 in 1940, according to the census. The high valuation in 1920 coincides with the high price level prevailing at that time. The increase in value per farm was accompanied by a 55 percent decrease in size of farms. The relative value of farm buildings has increased, and in 1940 it constituted 22.3 percent of the total average value of farms. Domestic animals have decreased in relative value from 21.6 percent in 1880 to 17.2 percent in 1940. Land represented 54.0 percent of the total value of farms in 1940.

The relative value of farm machinery and implements has remained at a low figure. In 1940 it was 6.5 percent of the total farm investment. On the majority of farms, the implements and machinery consist of the following: A one- or two-horse turning plow, middle buster, harrow, stalk cutter, cotton and corn planter, two-horse disk, shovel stock (Georgia stock), and wagon. Only 27 farmers had tractors in 1940, according to the census.

In 1940 land and buildings alone were valued at $980 a farm and $13.23 an acre, as compared with $1,219 a farm and $17.38 an acre in 1930.

TYPES OF FARMS

In the classification according to size, the census for 1940 reported 548 farms ranging from 3 to 29 acres, 875 from 30 to 69 acres, 411 from 70 to 99 acres, 486 from 100 to 219 acres, 74 from 220 to 499 acres, and 8 of 500 acres or over. Of those farms over 500 acres, only 1 is 1,000 acres in size. From these figures it is apparent that the most of farms are less than 220 acres in size.

According to major source of farm income, the farms are classed as follows: Field crops, 387; forest products, 31; livestock, 10; dairy products, 6; poultry and poultry products, 5; other livestock products, 1; fruits and nuts, 1; and subsistence, 1,955.

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 content of lime in

the soil profile is determined by simple tests. The 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 interrelation of the soil and vegetation is studied.

The soils are classified according to their characteristics, both internal and external, with special emphasis upon the features that influence the adaptation of the land for the growing of crop plants, grasses, and trees. Upon the basis of these characteristics, soils are grouped into classification units. The three principal units are (1) series, (2) type, and (3) phase. In places two or more of these principal units may be in such intimate or mixed pattern that they cannot be clearly shown separately on a map but must be mapped as (4) a complex. Some areas of land, such as coastal beach or bare rocky mountainsides, which have no true soil, are called (5) miscellaneous land types.

The most important of these units 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 one 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 differ within a series. The soil series are given names of places or geographic features near which they were first found. Savannah, Cuthbert, Ruston, and Prentiss are names of important soil series in this county.

Within a soil series are one or more soil 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, Ochlockonee silt loam and Ochlockonee fine sandy loam are soil types within the Ochlockonee series. Except for the texture of the surface soil, these soil types have approximately the same internal and external characteristics. The soil type is the principal unit of mapping, and because of its specific character it is usually the soil unit to which agronomic data are definitely related.

A phase of a soil type is recognized for the separation within a type of soils differing 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 some areas may be adapted to the use of machinery and the production 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 crops. In such instances the more sloping or the less sloping parts of the soil type may be segregated on the map as a level, undulating, rolling, or hilly phase, as, for example, Savannah silt loam, rolling phase, or Cuthbert very fine sandy loam, hilly phase. Similarly, different parts of the same soil type may vary greatly in degree and kind of accelerated erosion, and such differences may be expressed

as phases; as, for example, Savannah silt loam, eroded phase; or Atwood very fine sandy loam, eroded phase.

The term "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 (sand), and heavy-textured soils contain much clay. The term "structure" refers to the natural arrangement of the soil material into aggregates, or structural particles or masses. "Consistence," a term that has come into use rather recently, 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. The term "surface soil" ordinarily refers to the lighter textured surface layer, which generally ranges from 5 to 10 inches in thickness. The layer just below the surface soil, which generally is heavier textured, is called the "subsoil." In this county its thickness ranges from about 15 to 30 inches. The "substratum" is beneath the subsoil and is characteristically splotched or mottled with two or more colors.

In a practical sense, the degree of acidity may be thought of as the degree of poverty in lime (available calcium). An acid soil is low in relative content of lime, a neutral soil is about medium, and an alkaline soil is high. The term reaction [10] refers to the condition of the soil as regards degree of acidity.

8he soil surveyor makes a map of the county or area, showing the location of each of the soil types, phases, complexes, and miscellaneous land types, in relation to roads, houses, streams, lakes, and other local cultural and natural features of the landscape.

SOILS

All the soils in Tishomingo County have developed in an environment of relatively high temperature, relatively high rainfall, and a forest vegetation. As a result of having developed in this more or less uniform environment, the soils have a number of characteristics in common. They are all strongly to very strongly acid in reaction, indicating a low content of lime and other bases. They are also very low in content of soluble salts and low in content of organic matter. In comparison with the soils of the United States as a whole, those of Tishomingo County are low in natural fertility, but most of the arable soils of the county respond well to good management. With the exception of the steep phase of Guin gravelly loam, all the soils are nearly free of stone. The surface soil (A horizon) of all the well-developed soils is chiefly light gray in color, loose in consistence,

[10] Indicator solutions are used to determine the reaction of the soil. The presence of lime in the soil is detected by the use of a dilute solution of hydrochloric acid. 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 in the Soil Survey Manual (*5, p. 86,*) as follows:

	pH value
Extremely acid	<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 silt loam or fine sandy loam in texture. Roots, water, and air easily penetrate this layer. The subsoil (B horizon) of all the well-developed, well-drained soils is either chiefly red or chiefly yellow in color and clay loam to clay in texture. The subsoils of all the soils, except the Cuthbert, are friable and easily penetrable by roots, water, and air. The solums (surface soil plus subsoil) of all the well-developed, well drained soils range from about 2 to 3 feet in thickness.

The parent materials of all the soils consist of unconsolidated deposits that contain varying proportions of gravel, sand, silt, and clay. The parent materials of all the soils, except the Savannah, were deposited by water, either by the waters of the old gulf that covered the county at one time or by streams that developed subsequent to the recession of the old gulf. Available evident indicates, but does not prove conclusively, that a significant part of the parent material of the Savannah soils was laid down by wind and that the parent material therefore consisted of a mixture of loess and sandy coastal plain material.

Although the soils in the county are similar in a number of general features, they differ in many respects. They differ in such internal features as color, texture, structure, consistence, thickness of the different soil layers, content of gravel, and internal drainage conditions; and they also differ in such external features as relief or slope, external drainage condition, and degree of erosion.

The color of the surface layer of the well-developed soils in the county is chiefly gray. Such uniformity of color, however, does not prevail in the subsoil. In about 50 percent of the area of the county the color of the subsoil is chiefly red, in about 15 percent chiefly yellow, and the rest chiefly brown or mottled gray.

The soils that cover about 40 percent of the county are classified as very fine sandy loam. Ranking second in area is silt loam, which occupies about 25 percent of the area of the county. Closely following the silt loam is fine sandy loam, which occupies about 20 percent of the area of the county; and ranking fourth is gravelly loam and the gravelly very fine sandy loam, which together occupy about 15 percent.

The soils also differ considerably in consistence and structure. The subsoil in somewhat over 35 percent of the area of the county is tough and plastic and has a fairly well-defined blocky structure, but in the rest of the county it is friable and generally has a poorly defined structure. The soils in about 15 percent of the area of the county have a conspicuous hardpan layer just below the subsoil, but elsewhere the material below the subsoil is friable and permeable.

Both internal and external drainage range from very poor to very good. In about 80 percent of the area of the county the soils are well drained, in about 10 percent they are intermediately drained, and in about 10 percent they are poorly drained.

In about 15 percent of the area of the county the soils have a rather high content of gravel, high enough to interfere materially with cultivation if cultivation were otherwise feasible. In the rest of the county, gravel is either scarce or else present in negligible quantities.

The soils range from one extreme to the other in degree of accelerated erosion. Some accelerated erosion is discernible on practically

all of the soils that have been cleared and used for crops, except those occupying level or nearly level areas. The soils in about 12 percent of the area of the county are mapped as eroded phases—soils on which approximately two-thirds or more of the original surface soil has been lost. About 0.3 percent is mapped as rough gullied land.

In relief the soils range from level to steep. Level or nearly level areas (having a slope of less than 2½ percent) occupy about 24 percent of the area of the county, undulating areas (having a slope of 2½ to 7 percent) about 8 percent, rolling areas (having a slope of 7 to 15 percent) about 24 percent, hilly areas (having a slope of 15 to 30 percent) about 32 percent, and steep areas (having a slope exceeding 30 percent) about 12 percent.

It is evident from the foregoing paragraphs that the soils in Tishomingo County differ considerably in a number of features. Owing to such differences, they also differ in their relative suitability for agriculture as expressed through their workability, productivity, and conservability.[11] On the basis of their relative physical suitability for use in the present agriculture, the soils are grouped into five general classes and are called First-, Second-, Third-, Fourth-, and Fifth-class soils. Under present conditions the practical interpretations of these soil classes may be considered as follows: First-class soils are physically well suited for the production of crops, Second-class soils are physically moderately well suited for the production of crops, Third-class soils are physically poorly suited for the production of crops, Fourth-class soils are physically very poorly suited to the production of crops but are suitable for pasture, and Fifth-class soils are physically very poorly suited to either cropland or pasture but are adapted to forestry. First-class soils occupy about 3 percent of the county, Second-class soils about 23 percent, Third-class soils about 17 percent, Fourth-class soils about 8 percent, and Fifth-class soils about 49 percent.

In Tishomingo County a fairly consistent relation is manifest between the general well-being of the people living on the land and the general suitability of the soils for the production of the common farm crops. On the basis of observations, it is apparent that the more progressive agricultural communities, as expressed by good farmhouses and other farm buildings, good fences, ample farm equipment, well-constructed schoolhouses and churches, and good local roads, are generally in areas where the soils are prevailingly suitable for the production of crops. These communities are in areas where soils such as the Atwood, Savannah, Prentiss, Ochlockonee, and Iuka predominate. In a general way these areas correspond to land type 1 in figure 3 (see p. 80). On the other hand, the less pretentious farmhouses and other farm buildings, poorer fences, small and irregular fields, poorer schools, and poorer churches are generally, but not always, in those areas where the soils are poorly suited to the production of crops. These latter communities are generally in areas where Cuthbert, Ruston, Guin, and Bibb soils predominate. In general, the distribution of these areas corresponds to land type 3 in figure 3 (see p. 80). It is also true that the density of population is

[11] For definitions of these terms see p. 76.

greater where the soils are well suited to the production of crops than where the soils are poorly suited for such use.

In order to make full use of the soil survey the reader must understand the units on the soil map, units that are designated as soil types and phases. As brought out in the section on Soil Survey Methods and Definitions, a phase is merely a subdivision within the type, and a soil type, in turn, is a subdivision within the soil series. After the reader becomes familiar with the soil series, an understanding of the types and phases within each series is easy to reach. The logical procedure, therefore, in obtaining a working knowledge of the soils of the county is to learn first the characteristics of the different soil series.

The fact that soils differ in characteristics such as color, consistence, and structure, has already been brought out. On the basis of such characteristics the soils of the county are classified into 11 soil series and 2 miscellaneous land types. A convenient approach to an understanding of the soil series is to associate, first of all, the soils of each series with the position they normally occupy on the broad landscape. Accordingly, the soil series are placed into three groups, viz, (1) soils of the uplands, (2) soils of the terraces, and (3) soils of the bottom lands. Bottom lands, also called flood plains, are narrow plains along the streams that are subject to flooding. Terraces, also known as second bottoms and benches, are benchlike flats or plains that border the bottom lands and that lie above the overflow of the present streams. The uplands include all those extensive areas between the streams that are above the terraces and bottom lands.

Among the soils in the uplands, the Savannah soils are distinguished by being the only ones with a yellow subsoil and a hardpan just below the subsoil. They are further distinguished by having a gentler relief than any of the other soils in the uplands. The Cuthbert, Atwood, and Ruston soils resemble one another in that they are all chiefly red in the subsoil. The Cuthbert soils, however, are readily identified by the heavy texture, sticky, plastic consistence, and angular, nutlike structure of the subsoil. The Atwood and Ruston soils resemble each other in both color and consistence, but the Ruston soils differ from the Atwood in being sandier throughout and in having a stronger relief. The Guin soils are distinguished by their high content of gravel and strong relief.

On the terraces, the yellow soils are included in the Prentiss series, the red soils in the Cahaba series, and the mottled gray soils in the Myatt series. The Cahaba and Prentiss soils are well drained, whereas the Myatt soils are poorly drained. The Prentiss soils of the terraces are similar in profile characteristics to the Savannah soils of the uplands, and the Cahaba soils of the terraces are somewhat similar to the Atwood soils of the uplands.

In the bottom lands, the Ochlockonee soils are well drained, the Iuka soils are intermediately drained, and the Bibb soils are poorly drained. The Ochlockonee soils are brown to a depth of more than 30 inches, the Iuka soils are brown to a depth of about 12 inches, below which they are mottled gray, and the Bibb soils are mottled gray from the surface downward.

The main characteristics of the different series are given in table 4.

TABLE 4.—*Main characteristics of soil series in Tishomingo County, Miss.*

SOILS OF THE UPLANDS

Soil series	Parent material	Dominant relief	Drainage		Surface soil (A horizon)				Subsoil (B horizon)				Remarks
			External	Internal	Color	Texture	Consistence	Approximate thickness	Color	Texture	Consistence	Approximate thickness	
								In.				*In.*	
Savannah	Mixture of loess and Coastal Plain material.	Undulating	Good	Retarded	Light yellowish gray.	Silt loam	Mellow	8	Brownish yellow.	Silty clay loam.	Friable	15	Conspicuous hardpan underlies the subsoil. Adapted to the common farm crops. Medium to high productivity. High response to fertilization.
Atwood	Coastal Plain material, chiefly sandy clay.	Rolling	do	Good	Brownish gray.	Very fine sandy loam.	Loose	9	Brownish red.	Silty clay loam to very fine sandy clay.	do	30	Well adapted to common farm crops. Medium to high productivity. Medium to high response to fertilization. Moderately susceptible to erosion.
Ruston	Coastal Plain material, chiefly sand and sandy clay.	Rolling and hilly.	do	do	Yellowish gray.	Fine sandy loam.	do	14	Reddish brown	Sandy clay loam.	do	16	Adapted to farm crops on milder slopes. Medium productivity. Medium to high response to fertilization. Moderately susceptible to erosion.
Cuthbert	Coastal Plain material, sand and sandy clay with thin layers of clay (or soft shale).	Hilly and rolling.	do	Fair	do	Very fine to fine sandy loam.	do	8	Yellowish red.	Clay to very fine sandy clay.	Tough, sticky, and plastic.	18	Suited to farm crops on the milder slopes only and even there the relative adaptability is low. Medium to low productivity. Medium to low response to fertilization. Highly susceptible to erosion.
Guin	Coastal Plain material, gravel, sand, and clay.	Hilly and steep.	Excessive.	Good	Gravelly soils. Variable, ranging from nearly pure beds of gravel to material of which the gravel is only about 15 percent of mass. Where the gravel content is relatively low, the soils have a light-gray surface soil and a brownish-yellow or brownish-red subsoil.								Unsuited to farm crops.

SOILS OF THE TERRACES													
Cahaba	General stream alluvium derived from Coastal Plain material.	Gently sloping.	Good	Good	Brownish gray.	Very fine sandy loam or silt loam.	Mellow	6	Brownish red.	Silty clay loam.	Friable	20	Resembles the Atwood soils of the uplands. Well adapted to the common farm crops. Relatively high productivity. Medium to high response to fertilization. Moderate susceptibility to erosion.
Prentiss	do	Nearly level or gently sloping.	do	Retarded	Yellowish gray.	Silt loam or very fine sandy loam.	do	7	Brownish yellow.	Silty clay loam.	do	15	Resembles the Savannah soils of the uplands. Conspicuous hardpan underlies the subsoil. Adapted to the common farm crops. Medium to high productivity. High response to fertilization. Moderate to low susceptibility to erosion.
Myatt	do	Nearly level.	Poor	Poor	Poorly drained soils that show but little layer differentiation. The surface 1 or 2 inches is a light-brown or gray silt loam. This is underlain by a heavy silt loam or silty clay loam that is highly mottled with gray, blue, yellow, and brown.								Unsuited for crops in natural condition. Suitable for pasture.
SOILS OF THE BOTTOM LANDS													
Ochlockonee	General stream alluvium derived from Coastal Plain material.	Nearly level.	Slow	Good	Young soils. Well drained but subject to periodic flooding. Mellow, light brown or yellowish brown to a depth of about 30 inches. Texture ranges from silt loam to fine sandy loam.								Particularly well adapted to corn. Also well adapted to other farm crops.
Iuka	do	do	do	Intermediate.	Young soils. Intermediately drained. Subject to periodic flooding. Mellow, brownish yellow or yellowish brown to depth of about 12 inches below which they are highly mottled. Texture ranges from silt loam to fine sandy loam.								Adaptability limited by unfavorable drainage condition. Corn is grown but is occasionally injured by wet conditions. Well adapted to hay and pasture.
Bibb	do	do	Poor	Poor	Young soils. Poorly drained and subject to frequent flooding. Generally gray mottled with brown, yellow, and blue from surface, downward to more than 30 inches.								Unsuited for crops in natural condition. Suitable for pasture.
Alluvial sands	do	do	do	do	Recent alluvial deposits of sandy material								Unsuited to crops and pasture and but poorly suited to forestry.

[1] Where no appreciable accelerated erosion has taken place.

In the following pages the soils are described in detail, their agricultural relations are discussed, and their acreage and proportionate extent are given in table 5.

TABLE 5.—*Acreage and proportionate extent of the soils mapped in Tishomingo County, Miss.*

Soil type	Acres	Percent	Soil type	Acres	Percent
Alluvial sands	3,392	1.2	Iuka fine sandy loam	17,728	6.4
Atwood gravelly very fine sandy loam	1,920	.7	Iuka silt loam	8,000	2.9
Atwood very fine sandy loam	3,712	1.3	Myatt silt loam	2,944	1.1
Atwood very fine sandy loam, eroded phase	10,240	3.7	Ochlockonee fine sandy loam	4,800	1.7
Atwood very fine sandy loam, eroded undulating phase	1,984	.7	Ochlockonee silt loam	4,416	1.6
Atwood very fine sandy loam, undulating phase	1,280	.5	Prentiss silt loam	4,480	1.6
Bibb fine sandy loam	7,872	2.8	Prentiss silt loam, level phase	3,072	1.1
Bibb silt loam	12,032	4.3	Ruston fine sandy loam	1,856	.7
Cahaba very fine sandy loam	640	.2	Ruston fine sandy loam, eroded phase	2,112	.8
Cuthbert gravelly very fine sandy loam	1,024	.4	Ruston fine sandy loam, hilly phase	7,424	2.7
Cuthbert very fine sandy loam	18,240	6.5	Ruston fine sandy loam, steep phase	768	.3
Cuthbert very fine sandy loam, eroded phase	11,264	4.0	Rough gullied land (Cuthbert soil material)	768	.3
Cuthbert very fine sandy loam, hilly phase	54,208	19.4	Savannah gravelly silt loam	320	.1
Cuthbert very fine sandy loam, steep phase	4,992	1.8	Savannah gravelly silt loam, rolling phase	3,200	1.1
Cuthbert-Ruston fine sandy loams	9,984	3.6	Savannah silt loam	8,704	3.1
Cuthbert-Ruston fine sandy loams, steep phases	7,552	2.7	Savannah silt loam, eroded phase	3,136	1.1
Gravel pits	128	(1)	Savannah silt loam, eroded rolling phase	7,232	2.6
Guin gravelly loam	17,856	6.4	Savannah silt loam, level phase	2,368	.8
Guin gravelly loam, steep phase	19,328	6.9	Savannah silt loam, rolling phase	8,064	2.9
			Total	279,040	100.0

[1] Less than 0.1 percent.

SOILS OF THE UPLANDS

The soils of the uplands have a number of characteristics in common. They are fairly well to very well drained. They have all been rather thoroughly leached and as a result are strongly to very strongly acid in reaction and low in content of soluble salts. They are also relatively low in organic matter. All have developed from unconsolidated material that consisted of varying proportions of gravel, sand, silt, and clay. The surface layer of all the soils is yellowish gray or brownish gray, and the subsoil is chiefly either red or yellow. All except the Guin soils have well-developed profiles. The native vegetation is a mixture of deciduous and coniferous trees.

The soils of the uplands differ considerably in texture, consistence, relief, content of gravel, and degree of accelerated erosion. The soils in about 1 percent of the uplands have a nearly level relief; those in about 7 percent, an undulating relief; those in about 32 percent, a rolling relief; those in about 45 percent, a hilly relief; and those in about 15 percent, a steep relief. Some accelerated erosion has taken place on most of the soils in the uplands that have been cleared. In about 15 percent of the uplands, approximately two-thirds or more of the original surface soil has been lost by accelerated erosion.

On the basis of their characteristics, the soils in the uplands are classified into five series, namely, the Savannah, Atwood, Ruston, Cuthbert, and Guin. Of these, the Cuthbert soils are by far the most extensive. Their total area is more than the combined area of all the

other soils in the uplands. The Ruston soils have the smallest area. The total area of all the soils of the uplands is about 75 percent of the county.

The soils of the uplands differ greatly in their relative suitability for agricultural uses. Generally speaking, the Savannah and Atwood soils are relatively well suited to the production of crops, the Ruston soils are somewhat less well suited, the Cuthbert soils are prevailingly very poorly suited, and the Guin soils are almost wholly unsuited.

The Savannah soils are easily distinguished by their brownish-yellow subsoil, the hardpan just below the subsoil, and their prevailingly gentle relief. This hardpan consists of hard material that appears to be rather firmly cemented. The Atwood soils differ from the Savannah soils in having a reddish-brown or brownish-red subsoil rather than a brownish-yellow subsoil and in being devoid of a hardpan below the subsoil. The Atwood soils further differ from the Savannah soils in having a lighter textured surface layer and somewhat stronger relief. The Ruston soils are very similar to the Atwood soils in color and consistence, but they differ from the Atwood soils in being lighter textured, in having a deeper surface layer, and in having a stronger relief. The Cuthbert soils resemble the Atwood and Ruston soils in color and, like the Ruston soils, have strong relief. The Cuthbert soils, however, differ from all the other soils in the county in having a plastic, sticky consistence and a well-defined blocky structure in the subsoil: whereas all the other soils have a friable consistence and no well-defined structure in the subsoil. The Guin soils are readily distinguished by their high content of gravel, their strong relief, and their poorly developed profiles.

SAVANNAH SERIES

Soils of the Savannah series can be readily distinguished from the soils of all other series in the uplands by (1) the brownish-yellow color of the subsoil and (2) the thick cemented layer (hardpan) just below the subsoil. In addition, the Savannah soils are the only ones in the uplands that occupy large nearly level and undulating areas. The surface layer is light yellowish gray. The Savannah soils are strongly acid in reaction, low in organic matter, and low in content of plant nutrients. They are devoid of stones but in a few areas contain some gravel. They have developed from unconsolidated material that was high in silt and very fine sand, presumably a mixture of loess and Coastal Plain material. The native vegetation was a mixture of coniferous and deciduous trees.

The Savannah soils cover a total area of approximately 33,000 acres, or about 11.7 percent of the county. Although they occur in all parts of the county, the largest areas are in the southeastern part in the vicinity of Belmont and Golden. About 7 percent of the total area occupied by the Savannah soils is nearly level, 37 percent is undulating, and 56 percent is rolling. In approximately 26 percent of the total area two-thirds or more of the original surface layer has been lost by accelerated erosion.

All the Savannah soils are suitable for the production of farm crops and agriculturally are among the most important ones in the county. They differ in their relative suitability for crop use, however, according to differences in relief and in degree of accelerated erosion. Fer-

tilization, to which they are highly responsive, is required for the production of practically all crops.

The soils of the Savannah series are classified and mapped into two types and five phases; namely, Savannah silt loam; Savannah silt loam, eroded phase; Savannah silt loam, level phase; Savannah silt loam, rolling phase; Savannah silt loam, eroded rolling phase; Savannah gravelly silt loam; and Savannah gravelly silt loam, rolling phase.

Savannah silt loam.—Agriculturally, Savannah silt loam is one of the most important soils in the county. It occupies undulating areas in the uplands, where it has developed from unconsolidated material high in silt and very fine sand. The native vegetation is forest, consisting of a mixture of coniferous and deciduous trees. The soil is strongly to very strongly acid in reaction, low in organic matter, and low in plant nutrients. The external drainage is good. Although the internal drainage is retarded by the hardpan, the soil is drained adequately for the production of crops such as cotton and corn. This soil has an undulating relief and occupies comparatively long slopes ranging in gradient from approximately 2½ to 7 percent.

In uneroded fields Savannah silt loam has a light yellowish-gray soft and smooth silt loam surface soil about 8 inches thick. Underlying this is the subsoil, which ranges in thickness from about 12 to 16 inches and consists of friable light brownish-yellow silty clay loam. The subsoil contains a few tiny black hard concretions and in the lower part some large brown and yellow concretions ranging from one-fourth to one-half inch in diameter. These large concretions can be crushed with the fingers. The subsoil rests on the hardpan layer, which consists of hard cementlike material that ranges in texture from very fine sandy clay to clay loam and is highly mottled with gray, yellow, red, and brown. This layer contains numerous concretions that are black or dark brown on the outside and rusty brown or yellow on the inside. The material in this layer is difficult to dig out, but the displaced lumps are brittle and break rather easily. The hardpan ranges in thickness from 20 to 40 inches. The upper 6 to 12 inches, however, are generally the most firmly cemented, and as the depth increases the cementation appears to decrease gradually. Although this hardpan apparently is not wholly impervious to water, it greatly retards the movement of water. It is also highly significant that roots rarely penetrate this layer.

Among the soils in the county that are well adapted to the production of crops, Savannah silt loam is one of the most extensive and most important. It covers a total of 8,704 acres, or about 3.1 percent of the county. The largest area is in the southeastern part of the county in the vicinity of Belmont and Golden, where this soil and the different phases of Savannah silt loam cover almost 8 square miles. Scattered areas ranging in size from 2 to 150 acres are associated with areas of the other soils of the uplands in most parts of the county wherever the slope is very gentle.

Good tilth, gentle relief, and occurrence in areas large enough to lay out fields of convenient size enhance the value of this soil for agriculture. On the other hand, the more or less impermeable hardpan decreases its value because it retards internal drainage and prevents deep penetration by roots. Deep-rooted plants, therefore, such

as alfalfa and sweetclover, are unlikely to grow successfully. Another undesirable feature is the low content of plant nutrients, but this can be overcome to a large extent by proper fertilization. Available evidence indicates that the relative increase in yields from fertilization is greater on Savannah soils than on any other soils in the county.

Approximately 90 percent of Savannah silt loam is cleared and used for the production of crops. This soil is well adapted to cotton growing, and it is estimated that at least 80 percent of the cleared area is thus utilized. When the land is fertilized with 200 to 300 pounds of a 4–8–4 fertilizer to the acre, which is the common practice, cotton normally yields between 200 and 350 pounds of lint to the acre. Corn, grown on about 15 percent of the cleared land, yields between 15 and 20 bushels an acre. Other miscellaneous crops, such as peas, beans, lespedeza, sweetpotatoes, potatoes, and garden vegetables, grow successfully.

The management of much of this soil consists merely of preparing the seedbed, fertilizing and planting the cotton in the spring, and cultivating the cotton throughout the summer. This crop is grown several years in succession, then corn for a year, and then cotton again. Lespedeza, soybeans, or cowpeas are grown occasionally in place of the corn. Cotton land is usually fertilized, as described above, with a 4–8–4 fertilizer applied at the rate of 200 or 300 pounds to the acre, but a few farmers also apply nitrate of soda and superphosphate. Corn is usually side-dressed with nitrate of soda at the rate of about 100 pounds an acre. On a small proportion of this soil vetch is grown as a winter cover crop and turned under as a green manure in the spring. Triple superphosphate, applied at the rate of about 100 pounds to the acre, is generally used for this crop. Vetch is followed by either cotton or corn.

That the productivity of this soil can be considerably increased has been demonstrated in the last few years. Where winter legumes have been grown and turned under as green manure, acre yields of cotton in several instances have been increased to 1 bale with only the usual fertilizer application. Yields of corn also have been materially increased by this practice of growing winter legumes. Vetch as a winter cover crop succeeds well when the soil is fertilized with at least 100 pounds of triple superphosphate. If lime were also added a still higher yield of vetch and of the succeeding crop would be expected.

The growing of winter cover crops, however, is not the only way in which to increase the productivity of this soil. A good rotation of crops including proper fertilization is one of the most effective ways to increase the productivity and maintain it at a reasonably high level. The crops in the rotation need to be carefully selected and grown in the proper sequence. The rotation should include both a legume to add nitrogen to the soil and a grass to add durable organic matter. Preferably, the legumes and grasses should be grown as a mixture. Because of the impervious hardpan, deep-rooted legumes, such as alfalfa, probably would not do well; but the less deep rooted ones, such as lespedeza and crimson clover, will do well. Ryegrass, orchard grass, and redtop should grow successfully. The sequence of crops should be such as to keep a vegetative cover on the soil most of the time and to make the most efficient utilization of the nitrogen

and organic matter added to the soil by the legumes and grasses. The growth of adapted crops on this soil depends largely on the kinds and amounts of fertilizers applied. Proper fertilization and liming, therefore, are extremely important. As this soil is strongly acid, lime is required for the production of nearly all the legumes except lespedeza. It also promotes efficient utilization of phosphates. As most legumes have a high phosphorus requirement, adequate application of phosphate is important. The application of potash may also be necessary.

Like most soils in the Coastal Plain, Savannah silt loam is susceptible to accelerated erosion unless runoff is adequately controlled, especially when the land is bare. Erosion is particularly harmful to this soil because the impervious hardpan just below the subsoil limits the penetration of plant roots. One of the best ways to control erosion is to keep a good vegetative cover on the land nearly all the time. As this is not always feasible, it may be necessary to resort to mechanical measures, such as terracing, for control of runoff. In regard to terracing, however, it is important to remember that this soil has a hardpan at a depth of about 2 feet; and, because of that, terracing may have some highly unfavorable effects.

Savannah silt loam, eroded phase.—This soil represents Savannah silt loam on which, because of ill-adapted use and management, accelerated erosion has removed about two-thirds or more of the original surface soil. The present surface soil has had the upper part of the subsoil mixed with it so that now the upper 3- to 5-inch layer is a light brownish-yellow or pale-yellow heavy silt loam or silty clay loam. In all other respects the soil profile of this eroded phase is similar to that of the normal Savannah silt loam. Included are a few severely eroded areas in which shallow gullies are numerous. The eroded phase of Savannah silt loam has a relief similar to that of the normal Savannah silt loam having about the same gradient—2½ to 7 percent. It is also associated with the normal soil.

This soil covers a small total area of 3,136 acres. All the land has been cleared for a number of years. It is estimated that cotton is produced on about 65 percent, corn on about 15 percent, and miscellaneous crops, such as peas, beans, peanuts, and hay, on about 10 percent of the land. An estimated 10 percent is lying idle.

Crop yields vary greatly. In years when the weather conditions are good, cotton yields from 150 to 200 pounds of lint to the acre. The land is usually fertilized with 200 or 300 pounds of 4–8–4. Corn yields from 5 to 20 bushels an acre. During dry periods, crops on this soil are injured much more than on the normal Savannah silt loam. In a few places, where all the original surface soil and part of the subsoil have been lost, the moisture-holding capacity is low; and here the crops are readily injured by dry weather.

The soil has been significantly injured by erosion largely because the hardpan has been brought closer to the surface. This hardpan, it will be recalled, is impervious or nearly impervious to both roots and water, and the penetration of roots and the percolation of water are limited to the friable soil above.

Although this soil has been injured by erosion, its productivity can be increased materially by good management, as it has a favor-

able relief and adequate drainage and responds well to fertilization. On the other hand, it is low in plant nutrients, low in organic matter, strongly acid in reaction, comparatively shallow over the hardpan, and highly susceptible to further erosion unless protected from excessive runoff. In a good management program, therefore, it is important that adequate fertilization and liming be practiced, that organic matter be added, and that erosion be controlled. A rotation of crops that includes legumes and grasses would be highly desirable. Preferably, the soil should be kept in sod or close-growing crops most of the time. Winter cover crops, particularly vetch, succeed fairly well on this soil and should be grown where it is necessary to use the land for summer crops. Although mechanical measures for the control of erosion may seem necessary, such measures may not be satisfactory, owing to the slight depth to the hardpan. If a good vegetative cover is kept most of the time, mechanical measures for erosion control should not be necessary.

Savannah silt loam, level phase.—This soil differs from the normal Savannah silt loam already described chiefly in occurring in level or nearly level areas, whereas the normal Savannah silt loam occurs in undulating areas. This phase is mapped where the slopes are so gentle that surface runoff is very slow. It is similar to the normal soil in all apparent profile characteristics, except that a few mottlings and more concretions occur in the subsoil, both of which indicate somewhat poorer internal drainage. Damage to crops from inadequate drainage is unusual, but cultivation must be delayed a day or two after heavy rains. Prevention of soil erosion presents no serious problem as it does on the normal Savannah silt loam.

Almost all of this soil lies in the large area of Savannah soils in the southeastern corner of the county. Practically all of the land is cleared and used for the production of crops. The proportionate acreage devoted to each crop grown, yields obtained, and management practiced are about the same as for the normal Savannah silt loam. Because the soil of this level phase is not appreciably susceptible to erosion, it is better adapted to the production of intertilled crops than the normal silt loam, and management consists chiefly in increasing the fertility by increasing the content of organic matter, nitrogen, lime, phosphate, and potash.

Savannah silt loam, rolling phase.—This soil differs from the normal Savannah silt loam chiefly in having a stronger relief, but in addition it is somewhat more variable in profile characteristics. It has a rolling relief and the slope ranges from about 7 to 15 percent. The surface soil is chiefly yellowish gray and from 6 to 10 inches thick. The color of the subsoil ranges from yellow to yellowish brown, the texture from silty clay loam to very fine sandy clay, and the thickness from 12 to 18 inches. The hardpan layer that lies just below the subsoil presumably is not so thick as in the normal Savannah silt loam.

Included in this separation is about 1,500 acres in which the surface soil is very fine sandy loam rather than silt loam. Most of this lighter textured variation lies northeast of Iuka. The use, productivity, and management requirements of this lighter textured soil do

not appear to be significantly different from those of the normal rolling phase of Savannah silt loam.

This soil occurs in nearly all parts of the county, although the greater part lies in the eastern one-third. The total area is 8,064 acres. Individual bodies range in size from about 2 to 50 acres. This soil is associated mainly with the Guin and other Savannah soils, but it is also associated with the other soils of the uplands.

About half of this rolling land is still in woods; the rest is cleared and used for the production of crops, chiefly cotton and corn. The fact that much of this soil occurs in small areas, more or less isolated by the hilly and steep areas of the Guin soils, which are not adapted to crops, accounts for much of it being still in woods. On the half that is cleared, cotton, corn, and other crops are grown in about the same proportion as on the normal Savannah silt loam. The management is also practically the same, but the yields are thought to be somewhat lower.

Owing to its stronger relief, the soil included in the phase is considerably more susceptible to accelerated erosion than the normal Savannah silt loam. Some erosion is already evident on about 25 percent of the cleared areas. Because of this unfavorable feature, the proper management of this soil is considerably more difficult than for the normal Savannah silt loam. The same principles of fertilization and rotations apply, however, but greater care needs to be exercised in regard to the selection of crops and the sequence in which they are grown. This soil should be kept in close-growing crops as much of the time as possible.

Savannah silt loam, eroded rolling phase.—This soil differs from the rolling phase of Savannah silt loam, just described, chiefly in having lost about two-thirds or more of the original surface soil by accelerated erosion. The rest of the surface soil has been mixed with the upper part of the subsoil by tillage operations; and the resulting surface layer, 3 to 5 inches thick, is pale-yellow or grayish-yellow heavy silt loam or silty clay loam. In other profile characteristics, including variations in these characteristics, this phase is similar to the rolling phase. Some areas are included in which all of the original surface soil and the upper part of the original subsoil have washed away and in which, in addition, a few shallow gullies have formed. This eroded soil is similar to the eroded phase of Savannah silt loam but differs chiefly in having a stronger relief. The slope ranges from about 7 to 15 percent.

A variation included with this phase consists of some areas of the rolling phase of Savannah gravelly silt loam that have been similarly eroded. This variation occurs only in the eastern part of the county where it is associated with the gravelly soils of the Savannah and Guin series.

This soil is mapped on the uplands in all parts of the county. The individual bodies are generally small; most of them are less than 20 acres, but a few are over 40 acres. They aggregate 7,232 acres.

Practically all of this eroded rolling land has been cleared for at least 10 years and most of it for a considerably longer period. It is estimated that about 60 percent is devoted to cotton, 20 percent to corn, 5 percent to miscellaneous crops, such as soybeans, cowpeas,

and sorgo, and about 15 percent is lying idle or is used as unimproved pasture.

The yields of crops vary greatly according to the distribution and amount of rainfall, amount and kind of fertilizer applied, and type of management practiced. Generally, the yields are low. The crops are more severely injured by dry weather on this phase than on any other type or phase of the Savannah series. Where legumes have been grown and turned under, significant increases in yields of the succeeding crops have resulted. Vetch as a winter cover crop succeeds fairly well but is subject to winter-killing in hard winters, particularly on the severely eroded spots.

The conservation and improvement of this soil will necessitate first of all a rigid control of erosion so that further deterioration can be prevented. In order to do that, a good vegetative cover must be maintained most of the time. This means that the production of intertilled crops must be sharply curtailed and that of close-growing crops and sod crops greatly increased. It may require temporary or periodic shifting of the use from crops to pasture. Proper fertilization and liming are, of course, absolutely essential.

Savannah gravelly silt loam.—The chief difference between this soil and Savannah silt loam is that the gravelly silt loam has a significant content of gravel, whereas the normal silt loam is nearly free of gravel. Tillage is more difficult than on the nongravelly soil. In features such as color, structure, texture, depth, and relief, however, the two soils are similar.

In uneroded fields Savannah gravelly silt loam has a yellowish-gray loose light gravelly silt loam surface soil about 8 inches thick, a brownish-yellow friable gravelly silty clay loam subsoil about 15 inches thick, and just below the subsoil a hardpan layer consisting of hard or cemented material mottled with gray, yellow, red, and brown. The gravel in this soil consists of quartz, and the pieces range in diameter from about ½ to 1½ inches. Undulating in relief, the soil has a slope of 2 to 7 percent.

This soil, which covers an area of only 320 acres, occurs only along the eastern border of the county in small patches on narrow ridges in association chiefly with the nonagricultural Guin soils and with the rolling phase of Savannah gravelly silt loam.

It is estimated that about 40 percent of the land is cleared and used for crops. The use and management are about the same as for Savannah silt loam, but the yields obtained on the gravelly silt loam are thought to be lower. Occurrence in small more or less isolated patches surrounded by the nonagricultural Guin soils accounts for the high proportion of land still in woods.

The suitability for use, the management requirements, and the response to good management of this soil are similar to those of the silt loam.

Savannah gravelly silt loam, rolling phase.—The chief difference between this phase and Savannah gravelly silt loam, just described, is that this phase has a rolling relief, whereas the normal gravelly silt loam has an undulating relief. In other features, such as color, texture, structure, and depth, the two soils are similar, but the rolling phase is a little more variable in these features. This gravelly

rolling phase has a relief similar to that of the rolling phase and the eroded rolling phase of Savannah silt loam. It differs from the rolling phase of Savannah silt loam chiefly in containing a significant quantity of gravel.

Savannah gravelly silt loam, rolling phase, covers a small total area of 3,200 acres. It occurs only along the eastern boundary of the county, where it lies on narrow ridges. The size of individual bodies ranges from about 4 to 100 acres. The larger and more important ones lie between Bear and Cedar Creeks in the southeastern part of the county. Areas are almost everywhere bounded by the steep, nonagricultural Guin soils.

It is estimated that about 50 percent of this soil has been cleared, mostly in the last decade. The remaining forested areas are being gradually cleared, and in a few years the greater part of this soil will probably be cleared and used for the production of crops. It is further estimated that about 85 percent of the present cleared land is used for cotton and the rest chiefly for corn. The management practiced and the yields obtained are about the same as for Savannah silt loam, rolling phase.

The rolling phase of Savannah gravelly silt loam is considered slightly less suitable for the production of crops than the rolling phase of Savannah silt loam. This difference is due to the gravel, which interferes with cultivation and lowers the moisture-holding capacity. The gravel, however, partly compensates for its undesirable effects by causing the soil to be slightly less susceptible to accelerated erosion. The management requirements of the two soils are thought to be practically the same.

ATWOOD SERIES

The soils of the Atwood series are on the uplands, have an undulating to rolling relief, are well drained, and are all considered suitable for the production of crops. They have developed under a forest vegetation consisting of a mixture of deciduous and coniferous trees. In uneroded fields these soils have a brownish-gray loose very fine sandy loam surface soil and a brownish-red or yellowish-red friable silty clay loam or very fine sandy clay subsoil. The parent material is rather uniform sandy clay that is chiefly red but is mottled with gray and yellow.

The Atwood soils are geographically associated chiefly with members of the Savannah, Cuthbert, and Ruston series. They differ from the Savannah in having a brownish-red subsoil, no hardpan, and a predominantly gently rolling relief. They resemble the Cuthbert soils in color but differ from them in having a friable consistence and poorly defined structure in the subsoil and in having a comparatively gentle relief. They resemble rather closely the Ruston soils in color and consistence but are heavier textured throughout and have a shallower surface soil and a milder relief.

Altogether the Atwood soils occupy about 19,140 acres, or about 6.9 percent of the county area. They occur in nearly all parts of the county, but chiefly in a belt extending northward from Belmont to a point about 4 miles north of Iuka. The relief on about 80 percent of the total area of these soils is rolling (having a slope of about 7 to 15 percent), and that of the rest is undulating (having a slope of 2

to 7 percent). Most of the Atwood soils have been cleared and used for the production of crops; and on practically all of the areas that have been cleared some accelerated erosion has taken place. About 65 percent of the total area of these soils has lost approximately two-thirds or more of the original surface soil.

All the Atwood soils are considered suitable for the production of crops, but they differ somewhat in regard to their relative suitability for such use because of differences in relief and differences in degree of erosion. In comparison with the soils of the United States as a whole, the Atwood soils are relatively low in natural fertility; but in comparison with the other soils in Tishomingo County they are thought to be relatively high. They respond remarkably well to good management. Agriculturally, they are among the most important soils in the county.

The soils of the Atwood series in Tishomingo County are classified and mapped into two types and three phases, namely, Atwood very fine sandy loam; Atwood very fine sandy loam, eroded phase; Atwood very fine sandy loam, undulating phase; Atwood very fine sandy loam, eroded undulating phase; and Atwood gravelly very fine sandy loam.

Atwood very fine sandy loam.—This is a well-drained, well-developed, strongly to very strongly acid soil that occurs on rolling areas in the uplands. It has developed from very fine sandy clay material that presumably belongs to the Eutaw formation. The native vegetation consists of a mixture of deciduous and coniferous trees. This soil is fairly well adapted to the production of crops.

In uneroded fields, Atwood very fine sandy loam has a surface soil that consists of brownish-gray loose very fine sandy loam from 7 to 9 inches deep. Between the surface soil proper and the subsoil proper is a 2- or 3-inch layer that is intermediate in characteristics between the surface soil and the subsoil. This intermediate layer is chiefly a light yellowish-red friable heavy loam. The subsoil, which ranges in thickness from about 25 to 30 inches, consists of a friable silty clay loam to very fine sandy clay material. The upper part of the subsoil is generally brownish red and the lower part reddish brown. Below the subsoil the material is generally a rather brittle but friable fine sandy clay that is predominantly reddish brown but contains numerous splotches and mottlings of dark red and bright yellow.

In wooded areas this soil has a surface layer 1 or 2 inches thick that is stained dark by a relatively high content of organic matter. This organic matter disappears fairly rapidly when the wooded areas are cleared and put into cultivation.

This soil has a rolling relief, having a gradient of about 7 to 15 percent. The slopes are relatively long; most of them are between 500 and 1,000 feet in length.

Variations of this type in which the subsoil layer is friable clay rather than clay loam or very fine sandy clay are included. Another variation is one in which the material below the subsoil layer is slightly cemented and brittle. These variations occur in small areas only, generally along the soil boundaries between the Atwood and Cuthbert or the Atwood and Savannah soils. The total acreage of either variation is small, and no consistent and significant difference in agricultural value is apparent. Also included in this type are areas

that have lost as much as half of the original surface soil by sheet erosion.

About 3,700 acres is mapped throughout the uplands, but the largest areas are in the vicinity of Midway, Tishomingo, and Dennis. Although areas as small as 2 acres and as large as 40 acres are mapped, most of them are between 10 and 20 acres. Many areas lie on low ridges surrounded by slopes having a gradient of more than 15 percent and occupied by the Cuthbert soils. Fields of convenient size can be laid out on the greater part of this land.

It is estimated that about 50 percent of the land is still in woods, which may seem a large proportion for land adapted to crops. It is significant, however, that most areas that have been cleared have later been eroded and are now separated as the eroded phase of Atwood very fine sandy loam. The eroded soil is much more extensive than the typical soil. When the total estimated acreage of only 1,800 acres of uncleared Atwood very fine sandy loam is compared with the area of the eroded phase—about 10,240 acres—the relative extent of the uncleared acreage is small. Some of this uncleared land is in small areas that are more or less isolated by soils not adapted to crops, some is included in timber tracts, and some is in wood lots on the farms. In these wooded areas, pines, hickories, and the better oaks, such as white oak and red oak, predominate.

All crops common to the locality are grown on the cleared land. An estimated 60 percent is devoted to cotton. The rest is used for the production of corn and miscellaneous farm crops. Cotton yields 200 to 350 pounds of lint to the acre under common management, including fertilization with about 200 pounds of 4–8–4. Corn yields between 12 and 25 bushels to the acre and is commonly side-dressed with nitrate of soda at the rate of about 100 pounds an acre. Generally the land devoted to cotton is fertilized with about 200 pounds of 4–8–4 to the acre, and sometimes 100 pounds of nitrate of soda is applied also. Much of the cornland is side-dressed with nitrate of soda at the rate of about 100 pounds an acre, but much of it receives no fertilizer of any kind. Recently, winter cover crops, chiefly vetch and Austrian Winter peas, have been successfully grown on this soil. Usually about 100 pounds of triple superphosphate to the acre is applied to these crops. In the 1936–37 season the green weight produced was approximately twice as great on fields of this soil receiving 100 pounds of triple superphosphate as on those receiving no phosphate.[12] Generally, no lime was applied.

From the standpoint of agriculture, Atwood very fine sandy loam has a number of desirable characteristics. It has good tilth, a relatively high moisture-holding capacity, and good drainage. Roots penetrate easily. The soil is free from stone and gravel, and in comparison with the other soils in the county it is high in fertility. Without fertilization, yields of crops would be higher on the Atwood soils than on any of the other soils in the uplands. Furthermore, crops are generally thought to be injured less in periods of drought on the Atwood soils than on any of the other soils in the uplands.

On the other hand, Atwood very fine sandy loam has some undesirable features. Although it is thought to rank high in content of plant

[12] Information furnished by county agent and his assistants in cooperation with the soil survey party.

nutrients as compared with other soils in the county, it ranks low as compared with soils over the country as a whole. This soil, it will be recalled, has a rolling relief. The slopes are strong enough to impair the workability somewhat. More significant, however, is the high susceptibility to accelerated erosion on these slopes, although it is not injured nearly so much by erosion as some of the other soils, particularly the Cuthbert and Savannah soils. The friable consistence of the subsoil tends to minimize the bad physical effects that ordinarily arise from erosion. Nevertheless, the high erodibility is one of the undesirable properties of this soil.

In order to take advantage of the desirable qualities of this soil, the management should fortify the soil against the effects arising from the undesirable qualities. The judicious application of fertilizers, particularly lime and phosphate; the frequent incorporation of organic matter; the rotation of crops, the rotation including legumes and grasses; and terracing are all practices that will tend to maintain or increase the productivity of this soil. As on all other soils of the uplands and terraces, proper fertilization is of primary importance for all crops if they are to be grown successfully over a period of years. The present fertilization is generally inadequate. Much more lime and phosphate needs to be applied; and, in connection with that more legumes need to be grown for green manure. A good rotation of crops with proper and adequate fertilization is one of the best ways to increase the productivity and maintain it at a high level. Terracing is becoming a common practice, and it appears to be a practicable aid in the control of runoff and erosion on this soil. The necessity for terracing, however, depends on the other management practices and the kinds of crops grown.

Atwood very fine sandy loam, eroded phase.—This soil differs from the normal Atwood very fine sandy loam chiefly in that approximately three-fourths of the original surface soil has been lost by accelerated erosion. The remaining surface soil has been mixed with the upper part of the subsoil to form a surface layer, 4 to 6 inches thick, of reddish-gray or light brownish-red loam, although the texture ranges from very fine sandy loam to clay loam. The profile variations, manner of occurrence, relief, and drainage described for Atwood very fine sandy loam also hold true for this eroded phase. An additional variation included, however, consists of a few small areas in the eastern part of the county that contain some gravel.

This soil is far more extensive than typical Atwood very fine sandy loam. Although areas occur in nearly all parts of the county, the main ones are in the vicinity of Midway, Tishomingo, and Dennis.

Originally all this soil was similar to normal Atwood very fine sandy loam; but, after it was cleared and put into cultivation, considerable accelerated erosion was allowed to take place. The eroded condition of this soil is, therefore, one of the results of the lack of proper adjustment between the soil on the one hand and the use and management on the other.

The use and the productivity of this soil vary considerably. All the land has been cleared for a number of years, some of it for as long as 30 years. The severely eroded areas, which generally contain some gullies, are used for pasture or remain as idle land. It is estimated that only about 10 percent, however, falls into this class. The remain-

ing 90 percent is being used continuously for the production of crops. Approximately 70 percent is used for cotton, 15 percent for corn, and 5 percent for miscellaneous crops, such as hay, peas, beans, peanuts, or sorgo. The yields of cotton and corn vary considerably. Where the management is poor the yields are correspondingly low, but where the management is relatively good the yields are correspondingly high. Cotton land is commonly fertilized with about 200 pounds of 4–8–4 or 4–6–4 and yields between 125 and 225 pounds of lint cotton to the acre. Corn yields between 5 and 12 bushels to the acre without fertilization and between 10 and 18 bushels when the land is fertilized with nitrate of soda at the rate of about 100 pounds to the acre.

Most farmers apply between 200 and 300 pounds of 4–8–4 to the acre for cotton, and a few also apply between 50 and 100 pounds of nitrate of soda. Occasionally a farmer also applies some superphosphate to the cotton. Much of the cornland is side-dressed with nitrate of soda at the rate of about 100 pounds to the acre. Barnyard manure is occasionally applied to cornland, a practice that greatly increases the yields, sometimes to as high as 35 bushels to the acre.

A redeeming property of this eroded soil is the comparative ease and rapidity with which it can be restored to a relatively high level of productivity. This has been demonstrated within the last few years and has been accomplished by applying lime and phosphate, growing leguminous winter cover crops and plowing them under in the spring, and terracing. It seems apparent, therefore, that the bad effects of erosion, particularly the low yields, can be overcome by proper soil management.

Atwood very fine sandy loam, undulating phase.—The main and conspicuous difference between this phase and the normal Atwood very fine sandy loam is that this phase has an undulating relief, whereas the other has a rolling relief. The undulating phase further differs from the normal Atwood very fine sandy loam in being slightly heavier in texture throughout and in having a slightly thicker subsoil layer. The color, consistence, internal drainage, content of organic matter, natural fertility, and parent material of the two soils are similar. Owing largely to its milder relief, the undulating phase is more desirable for agriculture.

In uneroded fields the surface soil is about 9 inches thick and consists of loose brownish-gray very fine sandy loam. The subsoil is about 30 inches thick and consists of brownish-red friable silty clay loam. The land is undulating and has a slope of about 2 to 7 percent.

This soil covers a small total area—1,280 acres. It occurs chiefly in association with the normal Atwood very fine sandy loam and the eroded phase of Atwood very fine sandy loam in the vicinities of Midway, Tishomingo, and Dennis. A few areas in the southeastern part of the county are associated with areas of the Savannah soils. The size of most of the individual areas ranges between 2 and 15 acres.

About 90 percent of the land is cleared and used for the production of crops. Inherently this is one of the best soils in the county, and all the crops common to the locality grow well on it. Approximately 60 percent of the area is devoted to cotton, and the rest is devoted chiefly to corn, some cowpeas, and some soybeans. Cotton is commonly fertilized with 200 pounds of 4–8–4 and yields between 225 and 375 pounds of lint to the acre in an average year. Without fertilizer,

corn yields between 10 and 20 bushels to the acre. Treatment with a fertilizer high in nitrogen produces considerably higher yields. Some of the farmers side-dress the cornland with nitrate of soda at the rate of about 100 pounds to the acre. Cowpeas, soybeans, lespedeza, and peanuts grow well; and winter cover crops, such as vetch and Austrian Winter peas, succeed unusually well if lime and phosphate are applied. The growing of winter cover crops and plowing them under in the spring increases yields of both corn and cotton. Yields of 1 bale of cotton to the acre have been common when this practice has been followed.

This undulating phase is one of the best soils in the county. It manifests many good qualities, such as friable consistence, good texture, high degree of permeability, moderate water-holding capacity, good internal and external drainage, gentle relief, and a good response to management. Like most soils in the county, however, it has a low content of plant nutrients, even though it ranks among the highest in the county. In addition, it is moderately susceptible to accelerated erosion when the land is bare, but is less susceptible than the normal Atwood very fine sandy loam.

Differences in management requirements between this phase and the normal type arise from differences in relief of the two soils. Because of the milder relief of the undulating phase, runoff is less rapid and accelerated erosion is easier to control. This, in turn, allows a greater latitude in the selection of crops. The undulating phase will stand more intensive use for the production of intertilled crops. The fertilizer requirements of the two soils are similar for similar crops.

Atwood very fine sandy loam, eroded undulating phase.—The chief difference between this soil and the undulating phase of Atwood very fine sandy loam, just described, is that it has lost about two-thirds or more of the original surface soil. The remaining part has been mixed with the upper part of the subsoil; and the resulting surface layer, 4 to 6 inches thick, consists of heavy loam or light clay loam ranging in color from reddish gray to brownish red. The subsoil and the substratum are similar to those of the normal undulating phase. The eroded undulating phase differs from normal Atwood very fine sandy loam chiefly in being eroded and in having a milder relief, and it differs from the eroded phase of Atwood very fine sandy loam chiefly in having a milder relief. This eroded undulating phase has a gentle relief, the slope ranging from 2 to 7 percent.

This soil is mapped in nearly all parts of the county, chiefly in the vicinities of Midway, Tishomingo, and Dennis, where it is associated with the other Atwood soils. The total area is 1,984 acres.

All of the eroded undulating phase of Atwood very fine sandy loam has been cleared for many years, and almost all of it is still used for the production of crops. It is estimated that about 75 percent of it is used for the production of cotton and the remaining 25 percent for the production of corn and miscellaneous crops, such as cowpeas, soybeans, hay, and truck crops. Average yields are slightly lower than on the related normal undulating phase of Atwood very fine sandy loam. Under the usual management, yields of 200 to 375 pounds of lint cotton to the acre are reported. Corn yields between 10 and 20 bushels an acre when the land is fertilized with nitrate of soda.

From the standpoint of suitability for crop use, this soil, like the other Atwood soils, possesses many favorable qualities, as it has a friable subsoil, affords ready penetration to roots and water, has a favorable texture, and responds well to proper management. Owing largely to such favorable features, erosion has not proved to be nearly so detrimental on this soil as on most of the other soils in the county; therefore it remains one of the most desirable soils for the production of crops.

Productivity reduced by improper management can soon be restored by good management and maintained at a relatively high level. This has been recently demonstrated by applying lime and phosphate in conjunction with the growing of winter legumes and turning them under in the spring. Proper fertilization and liming are essential in any good management program. A systematic rotation of crops, including legumes, should be practiced. The growing of winter legumes and turning them under in the spring appears to be a successful practice. Further erosion needs to be prevented because the erosion of the subsoil is harmful. Proper terracing seems to aid significantly in controlling erosion, but the necessity for mechanical structures, such as terraces, depends on the other management practices and the crops grown.

Atwood gravelly very fine sandy loam.—This soil differs from Atwood very fine sandy loam chiefly in having a significant quantity of quartz gravel on the surface and throughout the soil mass. The surface soil is brownish-gray or yellowish-gray loose gravelly silt loam, from 7 to 9 inches thick. The subsoil consists of brownish-red friable gravelly silty clay loam or very fine sandy clay and is about 15 to 22 inches thick. Although the content of gravel is considered high enough to interfere materially with feasible cultivation, it does not preclude cultivation. The pieces of gravel range in diameter from about ½ to 1½ inches.

Included in this separation are areas in which half or slightly more than half of the original surface soil has been lost by accelerated erosion. Also included are a few small areas in which the texture of both the surface layer and the subsoil is somewhat lighter than in the typical soil.

Atwood gravelly very fine sandy loam is mapped in a small total area—1,920 acres. Bodies ranging from about 2 to 15 acres are scattered along the eastern border of the county. Many of them are more or less isolated by surrounding areas of the Guin soils, a feature that lowers the agricultural value of this soil because the Guin soils are unsuitable for the production of crops.

About 60 percent of the land is cleared. Of this cleared land about two-thirds is used for the production of cotton. The greater part of the remaining area is used chiefly for the production of corn and miscellaneous crops, but a large part lies idle or is used as unimproved pasture. The occurrence of this soil in small areas surrounded by the nonagricultural Guin soils accounts for the considerable proportion that is still in woods. This unfavorable association also accounts for part of the idle cleared area. Another reason for the idleness of some areas of cleared land is a somewhat eroded condition. On this gravelly soil, erosion of the soil material leaves an increased accumulation of gravel on the surface, which further impairs the workability and lowers the productivity.

The present management of this soil is about the same as that of Atwood very fine sandy loam, but the yields of the various crops are generally somewhat lower. In regard to management requirements the two soils are thought to be similar.

RUSTON SERIES

Soils of the Ruston series occur in the uplands, have a rolling to steep relief, are well drained, have a fairly well developed profile, are strongly to very strongly acid in reaction, and are relatively low in organic matter and plant nutrients. They have developed from sandy Coastal Plain material under a mixed coniferous and deciduous forest. They have a loose yellowish-gray fine sandy loam surface soil, about 14 inches thick, and a reddish-brown friable fine sandy clay or fine sandy clay loam subsoil, about 16 inches thick.

The Ruston soils are geographically associated chiefly with the Cuthbert and Atwood soils and secondly with the Savannah soils. They resemble the Cuthbert soils in color and relief but differ conspicuously in having a thicker surface soil, a lighter texture throughout, a friable consistence, and a poorly defined structure in the subsoil. They resemble the Atwood soils rather closely in color and consistence, but they differ from them in having a lighter texture, a deeper surface soil, and a stronger relief. They differ from the Savannah soils in being much lighter textured and in having a deeper surface soil, a reddish-brown subsoil, no hardpan, and much stronger relief.

The Ruston soils occupy 12,160 acres, or about 4.5 percent of the county. They occur in nearly all parts of the county, but the main areas lie 1 to 5 miles southeast of Iuka and along the western border of the county. About 33 percent of the area of the Ruston soils has a rolling relief, 61 percent a hilly relief, and 6 percent a steep relief. Somewhat over three-fourths of the total area of Ruston soils is still in forest. About 18 percent of the total area is eroded, which is about two-thirds of the estimated cleared area.

The suitability of the Ruston soils for the production of crops varies considerably, depending chiefly on the slope and secondly on the degree of erosion. Under present conditions the Ruston soils with a rolling relief are considered suitable for the production of crops, but those with a hilly and steep relief are considered unsuitable, or at any rate poorly suitable. All the crops common to the locality are grown on the Ruston soils. Where the relief is favorable, these soils are thought to be relatively well adapted to the production of root crops.

The soils of the Ruston series in this county are classified and mapped into one type and three phases, namely; Ruston fine sandy loam; Ruston fine sandy loam, eroded phase; Ruston fine sandy loam, hilly phase; and Ruston fine sandy loam, steep phase.

Ruston fine sandy loam.—Ruston fine sandy loam is physically suitable for the production of crops. It is light textured, permeable, and strongly to very strongly acid in reaction. The relief is rolling, and drainage is good both internally and externally. This soil has a moderate to low water-holding capacity and is relatively low in content of both organic matter and plant nutrients. It is free from stone and generally free from gravel. This soil has developed from sandy Coastal Plain material under a mixed deciduous and coniferous vegetation. The profile is fairly well developed.

The surface soil is yellowish-gray loose fine sandy loam from 12 to 15 inches deep. Between the surface soil and the subsoil proper is a 2- or 3-inch transitional layer consisting of pale reddish-yellow heavy fine sandy loam. The subsoil ranges in thickness from about 14 to 18 inches and consists of friable light very fine sandy clay. The upper third of the subsoil layer is uniformly reddish brown (rust-colored), whereas the lower two-thirds is brownish red, here and there faintly mottled with yellow. In addition, the lower part of the subsoil differs from the upper part in being slightly brittle in consistence. The entire subsoil layer, however, is friable. The substratum, continuing to a depth of 60 inches or more, consists of red fine sandy loam or light fine sandy clay that is highly mottled with yellow, brown, and gray. This material is somewhat brittle but is still quite friable.

In wooded areas the top inch or two of the surface soil is stained dark with organic matter. In a few places the subsoil is chiefly yellowish red instead of reddish brown. Some of the areas contain a few pieces of gravel.

Ruston fine sandy loam has a rolling relief. The maximum range in slope is from 5 to 15 percent, but in the greater part of the area the slope ranges between 10 and 15 percent.

The color of this soil is similar to that of Atwood very fine sandy loam, but the texture throughout is lighter, the surface soil is thicker, the subsoil is thinner, and the relief is more strongly rolling. Where the subsoil and the substratum are exposed in road cuts, the exposed surface of these layers in both Ruston and Atwood soils remains smooth.

Ruston fine sandy loam covers a total area of only 1,856 acres. Although it occurs in nearly all parts of the county, the largest areas are south of Iuka. It is associated chiefly with the other Ruston soils and secondly with the Cuthbert and Atwood soils.

About 50 percent of the land is cleared and used for the production of crops. The fact that some of this soil is geographically associated with soils that are poorly suited for crops accounts for a part of it being still in woods. Furthermore, some of the areas occur in rather large timber tracts. About 80 percent of the cleared land is used for cotton, 15 percent for corn, and 5 percent for miscellaneous crops, such as peas, beans, rutabagas, sweetpotatoes, potatoes, and peanuts.

The present management of this soil is about the same as for the other soils in the county; and the yields, in comparison with the yields on the other soils in the county, are about medium. Cotton land usually receives from 200 to 300 pounds of 4–8–4 fertilizer to the acre, and with this treatment it produces between 175 and 300 pounds of lint cotton to the acre. Corn yields between 5 and 15 bushels an acre without fertilizer, and between 10 and 25 bushels if side-dressed with nitrate of soda at the rate of about 100 pounds to the acre. Root crops, such as sweetpotatoes, potatoes, turnips, and peanuts, do comparatively well.

Considered as to physical suitability for the production of crops, Ruston fine sandy loam has a number of favorable qualities, such as good tilth, friability, permeability to air, water, and roots, freedom from stone, excellent internal drainage, and high responsiveness

to good management. On the other hand, it has some unfavorable qualities, such as a strongly or very strongly acid reaction, low content of organic matter, low content of plant nutrients, moderate to low water-holding capacity, light texture, and a comparatively strong relief. Owing to the light texture and strong relief, this soil is highly susceptible to accelerated erosion, particularly gullying. Gullies will form more readily in the Ruston soil than in other soils in the county. Injury from erosion, however, can be remedied more readily on the Ruston than on the other soils except the Atwood.

The management requirements of this soil are thought to be similar to those of Atwood very fine sandy loam, except that more attention needs to be given to the control of runoff. Properly constructed terraces, like those built on Atwood very fine sandy loam, appear to be successful on Ruston fine sandy loam, but they are somewhat more difficult to maintain. The present fertilization is generally inadequate. More lime and phosphate should be applied, and, in addition, legumes should be grown and turned under in order to add nitrogen to the soil. If this soil is to be conserved, close-growing crops must be substituted for a large proportion of the intertilled crops. The adoption of a suitable rotation with proper and adequate fertilization is one of the best ways to conserve this soil and to increase its productivity.

Ruston fine sandy loam, eroded phase.—This soil differs from normal Ruston fine sandy loam chiefly in having lost the greater part of the original surface soil and in a few places a part of the original subsoil. The subsoil and the substratum of the two soils are similar. Like the normal Ruston fine sandy loam, this eroded soil has a rolling relief, the gradient in most places ranging from 10 to 15 percent.

Unlike the eroded phases of the Atwood and Savannah series, which are comparatively uniformly eroded, this soil is unevenly eroded. It is not uncommon to find bodies that retain over half of the original surface soil adjacent to completely denuded spots. A few gullies, ranging from 2 to 4 feet in depth, occur in most of the areas. The Ruston soils, owing largely to their light texture and rather loose consistence in the subsoil and substratum, are more susceptible to deep gullying than the other soils in the county.

About 2,000 acres is mapped. Although areas occur throughout most of the county, the largest ones are south of Iuka. This soil is associated chiefly with the other Ruston soils and secondly with the Atwood and Cuthbert soils.

All the land has been cleared for a number of years. About 75 percent of it is used for cotton, 10 percent for corn, and 5 percent for miscellaneous crops, such as peas, beans, sweetpotatoes, potatoes, and peanuts, and about 10 percent is lying idle.

In general, the present management is about the same as for the normal Ruston fine sandy loam, but the yields are usually somewhat lower. The growth of plants is uneven; on the patches where all the original surface soil has been lost the growth is less vigorous than in areas where a part of the original surface soil remains. Cotton is commonly fertilized with about 200 or 300 pounds of 4–8–4 to the acre and generally yields between 125 and 225 pounds of lint to the acre; but the yields vary greatly according to weather conditions

during the growing season. Without fertilizer, corn generally yields between 5 and 15 bushels an acre. The yields of the other crops are somewhat lower than on normal Ruston fine sandy loam.

Potentially this is a fairly productive soil, even though the present yields are rather low. Owing largely to the favorable physical properties of the subsoil and the absence of any critically unfavorable properties, proper management can probably restore and maintain the productivity at a moderate level. The management suggested for normal Ruston fine sandy loam should also be applicable to this eroded phase, but in addition special measures will probably be required for the rehabilitation of the badly eroded areas.

Ruston fine sandy loam, hilly phase.—This phase differs from normal Ruston fine sandy loam mainly in having a hilly rather than a rolling relief. The slope ranges from about 15 to 30 percent. In profile characteristics, such as color, consistence, texture, reaction, and natural fertility, the two soils are similar, except that the hilly phase is somewhat more variable and the surface soil and the subsoil are probably slightly thinner.

Included with this hilly phase are about 600 acres of a variation having a soil profile similar to that of Atwood very fine sandy loam but a hilly relief like this soil. Practically all of this variation lies just north of Dennis. Also included in this hilly phase of Ruston fine sandy loam are a few areas of the hilly phase of Cuthbert very fine sandy loam that are so small that it is considered impracticable to map them separately.

Although areas of this soil occur in nearly all parts of the county, most of them lie in the southwestern one-fourth, where the soil is chiefly associated with the Cuthbert soils. The total area is 7,424 acres.

Nearly all of this soil is devoted to forestry. The stand consists chiefly of white oak, red oak, shortleaf pine, and hickory, together with a few blackjack oak and post oak. A few areas have been cleared and used for crops, but most of these are now abandoned and are reverting to woods.

Because of strong relief, workability is rather difficult on this soil; but more important is the extreme difficulty of controlling accelerated erosion on these strong slopes if crops are grown. Owing chiefly to these conditions, the production of crops on this soil is considered not feasible. The best use of the soil, therefore, is thought to be forestry, a use to which it is naturally well adapted.

Ruston fine sandy loam, steep phase.—This soil differs from the hilly phase of Ruston fine sandy loam chiefly in having a prevailingly stronger relief. The gradient generally exceeds 30 percent. Most slopes range between 30 and 50 percent in gradient, although some are as steep as 60 percent. In addition to the difference in relief, the steep phase is a little more variable in profile features, such as color, texture, consistence, and thickness of layers. It is, however, prevailingly light in texture, friable in consistence, and easily penetrated by roots.

Included with this steep phase are a few small scattered areas of the steep phase of Cuthbert very fine sandy loam. It was considered impracticable to delineate these small included areas.

Only a small area—768 acres—of this soil is mapped. It lies chiefly in the southwestern quarter of the county, where it occurs in compara-

tively large areas in geographic association mainly with the Cuthbert soils.

The strong relief precludes the feasible use of this soil for the production of crops. At present practically all of it is used for forestry, which is thought to be its best use. In general, the kinds of trees on this soil are similar to those on the hilly phase of Ruston fine sandy loam.

CUTHBERT SERIES

A conspicuous characteristic of the soils of the Cuthbert series is the tough and plastic consistence and angular nutlike structure of the subsoil. They are the only soils in the county with such consistence and structure. They occur in the uplands, have a rolling to steep relief, are strongly to very strongly acid in reaction, and are relatively low in organic matter and plant nutrients. External drainage is generally rapid, but internal drainage is rather slow. Penetrability by air, water, and roots is impaired by the heavy subsoil. The parent material consists of sandy Coastal Plain material with a small admixture of thin, platy layers of clay; and the native vegetation is a mixture of coniferous and deciduous trees. These soils have a well-developed profile. The surface soil is yellowish-gray loose very fine sandy loam, and the subsoil is yellowish-red tough sticky plastic clay or very fine sandy clay with a blocky structure.

The Cuthbert soils are by far the most extensive soils in the county. Although they occur in all parts of the county, they are predominant in the quarter south of Iuka and Burnsville and west of Tishomingo and Belmont. They cover a total area of 108,032 acres, or about 38.7 percent of the area of the county. Of the total area occupied by these soils, about 28 percent is rolling, 60 percent is hilly, and 12 percent is steep. It is estimated that about 16,000 acres of the Cuthbert soils has been cleared; and of this about 11,000 acres is rolling and about 5,000 acres is hilly. It is further estimated that between 85 and 90 percent of this total cleared area has been eroded to the extent that it has lost two-thirds or more of the original surface soil. A large proportion of this eroded land is abandoned and reverting to woods.

Under present conditions, only the Cuthbert soils with a rolling relief that still retain the greater part of their original surface soil are considered suitable for the production of crops, and even these are relatively poorly adapted for such use. Their poor suitability is largely due to the extremely high susceptibility to accelerated erosion, the severe injury that results from erosion, and the strong relief.

The Cuthbert soils are rather easily recognized where the subsoil is exposed on old ditchbanks or railroad cuts. The wetting and drying of the exposed subsoil material causes it to come loose and fall off. As a result of this process, the surface of the subsoil gradually works inward, thereby leaving an overhanging mat of the part of the surface soil that is held in place by the plant roots. Numerous cracks develop on the surface of the exposed subsoil when it dries; and as a result of this property the farmers often refer to the Cuthbert subsoil as "jointed" clay.

The soils of the Cuthbert series are classified and mapped into two types, three phases, and one miscellaneous land type, namely: Cuthbert very fine sandy loam; Cuthbert very fine sandy loam, eroded

phase; rough gullied land (Cuthbert soil material); Cuthbert very fine sandy loam, hilly phase; Cuthbert very fine sandy loam, steep phase; and Cuthbert gravelly very fine sandy loam. The Cuthbert soils are also mapped as members of two complexes, namely: Cuthbert-Ruston fine sandy loams, and Cuthbert-Ruston fine sandy loams, steep phases.

Cuthbert very fine sandy loam.—This soil occurs on rolling areas in the uplands. Although it is considered suitable for the production of crops, it is not naturally well adapted to that use. It has developed from Coastal Plain material under a mixed deciduous and coniferous vegetation. It has a well-developed profile, is strongly to very strongly acid in reaction, is relatively low in organic matter, and is medium to low in content of plant nutrients. External drainage is good, but internal drainage is somewhat retarded. Penetrability of the subsoil by air, water, and roots is impaired by the heavy subsoil.

In uneroded fields the surface soil is yellowish-gray loose very fine sandy loam to a depth of 7 to 9 inches. In woods the upper inch or two is stained dark with organic matter and the material below has a more yellowish cast than it has in cultivated fields. The surface soil is generally underlain by a layer, 2 or 3 inches thick, that is transitional between the surface soil and the subsoil proper.

The subsoil consists of clay or very fine sandy clay having a fairly well-defined blocky structure. The structural aggregates range from about ¼ to 1 inch in diameter, but the most of them range from one-half to three-fourths of an inch. The larger aggregates are generally in the lower part of the layer and the smaller aggregates in the upper. When wet the material is tough, sticky, and plastic, and when dry it is hard. The upper part of the subsoil is generally more sticky and plastic than the lower part. The color of the uncrushed material is chiefly yellowish red; that of the crushed material is reddish yellow. A few yellow and gray splotches appear in the lower part of the subsoil. A little micaceous material is discernible in this layer. The subsoil is from 16 to 20 inches thick.

The substratum below the subsoil is variable. It represents a gradation in characteristics from those of the subsoil to those of the more or less unaltered geological material. In general, this layer is less sticky and plastic and somewhat lighter textured than the subsoil. Although the structural form is similar to that in the subsoil, the structural aggregates in the substratum are larger, and they become progressively larger and less distinct as the depth increases. The color is chiefly mottled red, yellow, and gray. Some micaceous material is generally discernible. The thickness of this layer is variable. In some places it is only about 12 inches, whereas in others it is as much as 40 inches. In some places the boundary between this layer and the more or less unaltered geological material is distinct, but generally the boundary is indistinct. The underlying geological material consists of light fine sandy loam or fine sand with an admixture of horizontally lying thin platy layers of gray clay.

Areas mapped as Cuthbert very fine sandy loam are characterized by numerous variations. The surface soil is only 6 inches thick in some places, whereas a few rods away it may be 10 inches thick. In some places the transitional layer between the surface soil and the subsoil proper is too thin to be readily discernible. A few rods

away it may be 8 inches thick, and here the heavy subsoil layer is correspondingly thinner. These variations are largely due to the character of the relief, which is characteristically abrupt and choppy. Other variations include areas in which the subsoil is reddish yellow instead of yellowish red, and also a few small areas in which the subsoil is a distinctive red. These areas would be mapped as Luverne soils if they were more extensive. This red-subsoil variation lies on little knolls in patches that in few places exceed 2 acres in size and that are surrounded by the more typical Cuthbert soil. In a few places small quantities of rusty-colored flat ferruginous sandstone fragments are scattered over the surface.

Cuthbert very fine sandy loam has a rolling relief. The gradient ranges from about 7 to 15 percent. In contrast with the comparatively long slopes of the Ruston and Atwood soils, those of the Cuthbert soils are relatively short and abrupt.

Cuthbert very fine sandy loam is one of the most extensive soils in the county. It covers a total area of 18,240 acres and occurs in all parts of the county. The size of individual areas ranges from 2 to 200 acres. The largest areas are just south, west, and northwest of Iuka. This soil is associated chiefly with the other Cuthbert soils and secondly with the Ruston and Atwood soils. The smaller areas generally lie on narrow ridge tops and are surrounded by the hilly and steep phases of Cuthbert very fine sandy loam.

Between 15 and 20 percent of the land is cleared and is used for the production of crops, and the rest is still in woods. Although there are some good stands of shortleaf pine on this soil, the trees in most of the wooded area consist predominantly of blackjack oak and post oak, together with a few pine, red oak, white oak, and hickory. Much of the original Cuthbert very fine sandy loam has been cleared and used for the growing of crops, but a large part of the cleared area is badly eroded now and is mapped as the eroded phase. It is estimated that about 65 percent of the cleared land is devoted to cotton. The first 2 or 3 years after this land is cleared, when the surface soil is still intact and some organic matter remains, cotton yields 125 to 275 pounds of lint to the acre quite consistently when the land is fertilized with 200 or 300 pounds of 4–8–4 and other management requirements are met. As erosion proceeds, however, the yields become progressively lower. About 25 percent of the cleared area is used for corn, which yields from 6 to 18 bushels to the acre. The rest is used for cowpeas, soybeans, peanuts, watermelons, and other crops.

The management is generally poor. Rather than attempt to control erosion, which is extremely difficult, many farmers prefer to abandon the older fields when they become badly eroded and to clear new land to take their places. This, of course, cannot continue indefinitely, because eventually there will be no more tillable land to clear. In the southwestern quarter of the county, where the Cuthbert soils predominate, most of the tillable land on many farms is limited to this Cuthbert soil, except for a few acres of the Iuka or Bibb soils in the bottoms. Generally speaking, this is where abandoned farms and the more poorly constructed farmhouses, schoolhouses, and churches are most common.

438331—44——4

Considered for purposes of agriculture, Cuthbert very fine sandy loam has several undesirable properties. The main one is the tough, sticky, and plastic consistence of the subsoil. Owing to this property, the penetration of roots and the percolation of water are greatly retarded, and runoff is correspondingly excessive; consequently, accelerated erosion is rapid unless controlled, which is indeed difficult. Because of this same unfavorable property of the subsoil, erosion is especially injurious. Another important unfavorable feature is the choppy relief, which also increases both the susceptibility to and the difficulty of controlling erosion. Like the other soils in the uplands, this one is also strongly acid in reaction, rather low in organic matter, and relatively low in content of plant nutrients. In regard to these qualities, however, it compares favorably with the other soils, but it responds less to fertilization.

The maintenance of Cuthbert very fine sandy loam in a fair state of productivity probably presents the most difficult problem of soil management in the county. The present management is obviously inadequate, and a different system needs to be adopted. It is vital that erosion be controlled. Owing to the plastic and sticky subsoil and the choppy relief, terraces are difficult both to construct and to maintain, and they may do more harm than good. Erosion must be controlled, therefore, almost entirely by keeping a good vegetative cover on the soil nearly all the time. This may require periodic utilization for pasture. A long rotation that includes mainly close-growing crops in conjunction with judicious fertilization, particularly the application of lime and phosphate, seems to be one of the few practicable methods of managing this soil so that it will not deteriorate.

Cuthbert very fine sandy loam, eroded phase.—This phase represents normal Cuthbert very fine sandy loam that has lost most of its original surface soil by accelerated erosion. The present surface layer is variable. The thickness of this layer ranges from 1 to 5 inches, the color from yellowish gray to yellowish red, and the texture from very fine sandy loam to very fine sandy clay. The subsoil, substratum, and underlying geological material of both soils are similar, and the relief is similar. In physical suitability for use, however, the two soils differ. The eroded soil is unsuitable for the production of crops, whereas the normal soil is suitable for such use, even though its relative suitability is low.

This soil is unevenly eroded. A few shallow gullies are present in most areas. Adjoining bare red spots in places are patches having as much as 5 inches of the original surface soil. Where the transitional layer between the surface soil and the subsoil proper is thick, the erosion is generally less severe and less injurious. As a result of this uneven erosion, the growth of plants is also uneven. On the numerous bare red spots practically nothing grows; but where some of the original surface soil remains, the growth may be moderate. Where crops are grown, the stand is correspondingly spotted and patchy.

Although this soil occurs in practically all parts of the county, the greater part of it is in the part south of Burnsville and Iuka and west of Tishomingo and Belmont. It is chiefly associated with the other Cuthbert soils. The size of most individual areas ranges from 2 to 25 acres. The soil covers 11,264 acres.

All this eroded land has been cleared for a number of years. Some of it, however, has not been cleared for more than 7 years and much of

it not more than 12 years. It is estimated that the areas abandoned for crop use, lying idle, and being used for unimproved pasture are about 80 percent of the total area. Such areas are covered mainly with broomsedge and scattered shortleaf pine seedlings. The pasture is generally poor. Crops are still grown on an estimated 20 percent of this land. Of this, it is estimated that about 60 percent is used for cotton, 30 percent for corn, and 10 percent for miscellaneous farm crops, such as lespedeza, cowpeas, soybeans, peanuts, and watermelons. Yields of cotton range from 75 to 200 pounds of lint to the acre, and the land is usually fertilized with an application of 200 to 300 pounds of 4–8–4 to the acre. Corn generally yields from 5 to 10 bushels to the acre. Crops are injured from drought more readily and more severely on this soil than on any other soil in the county on which crops are grown; consequently total failures are not uncommon.

Because the crop yields are low, pastures are poor, and response to good management is poor, the best use of this soil is thought to be forestry. Shortleaf pines establish themselves rapidly and make fairly good growth on it. As a great deal of this eroded soil occurs where tillable land is scarce, however, some of it will be cropped as long as farmers remain in those areas. In the last few years kudzu has been grown with success on a few small patches. Indications are that this crop might be adapted to this soil. If that is true, the continued use for agriculture of the area now in crops may be possible and the rehabilitation of much of the abandoned area may be feasible.

Rough gullied land (Cuthbert soil material).—This separation includes areas of Cuthbert soils that have been mutilated or almost destroyed by accelerated erosion. It also includes areas of what was once the Ruston, Atwood, and Savannah soils. The slope in this separation ranges from 4 to 30 percent, but in most places it is 10 to 25 percent. The soils have been reduced to a network of gullies that have destroyed the former soil layers, and actually this separation no longer represents true soils but the condition resulting from the loss of the true soils. Accelerated erosion has injured the land so much that its reclamation for crops or pasture ordinarily is too expensive for the individual landowners. Reclamation requires revegetation and, in many places, mechanical measures, such as check dams and diversion terraces or ditches. At least several years will be required for the reclamation of these areas.

Only 768 acres of this gullied land is mapped. It is distributed over nearly all parts of the county—individual areas generally ranging from 2 to 5 acres in size.

All this land was once used for the production of crops. It was cleared, put under cultivation, and allowed to erode to the extent of near destruction. Some, it is true, was not originally well suited to crop production, but a part of it was comparatively well suited. Now, however, all is abandoned for crop use; and although a little is used for pasture, the pasture is nearly worthless. Much of this land is reverting to woods with pines chiefly establishing themselves. Black locust, if planted and properly cared for, appears to survive and to grow fairly well.

Cuthbert very fine sandy loam, hilly phase.—This soil differs from Cuthbert very fine sandy loam chiefly in having a stronger relief. The slope of the hilly phase ranges from about 15 to 30 percent,

whereas that of the normal soil ranges from about 7 to 15 percent. The relief of this hilly phase is markedly abrupt and choppy, with many little drains extending up the slopes. Variations of the soil profile similar to those included in the normal soil are also included in this hilly phase. An additional variation included consists of a soil with a fine sandy loam texture in the surface layer and a heavy fine sandy clay texture in the subsoil. This sandy variation lies mainly in the watershed of Mackys Creek.

This is the most extensive soil in the county. It covers a total area of 54,208 acres, or about 19 percent of the county. Although it occurs in all parts of the county, it is particularly extensive in the quarter south of Burnsville and Iuka and west of Tishomingo and Belmont, where it occurs in large areas and more or less dominates the landscape.

It is estimated that about 90 percent of this soil is in woods. The stand in most places consists mainly of blackjack oak and post oak, together with an admixture of white oak, red oak, hickory, pine, sweetgum, dogwood, and ironwood. There are a few good stands of nearly pure pine. About 10 percent of this soil is cleared. Even though some of this has not been cleared longer than 5 years, it is badly eroded and the greater part is abandoned. Shortleaf pine is coming in on the abandoned land.

Owing primarily to the comparatively low natural productivity, strong relief, undesirable consistence of the subsoil, extremely high susceptibility to erosion, and the severe injury that results from erosion, this soil is considered unsuitable for the production of crops. Largely for the same reasons, it is considered unsuited, or very poorly suited, for pasture. Forestry is thought to be the best use for this soil.

Cuthbert very fine sandy loam, steep phase.—This soil differs from the hilly phase of Cuthbert very fine sandy loam, just described, chiefly in having a stronger relief. The slope generally exceeds 30 percent; in most places it ranges from 30 to 55 percent. This steep phase is similar in profile characteristics to normal Cuthbert very fine sandy loam, except that the surface soil and the subsoil are slightly less thick and the texture, structure, and color vary a little more. Included in areas mapped as this steep phase are small, scattered areas of the steep phase of Ruston fine sandy loam, because it was considered impracticable to delineate such small areas of the Ruston soil.

Cuthbert very fine sandy loam, steep phase, covers a total area of 4,992 acres. Although it occurs in nearly all parts of the county, the main areas are in the quarter south of Iuka and Burnsville and west of Tishomingo and Belmont. It is associated chiefly with the other Cuthbert soils and secondly with the Ruston soils.

Nearly the entire area of this soil is in forest. Blackjack oak and post oak are the dominant trees in most places; but generally mixed with them are white oak, red oak, pine, hickory, sweetgum, dogwood, and ironwood. There are a few good stands of pine on this soil.

The natural adaptability of this soil is, of course, limited. Its steep relief alone is enough to preclude its feasible use for crop production. In addition, this soil has other unfavorable properties, such as a tough, plastic, and sticky consistence of the subsoil, extremely high susceptibility to accelerated erosion where bare, and relatively low natural productivity. Under present conditions, therefore, it seems

quite apparent that the best use of this soil is for forestry, to which it is fairly well adapted.

Cuthbert gravelly very fine sandy loam.—This soil differs from Cuthbert very fine sandy loam chiefly in having enough gravel on the surface and throughout the soil to impair tillage operations significantly. Cuthbert gravelly very fine sandy loam has a yellowish-gray loose gravelly very fine sandy loam surface soil, about 8 inches thick, and a yellowish-red plastic sticky gravelly clay subsoil, about 18 inches thick. The subsoil has an angular nutlike or blocky structure. This soil has a rolling relief with gradient of about 7 to 15 percent.

Included in this separation is a variation in which the soil contains small subangular fragments of ferruginous sandstone from ½ to 1½ inches in diameter. Most of the 150 acres of this variation are on small ridges in the northeastern part of the county.

Most of this soil occurs on narrow ridges along the eastern border of the county, where it is associated chiefly with the Guin soils. In typical areas it lies on the narrow ridge tops and the gravelly Guin soils lie on the steep ridge slopes. Agriculturally, it is not important. First of all, it is of small extent, occupying only 1,024 acres; second, it is not well suited to crop production; and, third, it is generally associated with the Guin soils, which are unsuitable for the production of crops. It is estimated that about 40 percent of this gravelly soil is cleared and used for the production of crops, chiefly cotton and corn. The present management is similar to that of Cuthbert very fine sandy loam, but the yields are thought to be somewhat lower than on the nongravelly soils. Soil and plant relations, suitability for use, and management requirements are very similar for the two soils.

Cuthbert-Ruston fine sandy loams.—This complex is characterized by two soils that were so intricately associated geographically that it was considered impracticable to delineate each soil separately on the map. These soils are Cuthbert very fine sandy loam (see p. 48) and Ruston fine sandy loam (see p. 43). This complex, however, is marked by a more hilly relief than is typical of either of these soils as mapped separately. The Cuthbert soils, it will be recalled, have a yellowish-gray loose very fine sandy loam surface layer about 8 inches thick, and a yellowish-red tough sticky and plastic subsoil about 18 inches thick. The Ruston soils have a yellowish-gray loose fine sandy loam surface layer, about 14 inches thick, and a reddish-brown friable subsoil, about 16 inches thick. It is estimated that the Cuthbert soil occupies about 60 percent and the Ruston soil about 40 percent of the area. The areas included in this separation have a hilly relief, the gradient ranging from about 15 to 30 percent. The abrupt and choppy slopes, characteristic of the Cuthbert soils, are absent here; instead, the slopes are rather long, somewhat similar to those occupied by the Ruston and Atwood soils.

A conspicuous feature of areas classified in this separation is the presence of ferruginous sandstones on the surface and throughout the soil. These are rusty-colored flat stones ranging in thickness from about 1 to 3 inches and in diameter from about 3 to 15 inches. These stones are especially conspicuous on the surface at the edges of the narrow ridges.

About 10,000 acres of this complex is mapped. Most of it lies in the northwestern part of the county, where it is chiefly associated with

the steep phases of the same complex. Nearly all of the land is in woods. The predominant trees are blackjack oak, post oak, shortleaf pine, white oak, red oak, and hickory. This land is not considered physically suitable for the production of crops. Forestry is thought to be the best adapted use.

Cuthbert-Ruston fine sandy loams, steep phases.—The areas included in this complex of steep phases differ from those included in the normal Cuthbert-Ruston fine sandy loams, just described, chiefly in having a stronger relief. The gradient of most slopes in the complex of steep phases ranges from 30 to 55 percent. This separation can be thought of as an intricate geographic association of the following two soils: Cuthbert very fine sandy loam, steep phase (see p. 52) and Ruston fine sandy loam, steep phase (see p. 46). Like areas of the Cuthbert-Ruston fine sandy loams, just described, areas of these steep phases are also characterized by the presence of flat rusty-colored ferruginous sandstones.

This complex is mapped on a total area of 7,552 acres. Most of it is in the northwestern part of the county, where it is associated chiefly with the other complex, which occupies less steep areas. Nearly all of the land is forested, mainly with blackjack oak, post oak, shortleaf pine, white oak, red oak, and hickory. The areas classified as this complex of steep phases are physically unsuitable either for crops or for pasture. The best adapted use for them is forestry.

GUIN SERIES

Soils in the uplands that have a high content of gravel, chert, or stone are classified as members of the Guin series. These soils have a rugged relief. Physically, they are not suitable for agriculture. They do not generally have distinct and well-developed profiles. Gravel constitutes between 20 and 70 percent of the soil mass, and the other part is generally rather sandy.

Guin soils cover a total area of 37,184 acres, or a little more than 13 percent of the county. They occur mainly in the eastern third of the county, where they are the predominant soils. The relief on about half of the total area is steep; on nearly half, hilly; and on a small part, rolling. Nearly the entire area is still in woods.

The Guin soils are classified and mapped in one type and one phase, namely, Guin gravelly loam, and Guin gravelly loam, steep phase.

Guin gravelly loam.—All the gravelly, cherty, or stony soils that occur in the uplands and occupy slopes over 15 percent are mapped as Guin gravelly loam or as the steep phase of Guin gravelly loam. All the gravelly soils are developed from the Tuscaloosa formation. Typical Guin gravelly loam has a poorly developed soil profile, but on much of it there is a surface layer, about 1 inch thick, consisting of gravelly loam stained dark by organic matter. This is underlain by light-gray gravelly loam extending to a depth of between 5 and 8 inches. Below this the material is mainly gravel with an admixture of either red or yellow soil material. About half of the area mapped as this type, however, consists of soils that resemble Ruston, Atwood, or Savannah in color and texture but are nevertheless gravelly and hilly in relief, and therefore they are included in this separation.

The relief of Guin gravelly loam is hilly. The gradient ranges from about 15 to 30 percent, except on about 100 acres where it ranges

from 8 to 15 percent. On these milder slopes, however, the content of gravel is so large that it makes the soil practically nontillable. Ferruginous sandstones, gravel conglomerates, and chert fragments are scattered over many areas, and sandstone even outcrops in some of the areas along Bear and Cedar Creeks.

About 17,900 acres is mapped as Guin gravelly loam, almost all of it in the eastern and northeastern parts of the county. Generally the Savannah soils occupy the wider ridge tops where the Guin soils are on the ridge slopes. The slopes throughout 15 to 30 percent of the area are relatively long. The valleys are typically V-shaped, and the bottoms are comparatively narrow.

All but a few acres of Guin gravelly loam is in forest. Shortleaf pine, hickory, and the better oaks predominate. Owing chiefly to the hilly relief and the high content of gravel, this soil is considered unsuitable for the production of crops and very poorly suited to pasture. The best adapted use is thought to be forestry.

Guin gravelly loam, steep phase.—This phase is mainly undifferentiated gravelly and stony material on slopes steeper than 30 percent gradient. It is mapped on the steep slopes and bluffs along the Tennessee River and Bear, Cedar, and Sandy Creeks and some of their tributaries. Many areas contain outcrops of sandstone, and some of them, chiefly along Bear Creek, contain large sandstone ledges. On the Tennessee River bluffs and extending for a short distance up the small tributaries a few outcrops of limestone and shale occur in addition to the numerous outcrops of sandstone. A considerable amount of chert is also present here. The steep phase differs from normal Guin gravelly loam in that it occupies steeper slopes and contains more gravel, chert fragments, and stones and more outcrops of bedrock. A fairly large total area is mapped, all in forest. Oak, hickory, and shortleaf pine predominate. This steep phase soil is unsuitable both for crops and for pasture. Forestry appears to be its best use.

SOILS OF THE TERRACES

Soils of the terraces are developed from gravel, sand, silt, and clay deposited on the former flood plains of streams in the geologic past when the streams flowed at higher levels than they do now. During the progress of stream cutting over a period of years the channel was gradually deepened and new flood plains were formed at the lower levels, but large parts of the old flood plains were left. These old flood plains that were left are now above the overflow stage of the present streams, and they constitute what in this report is referred to as terraces. Such areas are frequently referred to locally as second bottoms or benches.

These terraces adjoin the present flood plains or bottom lands. For the most part they are nearly level or gently sloping. They occupy 11,136 acres, or about 4 percent of the area of the county. Agriculturally they are very important because the soils on most of them are well adapted to the production of crops.

The soils of the terraces have developed from old alluvium, nearly all of which has originated in the local uplands. They are all strongly to very strongly acid, relatively low in organic matter, and low in soluble salts. In comparison with the soils of the United States as a

whole, the soils on these terraces rank low in natural fertility and productivity; but in comparison with the other soils in the county they rank from medium to high. They generally contain a few small pieces of gravel but are free from stone. The surface soil and the subsoil are everywhere friable. These soils differ widely in drainage conditions, color, and character of the substratum. Largely on the basis of such differences, they are classified into three series, namely, Prentiss, Cahaba, and Myatt.

The soils of the Prentiss series, though not extensive, occupy a much larger area than the other soils on the terraces, and agriculturally they are very important. Although internal drainage is somewhat retarded and external drainage in some places is rather slow, these soils are drained well enough for the production of all the common crops of the locality. In morphology they closely resemble the Savannah soils of the uplands. The Prentiss soils have a yellowish-gray surface soil, about 8 inches thick, a brownish-yellow subsoil, about 15 inches thick, and immediately below the subsoil a thick hardpan layer.

The Cahaba soils, which are among the most productive in the county, are of small extent. They are the best drained soils on the terraces. In morphology, they resemble somewhat the Atwood soils of the uplands. The surface soil, about 6 inches thick, is brownish-gray mellow very fine sandy loam; the subsoil, about 20 inches thick, is brownish-red friable silty clay loam; and the substratum is mottled and friable silty clay loam or clay loam. The Cahaba soils differ from the Prentiss soils chiefly in having better drainage, a brownish-red subsoil, and no hardpan.

The Myatt soils are poorly drained. In their natural condition they are unsuitable for the production of crops. They are generally light gray mottled with blue, yellow, brown, and red, and they show but very little differentiation of layers in the upper 3 feet.

PRENTISS SERIES

Soils of the Prentiss series occupy nearly level or gently sloping terraces where they have developed from general alluvium, nearly all of which has originated in the local uplands. They have developed under a mixture of deciduous and coniferous trees. They closely resemble the Savannah soils in profile characteristics, such as color, texture, and thickness of soil layers. Like the Savannah soils, the Prentiss soils are readily distinguished by the light yellowish-gray surface soil, the brownish-yellow subsoil, and the conspicuous hardpan layer just below the subsoil. The Prentiss soils are also strongly acid in reaction, low in organic matter, and medium to low in content of plant nutrients. They are free from stones but contain some gravel in several areas. Although internal drainage is somewhat retarded by the hardpan, they are drained well enough for the production of all the common crops of the locality.

The Prentiss soils, which are by far the most extensive ones on the terrace lands, cover 7,552 acres, or nearly 3 percent of the county. About two-thirds of their total area is gently sloping and about one-third is nearly level. Although some erosion has taken place on most of the gently sloping areas, generally it has not been serious.

Agriculturally, these soils are among the most important in the county. Nearly all of the areas are cleared and used for the production of crops, chiefly cotton and corn.

The soils of the Prentiss series are classified and mapped into one type and one phase, namely Prentiss silt loam and Prentiss silt loam, level phase.

Prentiss silt loam.—Prentiss silt loam is an agriculturally important soil of the gently sloping stream terraces. It has a yellowish-gray surface soil, a brownish-yellow subsoil, and a mottled hardpan just below the subsoil. It is adequately drained for the production of the crops common to the locality. It is strongly to very strongly acid in reaction, relatively low in organic matter, and relatively low in content of plant nutrients. This soil has developed from general stream alluvium, most of which has originated in the local uplands—uplands underlain by Coastal Plain material. The native vegetation is a mixture of coniferous and deciduous trees.

In profile features, such as color, texture, consistence, structure, and depth, Prentiss silt loam is very similar to Savannah silt loam of the uplands (see p. 30). Furthermore, the two soils are similar in relief, in suitability for different uses, in productivity, and in management requirements. They differ in age and source of parent material. Presumably the Savannah soil has developed from a mixture of loess and old Coastal Plain deposits; whereas the Prentiss soil has developed from general alluvium, which was deposited by the streams that developed after the deposition of the Coastal Plain material and after the recession of the waters of the old gulf.

Prentiss silt loam has a mellow yellowish-gray surface soil from 6 to 8 inches thick. The subsoil is brownish-yellow friable silty clay loam from 13 to 18 inches thick. This layer contains some concretions, generally only a few in the upper part but a considerable number in the lower part. Some of these concretions are black and very small; others are yellow and brown and rather large, the latter ranging from about one-eighth to one-half inch in diameter. The subsoil rests on the hardpan layer which consists of hard cement-like material that ranges in texture from very fine sandy clay to fine sandy loam, is highly mottled with gray, yellow, red, and brown, and contains a great number of concretions. These concretions are black or dark brown on the outside and rusty brown or yellow on the inside. The material in this layer is very difficult to dig out, but the displaced lumps are brittle and break fairly easily. This hardpan layer ranges in thickness from 20 to 40 inches or more. The upper 6 to 12 inches, however, are generally the most firmly cemented, and the degree of cementation is thought to decrease slightly with the increase in depth. Although this hardpan apparently is not wholly impervious to water, undoubtedly it greatly retards the movement of water. Roots penetrate this layer with difficulty.

Prentiss silt loam occupies gently sloping areas, a feature that makes for a favorable rate of water runoff and is favorable for tillage. Although the slope ranges from about 2 to 7 percent, in most of the areas it is from 2 to 5 percent.

Included with Prentiss silt loam are about 25 acres of Prentiss fine sandy loam, which is similar except for the lighter texture. Also included are areas that have undergone some accelerated erosion. In about 60 percent of the total area of this soil the surface soil is only 4 to 6 inches thick because of the removal of 2 or 3 inches of the original surface soil by accelerated erosion.

Prentiss silt loam, the most extensive soil of the terraces, lies from 2 to 15 feet above the adjacent stream bottoms. It covers a total area of 4,480 acres. Areas range in size from about 3 to 200 acres. Although areas occur along nearly all of the larger creeks in the county, the largest ones are along Bear Creek in the southeastern quarter of the county and along Yellow Creek in the northwestern quarter. It is associated chiefly with the soils of the bottom lands and the other soils of the terraces.

At least 90 percent of the land has been cleared and is used for the production of crops. About 70 percent of the cleared land is used for cotton, about 25 percent for corn, and about 5 percent for miscellaneous crops, such as peas, beans, potatoes, and sweetpotatoes. When the land is fertilized with the usual application of 200 or 300 pounds of 4–8–4, cotton yields between 250 and 400 pounds of lint cotton to the acre. Corn normally yields between 12 and 25 bushels an acre and is commonly side-dressed with nitrate of soda at the rate of about 100 pounds to an acre.

The present management of this soil is similar to that of Savannah silt loam. Except for an occasional crop of corn, cotton is grown every year on a large part of this soil. The cotton land is usually fertilized with about 200 or 300 pounds to the acre of 4–8–4, which is applied in the spring when the seedbed is prepared. A few farmers also apply some nitrate of soda and superphosphate. Much of the corn is grown without fertilization; on the other hand, much of it is grown with a side dressing of nitrate of soda, applied at the rate of about 100 pounds an acre in the early part of the growing season. Such desirable practices as a systematic rotation of crops, liming, and the growing of winter legumes are seldom followed except on a few small areas. Terracing for control of water and erosion has been done on only a small part of this soil.

From an agricultural point of view, Prentiss silt loam, like Savannah silt loam, has some favorable as well as unfavorable qualities. Among the favorable ones are gently sloping relief, good tilth, and high response to good management. Some of the unfavorable qualities are comparative poverty of plant nutrients, relatively low content of organic matter, strongly acid reaction, moderate susceptibility to accelerated erosion, and the presence of a hardpan layer at a depth of about 2 feet. This hardpan, which is practically impenetrable by plant roots and nearly impervious to water, is the most unfavorable feature because there is no practicable way to break it and thereby overcome its unfavorable effects. In contrast to this, the other unfavorable features can be corrected largely by good management.

That the productivity can be materially increased has been demonstrated in the last few years. Where winter legumes have been grown and turned under as green manures, the yields of the succeeding cotton crop in some instances have been as much as 1 bale of lint cotton to the acre, even though only the usual fertilizer application was made for the cotton. Yields of corn have also been materially increased by the growing of winter legumes. Vetch as a winter cover crop succeeds well on this soil when it is fertilized with at least 100 pounds of triple superphosphate. If lime is added, still higher yields of vetch and the crop succeeding vetch may be expected.

As Prentiss silt loam and Savannah silt loam have such a similar morphology, and as observations indicate that they respond similarly

to corresponding management treatments, the suggestions for improving the management of the Savannah soil should be equally applicable to the Prentiss soil.

Prentiss silt loam, level phase.—This soil differs from the normal Prentiss silt loam chiefly in occupying nearly level areas on which runoff is slow. This level phase differs further from the normal type in having a few yellow and gray mottlings and more concretions in the subsoil, indications of slightly poorer internal drainage. In addition, practically no accelerated erosion has taken place on this soil; consequently the surface soil is more uniform in depth than the corresponding layer of the normal Prentiss silt loam. In other features, such as color, texture, consistence, depth, reaction, content of organic matter, content of plant nutrients, thickness and cementation of the hardpan, and nature of the parent material, the two soils are similar. The agriculturally significant difference is that the level phase is more slowly drained externally, not quite so well drained internally, and considerably less susceptible to accelerated erosion. This level phase is still adequately drained for the production of all the common crops of the locality; but after heavy rains cultivation must sometimes be delayed a day or two because of the slow runoff. In profile features and lay of the land this level phase is similar to the level phase of Savannah silt loam of the uplands.

Included with the level phase of Prentiss silt loam are about 25 acres of Prentiss fine sandy loam on similarly level or nearly level areas. This variation occurs in small scattered patches.

Prentiss silt loam, level phase, covers a total area of 3,072 acres along most of the larger creeks in the county, chiefly along Yellow Creek in the northwestern part of the county and along Bear Creek in the southeastern part. Most of the individual bodies range in size from about 5 to 35 acres. The soil is associated chiefly with normal Prentiss silt loam and secondly with Myatt silt loam.

Practically all of the land is cleared and used for farm crops. The proportion devoted to the different crops, the management practiced, and the yields obtained are about the same as for normal Prentiss silt loam.

Except for the minor differences arising from the smoother relief, the management requirements and use potentialities of this soil are similar to those of the typical soil.

CAHABA SERIES

Soils of the Cahaba series occupy gently sloping areas on the stream terraces. They have developed from alluvium, nearly all of which originated in the uplands underlain by sandy Coastal Plain material. These soils have developed under a forest vegetation, presumably chiefly deciduous. They are well drained and have a brownish-gray surface soil and a brownish-red friable subsoil. They are among the most productive soils in the county. In color and consistence they resemble the Atwood and Ruston soils of the uplands. Geographically, they are associated chiefly with the Prentiss soils, but the brownish-red color and the absence of a distinct hardpan in the Cahaba soils readily distinguish them from the Prentiss soils.

Only one type is mapped, namely, Cahaba very fine sandy loam, which occupies only 640 acres.

Cahaba very fine sandy loam.—This soil has developed on small gently sloping areas on the stream terraces along the larger creeks. It has a moderate to comparatively high moisture-holding capacity, is readily permeable to air, water, and roots, and is free from stone. It is strongly to very strongly acid in reaction and moderate to low in content of organic matter. As compared with the soils of the United States as a whole, it ranks moderate to low in natural fertility; but as compared with the soils of the county only, it ranks relatively high. It is one of the best soils in the county for the production of crops.

Cahaba very fine sandy loam has a brownish-gray or grayish-brown mellow surface soil ranging in texture from very fine sandy loam to silt loam and in thickness from about 3 to 7 inches. Presumably the original surface soil was about 8 inches thick; but, as some accelerated erosion has taken place in nearly all areas, the surface layer is now correspondingly shallow. The subsoil is brownish-red or reddish-brown permeable and friable silty clay loam, from 18 to 22 inches thick. In the subsoil are a few concretions, ranging from one-fourth to one-half inch in diameter. These concretions are black on the outside and yellow or brown on the inside. The substratum below the subsoil consists of brittle but friable material ranging in texture from heavy loam to silty clay loam. The color is chiefly yellowish brown with numerous mottlings of yellow, gray, and brown. Numerous brown, yellow, and black concretions, from about one-eighth to one-fourth of an inch in diameter, are present. This substratum layer continues downward to a depth of over 50 inches.

Cahaba very fine sandy loam covers only a small total area. It occurs on the older terraces of the larger creeks and is almost everywhere associated with Prentiss silt loam. The usual position for this soil is on a slight rise that many terraces have just before dropping into the first bottoms. In such positions drainage naturally would be very good. Individual bodies, which generally are small, range in size from about 1 to 10 acres. Incidentally, the abundance of unfinished arrowheads and other relics indicates that these small patches of this soil were favorite camping sites for the Indians.

All this soil has been cleared and is used for the production of crops. About 70 percent of the land is used for cotton, 20 percent for corn, and 10 percent for miscellaneous crops. The present management is about the same as for the geographically associated Prentiss silt loam. Cotton is commonly fertilized with 200 or 300 pounds of 4–8–4 to the acre and yields from 250 to 400 pounds of lint cotton to the acre. Corn is commonly side-dressed with nitrate of soda at the rate of about 100 pounds an acre and yields from 15 to 25 bushels to the acre in an average year. Lespedeza, crimson clover, hop clover, bur-clover, cowpeas, soybeans, sweetpotatoes, and potatoes have been and are being grown successfully on this soil. Likewise, the winter legumes, vetch and Austrian Winter peas, grow well.

Agriculturally, Cahaba very fine sandy loam is one of the most desirable soils in the county. It has a large number of favorable features, such as a gently sloping relief, friable consistence, good tilth, and excellent moisture condition. It responds to good management, and under proper management it is adapted to a great number of different crops.

Proper fertilization and liming are of primary importance in any management program. The application of lime and phosphate is particularly necessary, and the incorporation of organic matter is also important. A systematic rotation of crops, including a legume, is highly desirable. The growing of winter legumes and turning them under in the spring, which has been recently done on a few areas, seems to be a highly successful practice. Mechanical measures, such as terracing, may be necessary and desirable for the control of water and erosion, but the necessity for such measures will depend on the other management practices and the kinds of crops grown.

MYATT SERIES

The Myatt series includes the light-gray poorly drained soils that occur on the terraces in association chiefly with the Prentiss soils. They have developed from alluvium similar to that from which the Prentiss and Cahaba soils have developed; that is, alluvium that has originated in the uplands and is underlain by Coastal Plain material. They have developed under a vegetation of water-tolerant trees, are mottled light gray in color, contain numerous concretions, show but little differentiation of layers in a depth of 3 feet or more, are strongly to very strongly acid in reaction, and lie on level or slightly depressed areas. In their natural condition they are unsuitable for the production of the common crops but are usable for pasture. Only one type is mapped—Myatt silt loam. It covers a total area of 2,944 acres.

Myatt silt loam.—This is a poorly drained soil that occurs on level or slightly depressed areas on the stream terraces. It is locally referred to as "crawfish land" and "white, cold-natured land." It has developed from alluvium similar to that which has given rise to the Prentiss and Cahaba soils; that is, alluvium practically all of which has originated in the uplands where the Savannah, Atwood, Ruston, Cuthbert, and Guin soils occur. The native vegetation consists chiefly of water-tolerant trees, such as water oak, willow oak, sweetgum, and cypress. Myatt silt loam has a fluctuating water table, which rises to the surface in rainy periods and sinks to a depth of 3 feet or more in dry periods. This soil is free from stone and in most areas is also free from gravel. It is strongly to very strongly acid in reaction, low in organic matter, and presumably low in plant nutrients.

This soil has a surface layer, 1 or 2 inches thick, of light-brown silt loam containing roots and partly decayed organic matter. Below this and continuing to a depth of 30 inches or more, the material is chiefly light gray with numerous mottlings of blue, yellow, brown, and brownish red. Black, red, yellow, and brown concretions are abundant. The black ones are so hard that they can hardly be crushed between the fingers, but the others are not so hard. Concretions and mottlings seem to become more abundant with increasing depth. The texture ranges from silt loam to silty clay loam. In many places it grades from silt loam in the upper part to silty clay loam in the lower part. When dry, the material is somewhat hard and brittle; when wet, it is rather friable. There appears to be no structural development. Roots are scarce, even in the upper part. In a few places a cemented layer or hardpan has been observed at a depth of 30 or 40 inches, but it is not known whether this hardpan is generally present in this soil.

Included with Myatt silt loam is about 700 acres of a very similar soil that lies in the uplands rather than on the terraces. This variation occurs only in the vicinity of Belmont and Golden, where it occupies slightly depressed areas surrounded by the Savannah soils, chiefly the level phase of Savannah silt loam. In regard to use suitabilities, this Myattlike soil of the uplands is similar to the typical Myatt soil of the terraces.

Myatt silt loam is not an extensive soil. Except for the variation just mentioned, it occurs only on the stream terraces of the larger creeks. It is geographically associated chiefly with Prentiss silt loam and typically occurs in narrow belts at the foot of the bordering hills. In such positions, seepage at the foot of the hills is partly responsible for the poor drainage of this soil. Some areas lie in the middle of the large terraces, where they are everywhere surrounded by the level phase of Prentiss silt loam.

About 50 percent of the land is cleared, and about 75 percent of the cleared land is used for the production of hay and pasture. Most of the remaining cleared area is used for the production of corn, although the production of cotton is attempted on a small part. Wherever corn and cotton are grown, the drainage of this soil is improved by a system of ditches. Most of these ditched areas are south of Burnsville on the terraces that lie along Yellow Creek. Corn usually yields from about 5 to 15 bushels to the acre, but nearly total failures are common. Cotton yields are nearly always low, and total failures are frequent. The yields of hay obtained from this soil are generally moderate, and the pastures are fair.

In its natural poorly drained condition, Myatt silt loam is suitable only for forestry, pasture, or hay. If it were artificially drained, corn, probably cotton, and several other crops could be successfully grown under adequate fertilization. This soil, however, does not appear to lend itself to drainage very well. In the winter and spring when the rainfall is high, it becomes waterlogged and drains slowly, even where ditches are relatively numerous; and in the late summer and fall, when the rainfall may be low, it becomes hard and dry. Although corn can be grown on drained areas, the yields are prevailingly low. The fact that the yields are low, however, may not be due entirely to unfavorable moisture conditions but may be due partly to the lack of plant nutrients. Cotton appears to be even less successful than corn, but here again the poverty of plant nutrients may be important, as well as the somewhat unfavorable moisture condition. In view of the fact that this soil is rather difficult to drain and that its productivity is low even when drained, the best agricultural use seems to be for either pasture or the production of hay because such uses do not require artificial drainage. Lespedeza, Dallis grass, carpet grass, white clover, and hop clover are pasture and hay plants that will grow successfully. Cowpeas and soybeans may also succeed. Without the application of fertilizers, the growth of adapted plants will not be vigorous. It may not be especially vigorous even after fertilization, but a considerable increase is to be expected.

SOILS OF THE BOTTOM LANDS

By the term "bottom lands" is meant the flood plains, those nearly level areas along the streams that are flooded periodically. The material giving rise to all the soils in the bottom lands has been carried

there by the streams, and its character depends greatly on the source of the material, the rate at which the water was moving when the material was deposited, and the present drainage condition. In Tishomingo County, practically all of the alluvial material of the bottom lands has come from the local uplands, which are underlain by Coastal Plain material.

From the standpoint of soil genesis, all the soils in the bottom lands are young and immature. The material from which they are developing has not lain in place long enough for the dynamic forces of soil development to develop distinct horizons or layers. In a sense, therefore, these soils are essentially parent materials that have undergone but little change since deposition.

All the soils in the bottom lands are subject to periodic flooding. They are medium to very strongly acid in reaction, friable, and free from stone, although a few contain some gravel. In content of organic matter they rank from medium to low. In comparison with the other soils in the county, the soils in the bottom lands are thought to be relatively high in plant nutrients.

All the soils of the bottom lands have slow external drainage, but they differ widely in internal drainage; and largely on the basis of such differences the soils are classified into three series, namely, Ochlockonee, Iuka, and Bibb. In addition, two miscellaneous land types—alluvial sands, which designates a few areas of fresh sandy deposits, and gravel pits—are separated. The Ochlockonee soils are well drained, the Iuka soils are intermediately drained, and the Bibb soils and alluvial sands are poorly drained. The Ochlockonee soils are light brown to a depth of 30 inches or more; the Iuka soils are yellowish brown to a depth of about 12 inches, below which they are a mottled gray; and the Bibb soils are mottled gray from the surface downward. The Ochlockonee soils are well suited to the production of corn; the Iuka soils are considerably less suitable, and the Bibb soils are wholly unsuitable except where they are artificially drained. The alluvial sands are unsuitable for either crops or pasture. The bottom lands occupy a total area of 58,368 acres, or nearly 21 percent of the area of the county.

OCHLOCKONEE SERIES

The soils of the Ochlockonee series, which cover a total area of 9,216 acres, are light-brown or yellowish-brown well-drained friable productive soils lying along streams in the first bottoms. The alluvium giving rise to them has been washed from the uplands underlain by Coastal Plain material. They occupy level or nearly level areas, are medium to very strongly acid in reaction, medium to relatively low in content of organic matter, permeable to air, water, and roots, and free from stone. They are well adapted to the production of crops, particularly corn. They occur chiefly in the bottoms along Bear, Cedar, Mackys, and Indian Creeks. The Ochlockonee soils in Tishomingo County are classified and mapped in two types, namely, Ochlockonee silt loam and Ochlockonee fine sandy loam.

Ochlockonee silt loam.—This is a relatively fertile, highly productive,well-drained soil of the creek bottoms that is particularly well suited to the production of corn. It is medium to strongly acid in reaction, is permeable to air, water, and roots, has a moderate to high water-holding capacity, and is free from stones. The parent material

consists of alluvium that has come from the uplands where chiefly the Cuthbert, Ruston, Atwood, Savannah, and Guin soils occur; and the native vegetation is forest, chiefly deciduous. This soil is generally flooded one or more times each year, but the flooding usually occurs only in late winter and early spring; consequently, injury to summer crops is rather uncommon.

Ochlockonee silt loam is a young soil and shows very little differentiation of layers, but generally the surface soil, to a depth ranging from 12 to 16 inches, is uniform light-brown or yellowish-brown soft loose smooth silt loam. Underlying this and continuing to a depth of about 24 to 32 inches is yellowish-brown very friable silt loam containing a few yellow or gray mottlings and a few tiny black concretions. Below this the soil is generally highly mottled with yellow, brown, and gray and concretions are numerous.

Included with Ochlockonee silt loam are areas of Ochlockonee loam and some of Ochlockonee very fine sandy loam. Also included are a few areas in the northeastern part of the county that contain a small amount of gravel and chert. Also mapped as Ochlockonee silt loam is a total area of about 25 acres in small depressions at the very heads of drainageways. Actually, the soil in such positions consists of local wash from the Atwood soils. This variation occurs only among the Atwood soils.

From an agricultural point of view, these variations are not very significant, but a variation of considerable importance is the one in the bottom of Cedar Creek. Here the soil is less acid and considerably more productive than normal Ochlockonee silt loam. Acre yields of 45 to 55 bushels of corn are common. The higher productivity is very likely due to the influence of wash from some of the limestone hills in the Alabama part of the drainage basin of this creek. This variation covers about 500 acres. It is brown mellow silt loam to a depth of more than 30 inches.

Ochlockonee silt loam occurs chiefly in the creek bottoms in the eastern part of the county where the nonagricultural Guin soils dominate the landscape. The largest areas are in the bottoms of Bear and Cedar Creeks in the southeastern part of the county.

An estimated 75 percent of the land is cleared. Most of the uncleared area—about 1,000 acres—borders Bear Creek in the southeastern part of the county and adjoins the large area of Savannah soils previously described. This is probably the largest single area of potentially good cropland in the county that has not been developed, but it is now being cleared and put into the production of corn. This area is covered by a good stand of deciduous trees consisting mainly of beech, hickory, and several species of oaks.

Of the cleared land, it is estimated that about 85 percent is devoted to corn. It is the most productive soil for corn in the county, and yields of 30 to 45 bushels an acre are normally obtained. Corn is usually side-dressed with nitrate of soda at the rate of 50 or 100 pounds to the acre. About 13 percent of the land is devoted to cotton, which yields between 200 and 400 pounds of lint to the acre when the land is fertilized with the usual application of 200 to 300 pounds of 4–8–4 to the acre. Generally, cotton matures later on this soil than on soils in the uplands, and for that reason it is more subject to injury from diseases and insects. The remaining 2 percent of the land is used for growing hay, chiefly legumes adapted to the region, such as

cowpeas, soybeans, lespedeza, and vetch. Soybeans and cowpeas are sometimes grown with corn. Winter cover crops, such as vetch and Austrian Winter peas, succeed well, provided there is not too much flooding.

Agriculturally, Ochlockonee silt loam is one of the most highly desirable soils in the county. It is easy to work, easy to conserve, comparatively high in productivity, and well adapted to the production of important crops, particularly corn. It receives a slight deposit of alluvial material during the occasional floodings, which acts to replenish or maintain the fertility. Although periodic flooding has this desirable effect, it also has the undesirable one of injuring or destroying the crops when it occurs during the growing season. Although this soil is relatively high in natural productivity, as compared with the other soils in the county, its productivity can be materially increased by improved management. For the production of corn, more nitrogen is needed. This may be supplied either by adding nitrogenous fertilizer or by growing winter legumes and turning them under in the spring. Lime and phosphate should be added for the winter legumes. In the few areas where the latter practice has been followed, the corn yields have increased materially. Although winter cover crops may occasionally be injured by flooding, they should generally succeed on this soil.

Ochlockonee fine sandy loam.—This soil differs from the Ochlockonee silt loam chiefly in being lighter textured and generally somewhat lighter colored. Furthermore, it is more variable in color and texture and lower in productivity. In most places it is brownish-yellow loose fine sandy loam to a depth of about 24 inches. Below this a few gray and blue mottlings and a few concretions appear and gradually increase in number to a depth of about 36 inches, below which they are abundant. Included with this type are a few areas of Ochlockonee very fine sandy loam and a few of Ochlockonee sandy loam. The surface is nearly level, except in places on the Bear Creek bottom where it is slightly billowy. Like Ochlockonee silt loam, Ochlockonee fine sandy loam is subject to periodic floodings, but the floodings are generally less frequent. This soil is very well to excessively drained internally and has a low moisture-holding capacity. Crops, therefore, are readily injured by lack of sufficient moisture in periods of low rainfall.

Ochlockonee fine sandy loam covers a total area of 4,800 acres. It occurs chiefly along Bear and Mackys Creeks, although it borders many other streams and is associated with Ochlockonee silt loam, Iuka silt loam, and Iuka fine sandy loam.

About 90 percent of the land is cleared, and about 75 percent of the cleared area is used for corn, 10 percent for cotton, and 5 percent for miscellaneous crops, and about 10 percent is lying idle (or "resting" as the local farmers call it).

The management of this soil is similar to that of Ochlockonee silt loam, but the yields are lower and more variable. Corn normally yields from 15 to 25 bushels an acre and is usually side-dressed with nitrate of soda at the rate of 50 or 100 pounds to the acre. The yields vary considerably according to the quantity and distribution of rainfall during the growing season and the quantity and kind of fertilizers

438331—44——5

applied. Yields are frequently lower on the sandy variation than on the normal fine sandy loam. Yields of cotton are only moderate.

This soil is not so desirable for agriculture as Ochlockonee silt loam because the crops are more susceptible to injury from drought and the fertility is more rapidly depleted. Farmers say that they have to "give it a rest once in a while." In spite of these features, however, Ochlockonee fine sandy loam is one of the better soils in the county. It is very easy to till, and observations indicate that it responds well to improved management. For example, in the few places where barnyard manure has been applied the increase in corn yields from that practice alone has been great. As this soil is relatively low in organic matter, nitrogen, lime, phosphate, and presumably potash, increased yields will require the addition of all these amendments; and the management problem becomes one of adding them most cheaply and utilizing them most efficiently. One of the most feasible ways to do this is to grow winter legumes and turn them under as green manure. In this way nitrogen, the most expensive fertilizer element, can be added to the soil. In order to grow legumes successfully, lime, phosphate, and presumably potash will be required; but, if the legumes are turned under, the nutrients assimilated by them will be returned to the soil and will in turn become available for the succeeding crop.

IUKA SERIES

Soils of the Iuka series are intermediate in drainage between the well-drained Ochlockonee and the poorly drained Bibb soils. Like the Ochlockonee and Bibb soils, the Iuka soils have developed from general alluvium that has been washed from the uplands of the sandy Coastal Plain. The native vegetation is forest, chiefly deciduous. The Iuka soils are young and show relatively little profile development except in color. In general, they are light brown or yellowish brown to a depth of about 12 inches, below which they are light gray with mottlings of yellow, red, and brown. They are medium to very strongly acid in reaction. Although they are unsuitable for cotton, they are fairly productive of corn; but this crop is frequently injured by wet conditions. They are well adapted to hay and pasture. They cover a total area of 25,728 acres in most of the stream bottoms. The Iuka soils are classified and mapped in two types, namely, Iuka silt loam and Iuka fine sandy loam.

Iuka silt loam.—Iuka silt loam is a young soil that occurs in the bottom lands and is intermediate in drainage between the well-drained Ochlockonee and the poorly drained Bibb soils. The general stream alluvium giving rise to this soil originated in the uplands where the Cuthbert, Ruston, Atwood, Savannah, and Guin soils occur. The native vegetation is forest, chiefly deciduous. This soil is medium to very strongly acid in reaction. It is subject to rather frequent flooding, particularly in the winter and spring.

In typical areas, the surface layer, to a depth of about 12 inches, is a soft and mellow silt loam that is yellowish brown or brownish yellow and contains a few mottlings of gray, yellow, or brown. A few black or dark-brown concretions, ranging from about one-eighth to one-fourth of an inch in diameter, are generally present. Underlying this layer is mellow and friable silt loam that is chiefly bluish

gray with many yellow and a few brown and red mottlings. Brown and black concretions are numerous. This material continues with little or no apparent change to a depth of 40 inches or more. This gray material is waterlogged much of the time.

In profile features this soil is rather variable. The surface layer ranges in thickness from about 7 to 14 inches and in color from light brown to brownish yellow. In some areas, locally referred to as "buckshot land," concretions are quite numerous; and in other areas, chiefly in the eastern part of the county where the Guin soils are dominant, some gravel is present. It is not uncommon to find a sandy layer, 2 or 3 inches thick, at various depths. Included with the silt loam are areas in which the dominant texture is very fine sandy loam.

Almost all of Iuka silt loam is subject to periodic flooding, most of which takes place in the winter and early spring. Floodings, however, are not uncommon in the late spring or early summer after the crops have been planted. Sometimes the crops are killed and have to be replanted. As the soil remains wet and cold until late in the spring, crops are usually not planted on it until after the middle of May. The drainage of nearly all of the soil used for agriculture has been improved by a system of small ditches and canals, which indicates that some measure of artificial drainage is necessary in order to insure the production of corn, the main crop.

A fairly large total area—8,000 acres—is mapped, mostly in the bottoms of the larger streams. The largest bodies border Yellow Creek and its tributaries. This soil generally is associated chiefly with Bibb silt loam and secondly with Ochlockonee silt loam.

About 40 percent of the land is cleared, and about 85 percent of the cleared land is used for the production of corn. Without fertilizer, corn yields from 10 to 20 bushels an acre on undrained areas and 20 to 40 bushels on drained areas. It is generally grown year after year without fertilizer. About 5 percent of the cleared area is used for growing cowpeas and soybeans, and the remaining 10 percent is used for pasture and hay land. Cowpeas and soybeans do fairly well on it. Iuka silt loam is also good pasture or hay land. Lespedeza, hop clover, white clover, carpet grass, Bermuda grass, and Dallis grass grow well on it. The production of winter cover crops is only moderately successful, and failures are rather common. This soil is decidedly unfit for cotton, except where it is very well drained by artificial means. The wooded areas are characterized by many beech trees associated with water oak, willow oak, sweetgum, and a few hickory, maple, ironwood, alder, and white oak.

Iuka silt loam is one of the valuable soils for agriculture. It is easy to till, easy to conserve, and moderately productive of certain crops. Its chief detriment is the inadequate drainage, which, unless improved artificially, limits adaptability to those crops that are somewhat tolerant of wet conditions. In addition it is susceptible to flooding, and occasionally floods injure or destroy crops. On the other hand, periodic flooding acts to maintain the natural fertility of this soil. Nevertheless, under continuous cropping to corn without adding fertilizer the fertility will decrease. Where corn is grown some artificial drainage is considered necessary. Provided the drainage is adequate, increased yields of corn would certainly

be expected from such practices as proper fertilization, liming, addition of organic matter, and rotation of crops. Under present conditions, however, probably the most practicable thing to do is to grow corn year after year and to make relatively heavy applications of fertilizers that are high in nitrogen. Owing to the fact that floods are frequent enough on most areas of this soil to injure winter legumes, it may be impracticable to attempt to grow them for green manure.

Iuka fine sandy loam.—Like Iuka silt loam, Iuka fine sandy loam occurs only on the first bottoms and is characterized by restricted drainage conditions. It differs from the silt loam chiefly in being lighter textured. The surface layer, to a depth of about 12 inches, is brownish-yellow or yellowish-brown loose fine sandy loam containing a few concretions and a few blue or yellow mottlings. Underlying this is bluish-gray fine sandy loam that is highly mottled with blue, gray, yellow, brown, and red and contains numerous concretions. This material continues downward to a depth of more than 40 inches with little or no apparent change. The gray layer is normally waterlogged much of the time. The variations in color and depth of the surface soil are similar to those in Iuka silt loam. Included with the fine sandy loam are a few small scattered areas of Iuka very fine sandy loam and Iuka sandy loam. In the eastern part of the county some gravel is present in small areas. All areas are subject to flooding except the small ones at the heads of small drainageways.

Iuka fine sandy loam, mapped on level or nearly level bottom lands in all parts of the county, covers 17,728 acres. It is the dominant soil in the medium-sized to small areas of bottom lands near the uplands where the Cuthbert soils predominate.

About 80 percent of Iuka fine sandy loam is cleared and used for agriculture, whereas only 40 percent of Iuka silt loam is thus used, even though the latter is more productive. This difference in utilization is apparently due to differences in the manner of occurrence and in the geographic associations of the two soils. The silt loam occurs chiefly along the larger creeks where more suitable cropland—the Ochlockonee soils of the bottoms and the Prentiss soils of the terraces—is available; hence, the less suitable Iuka silt loam has not been cleared. On the other hand, a large part of Iuka fine sandy loam occurs in the smaller bottoms in association with the Cuthbert soils of the uplands—soils that are poorly suited to the production of crops. In these areas, therefore, where suitable cropland is so limited, most of Iuka fine sandy loam has been cleared.

Cleared areas of Iuka fine sandy loam are used mainly for the production of corn, although small areas are used for pasture and hay. On nearly all of the land used for corn, the drainage has been improved by surface ditches. The general practice in the narrower bottoms is to run a ditch along the boundary between the bottoms and the uplands so as to prevent seepage onto the bottoms. Many of the channels are also deepened and straightened. Although such measures have reduced the susceptibility to flooding, they have not prevented it altogether; and the growing corn is occasionally injured by late spring or early summer floods. On the other hand, crops have been known to be injured from lack of moisture in ex-

tended dry periods. Yields of corn, which are a little lower on this soil than on the silt loam, range between 10 and 20 bushels an acre in undrained areas and between 15 and 35 bushels in drained areas. Like the silt loam, the fine sandy loam makes good pasture, and the two soils support similar hay and pasture plants. Like the silt loam, again, this soil is unsuitable for the production of cotton except where it is very well drained by artificial means. Periodic flooding helps to maintain the fertility, but that alone is not sufficient under continuous use for corn. For the successful production of corn, improvement of drainage by artificial means is more or less necessary. If yields of corn are to be increased and maintained at a comparatively high level, it is also necessary to follow other practices, particularly making heavier applications of nitrogenous fertilizers. As on Iuka silt loam, the most practical management on the fine sandy loam is to grow corn year after year and to make heavy applications of fertilizers that are high in nitrogen. As winter floods are often severe enough to injure winter legumes, it may be impracticable to grow them except in those few areas that are very well drained by artificial means.

BIBB SERIES

The Bibb series include light-colored, young poorly drained soils of the first bottoms, consisting of materials that have been washed from the uplands underlain by Coastal Plain material. They are more poorly drained than the associated Iuka soils and also somewhat more susceptible to flooding. These soils are generally light gray mottled with bluish gray, yellow, brown, and reddish brown. They are medium to very strongly acid in reaction. In their natural, poorly drained condition they are unsuitable for the production of the common crops, such as cotton and corn, but are suitable for certain hay crops and pasture. The Bibb soils, distributed over all parts of the county, cover a total area of 19,904 acres, or about 7 percent of the county. They are classified and mapped in two types, namely, Bibb silt loam and Bibb fine sandy loam.

Bibb silt loam.—Bibb silt loam is poorly drained, both internally and externally. It occupies nearly level areas or slight depressions in the first bottoms subject to frequent flooding. Where this soil is not artificially drained, it is generally waterlogged in the winter and spring and frequently much of the summer. Because of the abundance of crawfish holes, it is locally referred to as crawfish land. It consists of silty material that has been washed from the uplands underlain by the Cuthbert, Ruston, Atwood, Savannah, and Guin soils. Bibb silt loam is medium to very strongly acid in reaction, friable, free from stone, generally free from gravel, and generally low in organic matter. Unless artificially drained, it is unsuitable for the production of the common crops, but it is suitable for hay and pasture.

Bibb silt loam, a young soil, shows little or no consistent profile development. In general, however, it has a surface layer, between 1 and 4 inches thick, of grayish-yellow mellow silt loam. Below this the material, to a depth of 36 inches or more, is generally friable smooth silt loam that is bluish gray or grayish blue, highly mottled with yellow brown, and reddish brown. Black, red, brown, and

yellow concretions, ranging from about one-sixteenth to one-fourth of an inch in diameter, are numerous throughout.

Several variations are included in mapping. One represents a few areas in which the 2- to 4-inch surface layer contains some peat-like organic matter. Another, indicated by marsh symbols, borders on swampland. Still other inclusions have a very fine sandy loam or silty clay loam texture. In the Yellow Creek bottom an aggregate area of about 200 acres, consisting of a mixture of Iuka silt loam and Bibb silt loam and dissected by many channels is mapped as Bibb silt loam.

Typically, Bibb silt loam occurs in the low back bottoms along the larger creeks and in bottoms that are unusually wide for the size of the stream. The streams in such bottoms are generally sluggish. This soil is subject to rather frequent flooding, and seepage from the hills keeps some of it wet most of the year.

It is estimated that about 85 percent of Bibb silt loam is still in woods, which consist mainly of water-tolerant trees, such as willow, willow oak, water oak, cypress, and sweetgum. Beech trees, abundant on the associated Iuka soils, are generally absent on the Bibb soils. Of the cleared area, about one-half is used for the production of corn and one-half for hay and pasture. Wherever corn is grown, the land is intensively ditched to improve the drainage. The yields vary greatly. Some of the highest yields of corn in the county have been made on this soil; on the other hand, total failures have been frequent. As a rule, however, the yields of corn are low. Where adequate artificial drainage can be effected, it appears as though corn can be successfully produced, but the flood hazard can hardly be entirely eliminated. Floods, therefore, are likely to damage the corn occasionally. Most of Bibb silt loam that is used for the production of corn lies in the Yellow Creek bottoms south of Burnsville. Here a big drainage canal takes care of most of the water; consequently floods are no longer frequent. Without artificial drainage, the soil is considered suitable only for hay and pasture. Lespedeza, carpet grass, Bermuda grass, Dallis grass, hop clover, and white clover grow fairly well on it. In a few places the drainage will probably have to be improved a little by ditching. The application of lime, phosphate, and presumably potash would be expected to increase the growth of pasture and hay plants. Nitrogen may be necessary in order to get the hay and pasture plants started.

Bibb fine sandy loam.—This soil differs from Bibb silt loam chiefly in being lighter in texture. Like the silt loam, this fine sandy loam is a poorly drained, light-gray soil that occurs in the first bottoms and is subject to frequent flooding. Included in this separation are a few areas of Bibb sandy loam and a few of Bibb very fine sandy loam.

About 12,000 acres of this soil are mapped. Typically, it occurs in narrower bottoms than does Bibb silt loam; but, like the silt loam, it occurs in all parts of the county.

Between 30 and 40 percent of the land is cleared. The proportionate area cleared is considerably higher than that of Bibb silt loam, because it occurs in areas where suitable cropland is limited. In wooded areas of Bibb fine sandy loam, willow, willow oak, water

oak, sweetgum, and cypress are the dominant trees. Of the cleared area, about 40 percent is used for the production of corn. All the cornland is intensively ditched. Yields of corn are variable. Where the artificial drainage is adequate and other conditions are favorable, the corn returns moderate yields; on the other hand, where conditions are slightly unfavorable, it returns low yields. Crop failure from flooding during the growing season is rather common; yet on the artificially drained areas corn has been known to be injured from lack of moisture during extended dry periods. About 15 percent of the cleared land is abandoned and is reverting to woodland, and the rest is used for hay and pasture. Under present conditions, hay land and pasture are probably the best uses that can be made of this soil. Lespedeza, carpet grass, Dallis grass, white clover, Bermuda grass, and hop clover will grow on this soil. Improvement of pasture and hay land is to be expected from the application of lime, phosphate, and presumably potash. The application of nitrogen may be necessary in order to get the hay and pasture plants started.

MISCELLANEOUS LAND TYPES

Alluvial sands.—This miscellaneous land type includes deposits of very recent alluvium consisting almost entirely of pure sand, generally fine or very fine sand. Most of these deposits are 2 feet or more in thickness and rest upon what used to be Ochlockonee, Iuka, or Bibb soils. The loose incoherent fine sand and very fine sand has been washed chiefly from the Cuthbert and Ruston soils of the uplands. The color, which is variable, is generally a mixture of yellow, brownish yellow, reddish yellow, and grayish yellow. Below the surface, mottlings of brown, red, yellow, gray, and blue appear and become more numerous with increase in depth. Both internal and external drainage are poor.

This separation is mapped in a small total area—3,392 acres—chiefly in two areas, one at the mouth of the Mackys Creek Canal and the other at the mouth of the Yellow Creek Drainage Ditch. Those drainage canals facilitated rapid drainage and rapid flow of water. After heavy rains the water would flow down these canals at a greatly accelerated rate carrying a heavy load of sandy material. As soon as it reached the end of the canal, where it was supposed to continue in the old channel, flooding resulted because the old crooked channel was not large enough to take care of the abnormal flow of water. The flooding and consequent slowing of the current resulted in the deposition of the sandy material. During the last 20 years, sandy deposits as deep as 10 feet have been laid down at the junction of the canals and the regular stream channels. This has had the same effect as shallow dams. The sandy material is being deposited farther and farther up the bottoms each year, covering good bottom land, bringing poor drainage to previously well or intermediately drained soils, killing the vegetation, and reducing cropland to virtual wasteland.

This land is unsuitable either for the production of crops or for pasture and is poorly suited even for forestry. Willows, briers, and alder bushes are the chief plants on areas of alluvial sands.

Gravel pits.—A few gravel pits, totaling 128 acres, have been opened along Clear Creek on either side of the railroad southeast of Iuka. They have no agricultural use and are valued only for the gravel extracted.

PRODUCTIVITY RATINGS AND PHYSICAL LAND CLASSIFICATION

In table 6 the soils of Tishomingo County are rated according to their productivity for the chief crops grown in the county and are grouped according to their physical suitability for agricultural use.

TABLE 6.—*Productivity rating of soils and physical suitability of land for use in Tishomingo County, Miss*

Soil (type, phase, complex, and land type) [1]	Crop productivity index [2] for—								Soil group or physical land classification [7]
	Corn (100=50 bushels)			Cotton (100=400 pounds)			Hay [6]		
	A [3]	B [4]	C [5]	A [3]	B [4]	C [5]	A [3]	C [5]	
Ochlockonee silt loam	50	70	100	45	60	100	Good	Very good.	First-class soils (good cropland)
Cahaba very fine sandy loam	30	40	75	40	70	130	...do	...do	
Atwood very fine sandy loam, undulating phase	30	40	70	40	70	130	...do	...do	
Atwood very fine sandy loam, eroded undulating phase	20	30	70	30	60	130	Fair	...do	
Prentiss silt loam, level phase	25	35	70	25	60	130	Fair	Good	Second-class soils (fair to good cropland).
Savannah silt loam, level phase	25	35	70	25	60	120	...do	...do	
Prentiss silt loam	25	35	70	25	60	120	...do	...do	
Savannah silt loam	25	35	70	25	60	120	...do	...do	
Ochlockonee fine sandy loam	30	40	80	30	45	80	...do	...do	
Atwood very fine sandy loam	25	35	70	30	60	120	...do	...do	
Atwood very fine sandy loam, eroded phase	15	25	70	25	40	120	Poor	...do	
Iuka silt loam (undrained)	25	30	40	...	...	...	Good	Very good.	
Iuka silt loam (drained)	40	50	85	[8] 25	[8] 35	[8] 45	...do	...do	
Iuka fine sandy loam (undrained)	25	30	40	...	...	...	...do	...do	
Iuka fine sandy loam (drained)	35	45	70	[8] 20	[8] 30	[8] 40	...do	...do	
Atwood gravelly very fine sandy loam	20	30	65	30	50	110	Fair	Good	Third-class soils (poor to fair cropland)
Savannah silt loam, rolling phase	20	30	60	25	55	110	Poor	Fair	
Ruston fine sandy loam	20	30	60	25	55	100	...do	Good	
Savannah gravelly silt loam	20	30	60	25	50	100	Fair	...do	
Savannah silt loam, eroded phase	15	25	50	15	30	85	Poor	Fair	
Savannah gravelly silt loam, rolling phase	20	25	50	25	40	100	...do	...do	
Ruston fine sandy loam, eroded phase	20	25	50	20	40	100	...do	Good	
Cuthbert very fine sandy loam	20	25	40	20	35	60	...do	Fair	
Cuthbert gravelly very fine sandy loam.	20	25	40	20	35	60	...do	...do	
Savannah silt loam, eroded rolling phase	15	20	40	15	25	60	Very poor.	...do	
Bibb silt loam (undrained)	10	10	20	...	...	...	Fair	Good	Fourth-class soils (poor cropland but fair pasture and hay land)
Bibb silt loam (drained)	30	40	65	[8] 20	[8] 30	[8] 40	Good	Very good.	
Bibb fine sandy loam (undrained)	10	10	20	...	...	...	Fair	Good	
Bibb fine sandy loam (drained)	25	35	60	[8] 15	[8] 25	[8] 35	Good	Very good.	
Myatt silt loam (undrained)	5	5	10	...	...	...	Poor	Fair	
Myatt silt loam (drained)	15	25	40	[8] 10	[8] 20	[8] 30	Fair	Good	

See footnotes at end of table.

TABLE 6.—*Productivity rating of soils and physical suitability of land for use in Tishomingo County, Miss.*—Continued

Soil (type, phase, complex, and land type) [1]	Crop productivity index [2] for—								Soil group or physical land classification [7]
	Corn (100=50 bushels)			Cotton (100=400 pounds)			Hay [6]		
	A [3]	B [4]	C [5]	A [3]	B [4]	C [5]	A [3]	C [5]	
Ruston fine sandy loam, hilly phase.	15	25	30	20	25	40	Poor	Fair	Fifth-class soils (very poor cropland, fair to poor pasture and hay land, generally best suited to forest)
Cuthbert very fine sandy loam, eroded phase.	10	15	25	10	20	35	Very poor.	Poor	
Cuthbert-Ruston fine sandy loams.	10	20	30	15	25	35	Poor	Fair	
Cuthbert very fine sandy loam, hilly phase	10	20	30	15	25	40	...do	Poor	
Quin gravelly loam	10	20	30	15	25	40	...do	...do	
Ruston fine sandy loam, steep phase	---	---	---	---	---	---	---	---	
Cuthbert-Ruston fine sandy loams, steep phases.	---	---	---	---	---	---	---	---	
Cuthbert very fine sandy loam, steep phase.	---	---	---	---	---	---	---	---	
Quin gravelly loam, steep phase	---	---	---	---	---	---	---	---	
Rough gullied land (Cuthbert soil material).	---	---	---	---	---	---	---	---	
Alluvial sands	---	---	---	---	---	---	---	---	
Gravel pits	---	---	---	---	---	---	---	---	

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

[2] The soils of Tishomingo County 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 amendments on the better soil types of significant extent in the regions of the United States in which this crop is most widely grown. Many of the ratings are the result of estimates, as supporting data are incomplete Absence of a rating indicates that the specified crop is not commonly grown on the soil and that the soil is considered physically unsuitable for the production of such crops.

[3] These indexes refer to yields commonly obtained without the use of commercial fertilizers, lime, manure, or beneficial crop rotation.

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

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

[6] Because yield data for the common hay crops—lespedeza, soybeans, cowpeas, and grasses—are extremely scarce, the terms "very good," "good," etc., are used instead of numerical indexes. These terms represent the relative productivity of the soils of the county for this class of crops without amendments (column A), and with amendments, particularly lime and phosphate (column C).

[7] This is a grouping of the soil types and phases according to their relative physical use adaptation. (For further details see text)

[8] Cotton is seldom grown on the Iuka, Bibb, and Myatt soils. For this reason yield data are extremely scarce and the indexes in the table were arrived at inductively.

The rating compares the productivity of each of the soils for each crop to a standard of 100. This standard index represents the productivity, without the use of fertilizers and amendments, of the more productive soils of that 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 for a 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.

Soils of Tishomingo County differ widely in productivity, under both the common and the improved practices of management. In the long run, the response to management is more significant than that intangible quality that has sometimes been called natural or

inherent fertility. For this reason the productivity of the soils of Tishomingo County is rated in three ways, according to different kinds of treatments.

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

In column B, the indexes refer to the expected yields under present prevailing practices of management. For cotton, these are the preparation of the seedbed in the spring, the application of 200 or 300 pounds to the acre of a 4–8–4 fertilizer, and the hoeing and cultivating necessary to eradicate the weeds during the growth of the cotton crop. For corn, the practices are about the same except that it is commonly side-dressed with nitrate of soda at the rate of about 100 pounds an acre. Much of the corn, however, is grown without fertilizer, whereas some cornland is treated with superphosphate or a 4–8–4 mixture, in addition to nitrate of soda. On the sloping land, tillage operations are generally performed on the contour, and terraces have been constructed in many fields. The application of lime and phosphate, the growing of winter cover crops, green manuring, and the systematic rotation of crops are not yet common practices in this county, although they are gaining in popularity.

In column C, the indexes refer to yields that may be expected under the best feasible management. Only a small part of the land is now managed in this way, and the indexes in this column are largely estimates. There were, however, a few well-managed fields from which yield data were obtained. Although there are not sufficient accurate data to support adequately these indexes, it is hoped that by comparing them with the indexes of columns A and B the relative response of each soil to management practices will be brought out. The term "best practices of management" refers to adequate fertilization and liming, rotation of crops, return of organic matter to the soil, and use where necessary of mechanical means of controlling water and erosion, carried on toward the end of maintaining and increasing the soil productivity but not to an extent that would make farming unprofitable.

In this county numerical ratings are given only for corn and cotton, the two main crops, as these were the only crops for which fairly reliable yield data are obtainable. In order to give some idea of the relative productivity of the soils for the common hay crops—lespedeza, soybeans, cowpeas, hop clover, and grasses—for which specific yield data are unavailable, use is made of such terms as "good," "fair," and "poor." These ratings or comparisons for hay are based almost entirely on observations. Those in column A represent the rating when the hay crops are grown without amendments, which is the common practice; and those in column C represent the relative yields expected under improved management, which includes particularly the application of lime and phosphate.

The soils have been listed in table 6 in what is thought to be the approximate order of their relative physical suitability, including productivity, for the production of the important crops under current practices of management, in the present agriculture.

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 wherever available. In Tishomingo County most of the productivity ratings are based largely on observations, interviews, and local expert advice. Because of a lack of definite information on yield data by soil types in some instances, the indexes in this table represent inductive estimates rather than established yields.

Productivity tables do not present the relative roles that soil types, because of their extent, pattern of distribution, and geographic association, play in the agriculture of the county. The table gives a characterization to the productivity of individual soil types. It 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 factors are not considered in determining the productivity indexes; therefore the indexes cannot be interpreted directly 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.

For the intermediately drained and poorly drained soils, ratings are given in both the undrained and drained conditions. Although cotton would be expected to grow on these soils if the soils were adequately drained, it would mature later than on the naturally well-drained soils. This later maturity might be very significant with regard to increased susceptibility of the cotton to injury from insects, and for that reason the production of cotton might not be practicable on these soils even though drained.

Ratings are not given for soils that are not now generally used for the production of crops and that farmers and local agricultural advisers agree are unsuitable for such utilization. For the most part, these soils are considered as Fifth-class.

In the column headed "Soil group or physical land classification," the soil types, phases, complexes, and miscellaneous land types of the county 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 on a county-wide, not a regional or Nation-wide basis, and for that reason the various classes may not be exactly comparable to corresponding classes in other areas, such as, for example, the loess section of Mississippi or the Nashville Basin or Central Basin and great valley of Tennessee. This grouping of the soils 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, under present conditions and relative to the other soils in the county, the 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 usable for hay and pasture; and Fifth-class soils, poor land for crops or pasture and best suited to forestry, although some of it may be used for pasture.

The soils of Tishomingo County differ widely in physical characteristics, and consequently in use capabilities and management needs. Such differences are the results of a number of internal and external soil features, such as texture, structure, consistence, amount and character of organic matter, chemical character (including lime), moisture conditions, soil depth, erosion, stoniness, and slope or lay of the land. These soil characteristics affect land use and management practices through productivity,[13] workability,[14] and conservability.[15]

An ideal soil for the production of crops is one that is very productive, easily worked, and capable of being conserved with minimum effort. A soil with such an ideal combination of features is very rare, if it exists at all. All the soil types and phases in Tishomingo County fall short of this ideal, but they differ widely in the degree of shortcoming; and it is on this basis that they are placed in five groups or classes for convenience in discussing their relation to agriculture. These, in the order of their desirability, will be referred to as follows: First-class soils, Second-class soils, Third-class soils, Fourth-class soils, and Fifth-class soils.

This grouping of soils into classes according to their relative physical suitability for use in the present agriculture, as given in table 6, is also shown in the legend of the accompanying detailed soil map.

FIRST-CLASS SOILS

In Tishomingo County four soils are considered First-class soils. They cover about 3 percent of the area of the county. The soils of this group differ in many characteristics, but they are similar in regard to conditions of productivity, workability, and conservability. In comparison with the other soils of the county, these First-class soils are relatively high in productivity of the common crops, have very favorable conditions of workability, and have relatively low requirements for conservation. As has been pointed out before, the soils of the county, as compared with the soils of the United States as a whole, are relatively low in content of plant nutrients and organic matter, and this holds true for the soils of this group. All the soils are adequately drained for the production of all the crops common to the area, but at the same time none of them is excessively drained. On the whole, crops on these soils are less susceptible to injury from wet or dry conditions than on the other soils in the county. The lay of the land ranges from level to undulating. Tilth conditions are favorable, and tillage is possible under a wide range in moisture content. The physical properties of these soils favor circulation of air and moisture and penetration of roots to a great depth.

[13] "Productivity" as used here refers to the capacity of the soil to produce crops under given farming practices. In appraising the soils for general productivity, all important crops are considered and the importance of each is weighed by its acreage and value per acre. The soil may be productive of a crop but not well adapted because of its poor workability or conservability or both.

[14] "Workability" as used here refers to the ease of tillage, harvesting, and other field operations. The following characteristics affect workability: Texture, structure, consistence, moisture conditions, organic matter, stoniness, and relief or lay of the land.

[15] "Conservability" as used here refers to maintenance or improvement of the productivity and workability of the soil and includes control of erosion. The degree to which the soil responds to management practices is a factor in conservability.

None of these soils is characterized by any prominent adverse external soil or land condition; that is, they are free from stone, have a lay of the land that is favorable to soil conservation and cultural operations, and none of them is severely eroded or highly susceptible to injury from erosion. To summarize, these soils have comparatively high productivity, favorable working qualities, and simple problems of conservation—both for the fertility of the soil and for the soil material itself—and they are all well adapted to most of the crops of the locality.

SECOND-CLASS SOILS

As compared with the First-class soils, the Second-class soils are characterized by one or more of the following qualities: Lower productivity, more difficult workability, or greater problems of conservation. The Second-class soils differ from one another in a number of respects, but they are all considered fairly well adapted to the production of crops. Each soil of this class has one or more detrimental or unfavorable characteristics and conditions, such as natural poverty of plant nutrients, scarcity of organic matter, imperfect drainage, unfavorable physical properties, gravelliness, or injurious degree of erosion. The detrimental effect of one or more of such undesirable characteristics on productivity or suitability for cultivation is greater for each of these soils than for any soil of the First class, but less than for any soil in the Third class. Their physical properties are moderately favorable for tillage and for the circulation and retention of moisture. None of them has a pronounced relief, none is stony, none is extremely gravelly, and none is greatly injured by erosion. These soils are moderately productive, have moderately favorable features affecting workability, and can be conserved by practices of good management. In short, they are all reasonably well adapted to most of the important crops in the locality.

Nine soils are included in this group. They cover about 23 percent of the area of the county. Four of them occur in the uplands, two on the terraces, and three in the bottoms. Four of the soils are characterized by an unfavorable hardpan, two by a rolling relief, two by inadequate drainage and susceptibility to overflow, and one by low fertility and low moisture-holding capacity.

THIRD-CLASS SOILS

As compared with the Second-class soils, the Third-class soils are characterized by more adverse conditions in regard to workability, productivity, or conservability. On the other hand, they are characterized by less adverse conditions of one or more of these factors than the Fourth-class soils. In the Third-class soils one or more of the following undesirable features are rather prominent: Poverty of plant nutrients, poverty of organic matter, undesirable physical properties, strong slope, gravelliness, eroded condition, susceptibility to erosion, and unfavorable moisture conditions. These detrimental features limit the use capabilities and complicate management requirements of these soils through the workability, productivity, and conservability. The Third-class soils are moderate to low in productivity of the crops common to the locality.

Ten soils are included in this group. They cover about 17 percent of the area of the county. All are soils of the uplands, eight have a

rolling and two an undulating relief, five are characterized by an unfavorable hardpan, three are eroded, four are gravelly, and two have an unfavorable consistence of the subsoil.

FOURTH-CLASS SOILS

None of the First-, Second-, or Third-class soils is characterized by extremely adverse productivity, workability, or conservability; but the Fourth- and Fifth-class soils are characterized by extremely adverse conditions of one or some combination of them. The soils of the Fourth-class in this county are characterized by particularly adverse conditions of productivity for such crops as cotton and corn; but they are moderately productive of certain pasture and hay plants. Only three soils are included in this group, and they cover only about 8 percent of the county. They occupy level or nearly level areas; two of them lie in the bottoms and one on the terraces. The particular and chief detrimental feature of these soils is their poor external and internal drainage. Furthermore, two of the soils are subject to frequent flooding. In their natural conditions, these soils are unproductive of most of the tilled crops, particularly corn and cotton, but they are adapted to the production of selected pasture and hay plants. If they were artificially drained they would probably be adapted to the production of most of the common crops of the area.

FIFTH-CLASS SOILS

Like the soils of the Fourth class, all the soils of the Fifth class are characterized by one or more very unfavorable or detrimental soil or land features and therefore are not physically suited for growing cultivated crops; moreover they are not, for the most part, physically adapted to pasture. The soils of this class are characterized by one or more of the following undesirable features: Hilly or steep relief, high content of loose stone, high content of gravel, severely eroded condition, and poor drainage. In addition, most of them are probably low in content of available plant nutrients, excessively drained, and strongly to very strongly acid in reaction. Owing to the undesirable characteristics manifested by soils of this class, their productivity of crops or pastures is low, their tillage is either impossible or very difficult; and, if used for crops, the problems of conservation, if cultivation were attempted on them, would be extremely difficult. Although they probably grow forest trees more slowly than the soils of the other groups, these Fifth-class soils may be thought of as being physically adapted to forestry in the broad sense that implies the use of land that best serves conditions as they exist. It is clearly understood, however, that factors arising from other existing conditions, either of the locality of or the individual farm unit, may require the utilization of some of this land for crops and pasture, even though it is very poorly suited to such uses.

Although these Fifth-class soils are characterized by features that disqualify them for any of the preceding classes, they differ from one another in many respects, such as texture, structure, consistence, and character of parent material. Owing to such differences, it is reasonable to assume that they exhibit important differences in the quality of the forest they support.

A total of nine soils and three land types are included in this group. They cover about 49 percent of the area of the county. All the soils and one miscellaneous land type occur in the uplands; the other miscellaneous land types occur in the bottom lands. Four of the soils have a steep relief, three soils and one miscellaneous land type have a hilly relief, and two soils have a rolling relief; alluvial sands occupy level but poorly drained areas; and the relief of the land type, gravel pits, is determined by the extent of excavations. Two of the soils are badly eroded. Except in the eroded soils, the surface texture of all the soils is light. Two of the soils have a high content of gravel. Loose stone is common in four of them. All the soils are well drained internally and excessively drained externally.

Although the soils of no one class are ideal for plant 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 from the ideal than those of the preceding group. The soils of the Fifth class are in general less productive, less easily worked, and more difficult to conserve than are the soils of any of the preceding groups.

GENERALIZED PHYSICAL LAND CLASSIFICATION MAP

The soil map of Tishomingo County shows graphically the extent and distribution of the 35 soil types, phases, and complexes and the 3 miscellaneous land types. As these 38 units of mapping are differentiated on a basis including both internal and external soil characteristics significant to land use, each unit possesses an individuality that influences the capability of the unit for land use and the requirement of the unit for management according to selected uses. 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, an example of such a land classification map, is of necessity generalized because of its small scale.

This figure shows the land of Tishomingo County divided into three classes or 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 productivity, workability, and relative ease of conservation. Land type 1 consists predominantly of soils characterized by relatively favorable conditions of productivity and workability and a minimum problem of conservation. In general, they are physically suitable for crop production. Land type 2 consists predominantly of soils that, in their natural condition, are characterized by unfavorable conditions of productivity but moderately favorable conditions of workability and moderate problems of conservation. They are, in their natural condition, unsuitable for crops requiring tillage but suitable for pasture. Land type 3 consists predominantly of soils of low to very low productivity that have unfavorable conditions of workability or are very difficult to conserve, or both. The soils are physically unsuited or very poorly suited to both crop production and pasture.

Land type 1 is composed chiefly of First-class, Second-class, and Third-class soils. Although small areas of Fourth- and Fifth-class

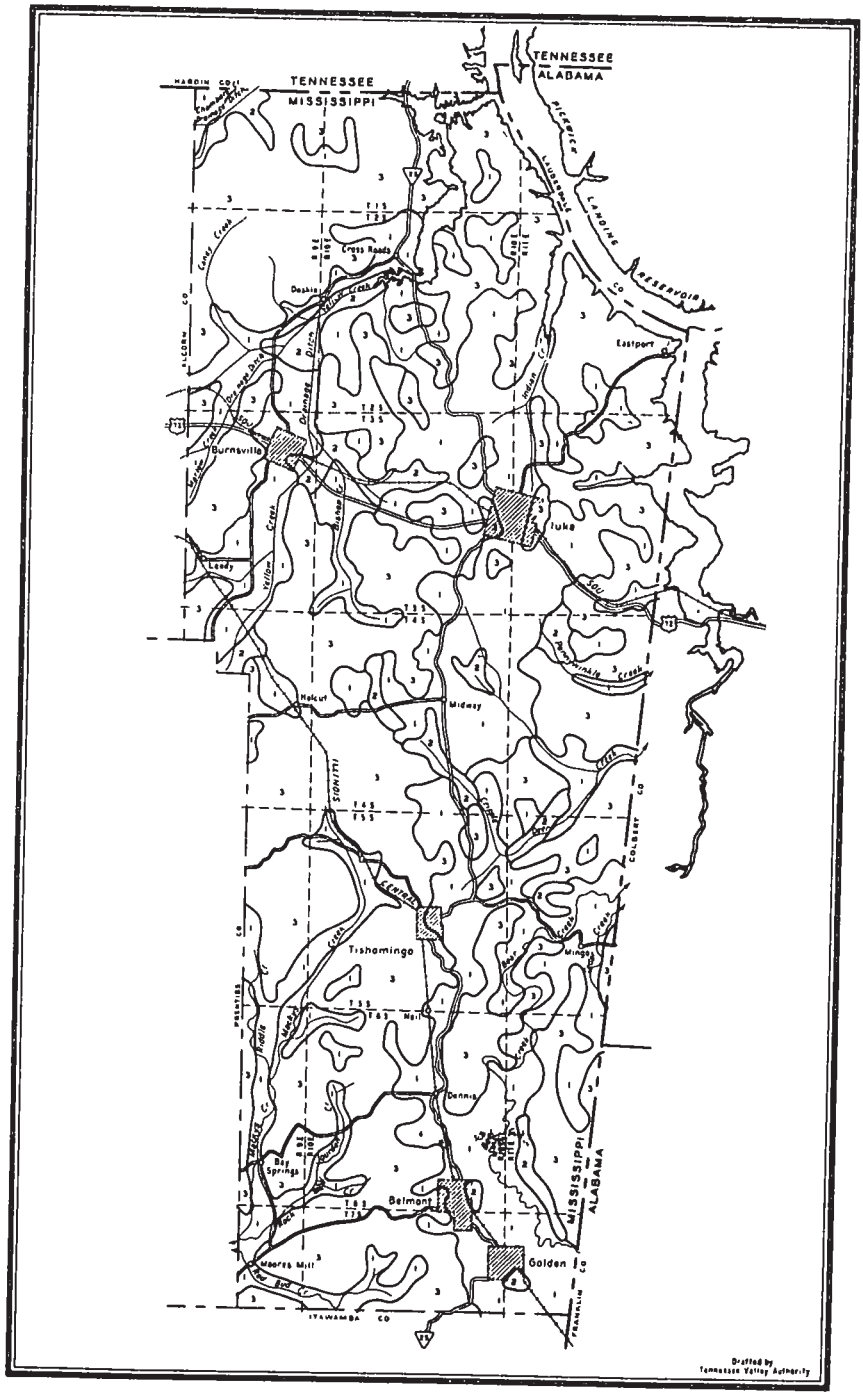

FIGURE 3.—Generalized physical land classification map of Tishomingo County, Miss.: Land type 1, predominantly soils of favorable productivity, workability, and conservability; land type 2, predominantly soils of unfavorable productivity but moderately favorable workability and conservability; land type 3, predominantly soils of low productivity and unfavorable workability or conservability, or both

soils are necessarily included because of the generalized character of the map, probably about 90 percent of the land in this type is physically adapted to crops requiring tillage. It is estimated that about 42 percent of the area of the county is included in this type. The greater part of the corn and cotton are produced on this type.

Land type 2 consists predominantly of Fourth-class soils. These, it will be recalled, are poorly drained. Probably about half of this type is cleared and is used chiefly for hay land and pasture. A small proportion, artificially drained, is used for growing corn. So far as the character of the land is concerned, it is thought advisable to devote considerably more of this land to hay and pasture where that use is consistent with feasible farm management. This land type is of small extent; it occupies only about 8 percent of the area of the county.

Land type 3 consists chiefly of Fifth-class soils. The greater part of this land is in forest, and the physical character of most of it suggests continued utilization of this land for forestry. Nearly all is hilly and steep, and the soils are of such a physical character that they are unsuitable for crops or pasture on such strong slopes. In short, this land is low in natural productivity, possesses poor qualities of workability, and has difficult problems of conservation. It is estimated that this type occupies about 50 percent of the area of the county.

This map is generalized. In each land type indicated on the map, small areas conforming to the other two land types are necessarily included. This applies particularly to land type 1, as much as 10 percent of which may be composed of isolated areas consisting largely of soils that conform to land types 2 or 3. Similarly, small areas of land types 1 and 3 are included in land type 2, and also similarly, areas of land types 1 and 2 are included in areas delineated as land type 3.

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, because factors other than those of the physical character of the land are involved in such recommendations.

LAND USES AND SOIL MANAGEMENT

In the preceding sections it has been brought out that the soils differ in their natural physical suitability for different uses. Some of the soils are suitable for the production of many different kinds of plants useful to man; others are suitable for the production of comparatively few kinds. Some of the soils are suitable for the growing of crops, pasture plants, and forest trees; others are suitable for forest trees only. Under present conditions, according to the accompanying map, about 42 percent of the land in the county is considered physically suitable for the production of crops, about 8 percent is unsuitable for cropland but is suitable for pasture, and about 50 percent is unsuitable for both cropland and pasture and is

438331—44——6

therefore suitable only for forestry. The physical use suitabilities of the individual soil types and phases have already been discussed in the section on Soils, and in the section on Productivity Ratings and Physical Land Classification the soils have been grouped and discussed according to their relative physical suitabilities for use and rated according to their productivity of specified crops.

In Tishomingo County the land is used chiefly for forestry and crop production. About 60 percent of the land is in forest and is used chiefly for the production of timber, but a small part is also used for pasture, that is, woodland pasture. About 20 to 25 percent of the land is used chiefly for the production of crops, and the rest is used mainly for pasture, homesteads, and roads. An insignificant acreage is devoted to urban development and recreation, and just a few acres are included in gravel pits.

According to the Federal census, 179,620 acres, or 62.2 percent of the county, was in farms in 1940, and the average size of farms was 74.8 acres. In 1939 the cropland harvested totaled 44,276 acres, or slightly more than 15 percent of the area of the county. Of the cropland harvested, corn was grown on a little less than 50 percent and cotton on a little more than 30 percent, a total of about 80 percent. Nearly 13 percent of the cropland harvested in 1939 was devoted to hay crops; the rest was used for miscellaneous crops, such as potatoes, sweetpotatoes, peanuts, sorgo, fruits, and vegetables.

In this county there is considerable difference between the actual use and what might be considered the potential use of the land, particularly in regard to the cropland. The total acreage of the First-, Second-, and Third-class soils, which are all considered physically suitable for the production of farm crops, is about 40 percent of the county. Contrast this with the proportion of the county from which crops were actually harvested in 1939—only 15 percent. This indicates that there is much more land physically suitable for the production of crops than is being used.

Among the reasons for this situation, the following are significant: First, a large proportion of the land considered suitable for the production of crops comprises Third-class soils—soils that can be used for crops but are not well adapted to that use. Second, a significant proportion of this land suitable for crops occurs in small areas that are more or less isolated from other cropland by land that is unsuitable for crops. Third, a significant proportion of this land forms a part of rather large timber tracts, and in addition some serves as wood lots on the farms. Fourth, some of this land is used for pasture, and a significant proportion of it is lying idle or fallow. Fifth, in certain parts of the county the development of land for agriculture has lagged, probably owing to unfavorable economic and social conditions.

The areas suitable for the production of crops and not so used are widely distributed over many soil types. Among these, however, Cuthbert very fine sandy loam is one of the most extensive. This soil probably accounts for nearly half of the land adapted to crops that is still in woods. In this connection it needs to be recalled that this soil is not well adapted to the production of crops, but rather it is on the borderline between soils suitable and soils unsuitable for such

use. Other soils adapted to crops that have significant areas not so used are Iuka silt loam, Ochlockonee silt loam, the eroded phase of Atwood very fine sandy loam, several of the Savannah soils, and to a less extent Atwood very fine sandy loam and Ruston fine sandy loam. Most of the land that is suitable for the production of crops but is not so used is utilized for forestry.

Past use of the land in the county has been guided with considerable regard for the physical character of the land. For example, most of the land that has been used for the production of crops is land that is suitable for such use; and, on the other hand, most of the land that has not been used for crops has been utilized for timber production, a use to which it is adapted.

Instances of improper land use, however, have been altogether too common. Probably one of the most conspicuous examples of improper land use is the attempt made year after year to grow cotton and corn on areas of the eroded phase of Cuthbert very fine sandy loam. Yields are almost invariably low, and total failures are rather common. Although this soil in its virgin condition was not highly productive of these crops, it was nevertheless productive enough to invite development for agriculture. Under the continuous growing of cotton and corn it rapidly deteriorated and is now unproductive not only for cotton and corn but for practically all of the other commonly grown crops. Under present conditions the best use of this land appears to be to return it to timber. Another conspicuous example of improper land use is the attempt to grow cotton and corn on the Myatt and Bibb soils without adequate artificial drainage. These soils are usable for hay land and pasture, but they are not suitable for corn and other crops except where they are adequately drained.

A symptom of maladjustment in land use is indicated by the ratio of potential to actual cropland. According to the Federal census, the total area of the land on which crops failed, the cropland that lay idle or fallow, and the plowable pasture in 1939 was 36,819 acres, as compared with the total area of the cropland harvested, which was 44,276 acres. Much of this plowable pasture is eroded and unimproved pasture land and is therefore of low productivity. These census data and the numerous examples of improper adjustment between the present use and the natural suitability of the land for use lead to the conclusion that the realization of proper use of the land is one of the basic problems in the agriculture of the county.

The term "land use" as used here refers to broad uses of land on the farm, such as for tilled crops, permanent pasture, and forestry. The problem of land use adjustment is logically followed by that of land management. The term "land management" as used here refers to such practices as the choice and rotation of crops, application of amendments, tillage methods, and mechanical means for water control.

The prevailing management practices in Tishomingo County are generally rather simple. Usually no systematic rotation is followed, but corn is grown year after year on the bottom lands and cotton on the terraces and uplands. Nearly all the cotton land is fertilized. The most common application is 200 or 300 pounds to the acre of 4–8–4 or a similar fertilizer. A large part of the cornland is generally not

fertilized, but much of the corn is side-dressed with nitrate of soda at the rate of about 100 pounds an acre. Lespedeza, cowpeas, and soybeans are generally not fertilized, but some phosphate fertilizer is usually applied to winter legumes. Very little lime is used in the county, although some is applied to winter legumes and pastures. Phosphatic fertilizers are usually applied to winter legumes and occasionally to pastures. Tillage, for the most part, is done on the contour.[16]

Fully as important as the problems pertaining to proper land use, and probably more pressing, are those pertaining to proper soil management. The prevailing low yields on most of the soils and the eroded condition of many of them indicate that the management is not and has not been, in most instances, adjusted to the requirements of the various soils. On the other hand, there is little doubt that the productivity of practically all of the soils suitable for the production of crops can be increased by adopting better systems of management—systems that fit the soils.

In regard to requirements of management, the soils of the county have a certain individuality. What is considered the ideal management system for one very likely will not be the ideal system for another in every detail; in fact, it may be vastly different. But, even though each soil has its individuality in regard to requirements of management, a number of principles of management have a wide application in this county, although the relative importance of these principles is different for different soils.

One of the most important of these principles is proper and adequate fertilization. It will be recalled that all the soils, except some of those of the bottom lands, are low in content of plant nutrients. They are all naturally low in lime, nitrogen, phosphorus, and presumably in available potash. In view of this condition, proper fertilization is of primary importance, and for efficient use of the fertilizers and lime it is necessary to adjust the fertilization to the demands of the crops to be grown and the extent to which the soil must be supplemented in order to supply these demands. As specific information pertaining to detailed fertilizer requirements of the different soils is not yet available, recommendations must necessarily be more or less general; but it is expected that continued observation and investigation will reveal significant and important differences in such requirements. Preliminary observations indicate that the immediate response of crops to the application of fertilizers is greatest on the Savannah and Prentiss soils, less on the Atwood, Ruston, and Cahaba soils, and least on the Cuthbert soils. On the other hand, the benefits are thought to last longer on the Cahaba, Atwood, and Ruston than on the Savannah and Prentiss.

Recommendations for the use of fertilizer for the leading crops on the principal agricultural soils are given in table 7.

[16] For more information pertaining to present management, see Agricultural Practices, pp. 17–18.

TABLE 7.—*Recommendations for the use of fertilizer for the leading crops on the principal soils of Tishomingo County, Miss.*[1]

Soil type	Quantity of fertilizer per acre recommended for—				
	Cotton [2]	Corn [3]	Winter legumes [4]	Summer legumes	Pasture [5]
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Atwood very fine sandy loam.	400 to 600 of 6–8–4.	16 to 20 of nitrogen.	200 to 300 of superphosphate. 40 to 60 of muriate of potash, 400 to 600 of lime	100 to 200 of superphosphate.	2,000 to 4,000 of lime. 500 to 800 of superphosphate.
Savannah silt loam	400 to 600 of 6–8–4 or 400 to 600 of 6–8–8	do	do	do	Do.
Ruston fine sandy loam	400 to 600 of 6–8–4	do	do	do	Do.
Cuthbert very fine sandy loam	do	do	do	do	Do
Ochlockonee silt loam	400 to 600 of 6–8–4, or 400 to 600 of 6–8–8.	do	do	do	Do.
Iuka silt loam		do	do	do	Do.
Myatt silt loam (artificially drained)		do		do	Do.
Bibb silt loam (artificially drained).		do		do	Do
Myatt silt loam (undrained)					Do
Bibb silt loam (undrained)					Do.

[1] Recommendations of Dr. Clarence Dorman, Director of the Mississippi Agricultural Experiment Station.

[2] The fertilizer for cotton should be applied before the cotton is planted. When a good cover crop is grown and turned under, 275 to 400 pounds of 0–12–6 fertilizer is recommended for cotton following it.

[3] The fertilizer for corn should be applied as side dressing when the corn is knee to waist high. When a good winter cover crop is grown and turned under, cornland ordinarily is not fertilized.

[4] The fertilizer and lime for winter legumes should be distributed by drills.

[5] The heavy application of lime to pastures should be made when the pasture is being started and as often thereafter as needed, depending upon the acidity of the soil The superphosphate should be applied every 3 to 5 years.

Consideration might well be given to the use of more concentrated forms of fertilizers in order to reduce freight, hauling, and spreading costs. A 6–8–4 fertilizer consists of 18 percent of available plant nutrients and 82 percent of inert material. A 12–16–8 fertilizer consists of 36 percent of available nutrients and 64 percent of inert material. As the 12–16–8 fertilizer is twice as rich as the 6–8–4, only half as much need be applied. Even though the cost per bag of the high-analysis fertilizer will be greater, the cost per unit of available plant nutrient should be less, owing to a saving in transportation and handling costs.

More attention should be given to the use of lime and phosphate. Although many beneficial effects are derived from lime, the chief reasons for applying it are to supply calcium, an essential element for plant growth, and to reduce the soil acidity. A third reason is of particular importance to phosphate fertilization because it makes for efficient utilization of the phosphate. Phosphorus fertilization is essential for the successful production of legumes, crops that are able to grow on nitrogen-deficient soils and restore to these soils

both nitrogen and organic matter, which are so essential for economical production of crops. The principal phosphatic fertilizers available in the area are (1) superphosphate (18–20 percent available phosphoric acid), (2) triple superphosphate (45–48 percent available phosphoric acid), (3) calcium metaphosphate (60–64 percent available phosphoric acid), and (4) fused rock phosphate (20–28 percent available phosphoric acid).

The adoption of a rotation including close-growing crops on the soils of the uplands and terraces should receive serious consideration. Such a practice, along with proper fertilization, would certainly increase crop yields. Furthermore, such a rotation must be adopted if the soils of the uplands and terraces are merely to remain in production more or less indefinitely, because marked deterioration is already manifest in places under the continuous production of intertilled crops. Such a rotation is particularly necessary on the sloping soils of the uplands and terraces, where a vegetative cover is required to control accelerated erosion. On the soils of the bottoms, however, where control of erosion is not a problem, the adoption of a rotation is not so necessary, although beneficial results would be expected from such a practice.

As cotton is the main cash crop in this county, the rotations should center on this crop, and the practicable sequence would seem to be cotton followed by close-growing crops and then cotton again.

For the level and undulating areas of soils having a hardpan—Prentiss silt loam, level phase of Prentiss silt loam, Savannah silt loam, level phase of Savannah silt loam, and Savannah gravelly silt loam—the following rotation is suggested: First year, cotton; second and third years, legume-grass mixture (lespedeza and orchard grass, rye grass, or redtop) for hay and pasture.

For the rolling phase of Savannah silt loam, the rolling phase of Savannah gravelly silt loam, and the eroded phase of Savannah silt loam, the rotation should be longer, preferably 1 year of cotton and 3 or 4 years of legumes and grasses. For the eroded rolling phase of Savannah silt loam cotton probably should not be grown more than once in every 5 or 6 years. Corn could be substituted for cotton in any of these rotations. Likewise, other legumes could be substituted for lespedeza, but then more lime and phosphate would be required. On the Savannah and Prentiss soils, which are characterized by the unfavorable hardpan, it will probably prove most economical to grow legumes and grasses that have low requirements for lime and phosphate.

On Cahaba very fine sandy loam and the undulating phase and the eroded undulating phase of Atwood very fine sandy loam, the following rotation is suggested: First year, cotton; second and third years, legume-grass mixture (red clover and orchard grass or timothy) for hay and pasture.

On Atwood very fine sandy loam, the eroded phase of Atwood very fine sandy loam, and Ruston fine sandy loam, cotton should be grown only once in every 3 or 4 years. Because of the favorable physical character of the Cahaba, Atwood, and Ruston soils, it is thought advisable to make heavy applications of lime and phosphate so as to be able to grow red clover or bur-clover, although overliming needs to be prevented.

Cuthbert very fine sandy loam, which has a heavy-textured subsoil and is highly susceptible to erosion, should be kept in close-growing crops most of the time. An intertilled crop should not be grown more than once in every 5 or 6 years.

Although the adoption of rotations of the general class suggested here appears to be essential if deterioration of the sloping soils is to be prevented, it must be recognized that the adoption of such rotations entails great changes in the agriculture. For various reasons, particularly economic and social, effecting such changes will be difficult and slow. Therefore, consideration needs to be given to other ways of raising the present level of productivity and retarding deterioration—ways that are more immediately feasible but less desirable over a long or indefinite period.

One of these ways is to grow legumes for green manures, even though they may not be rotated over the land systematically. Summer legumes (such as lespedeza, cowpeas, soybeans, crotolaria, and kudzu) and winter legumes (such as vetch and Austrian Winter peas) are now grown to a limited extent, but their acreage could be greatly increased. These crops can be grown on most of the soils that are suitable for tillage. Soybeans and cowpeas should be grown sparingly on sloping soils, because they seem to loosen the soil and thereby increase its susceptibility to erosion. Where grown, they should be followed by a winter cover crop. Increased yields of legume crops are to be expected from the application of lime and phosphate; in fact, some of the legumes cannot be successfully grown without these amendments. The growing of winter legumes is thought to be particularly desirable because they will reduce the leaching of soluble plant nutrients from the soil, add organic matter and nitrogen to the soil, reduce accelerated erosion during the winter, and allow the use of the land for summer crops.

Good results are to be expected from frequent additions of organic matter. The soils in the county, it will be recalled, are low in this constituent; and, in addition, organic matter added to the soil is quickly depleted. It is important, therefore, that organic matter be added frequently. In this regard it is interesting to note that Hilgard (*3*) as far back as 1860 recommended green manuring for this purpose. As just brought out, legumes are desirable for green manures. Organic matter can also be added by growing plants with fibrous roots, particularly grasses. The application of barnyard manure is also a very desirable practice. On most farms in this county, however, very little barnyard manure is produced; consequently, little is available for the land. In those few areas where barnyard manure has been applied to the soil, marked increases in crop yields have invariably followed.

Additional information on fertilizers, kinds and varieties of crops, rotations, and soil improvement may be obtained from the following publications:

Mississippi Agricultural Experiment Station Bulletins 289, Commercial Fertilizers for Cotton 1925–1930; 303, A Compilation of Experimental and Other Data on Winter Legumes; 321, A Compilation of Experimental Data on Cotton Fertilizers Applicable to the Hill Sections of Mississippi; 323, A Compilation of Experimental Data on Cotton—Land Preparation, Planting, and Cultivation; 325, Sweetpotato Plant Production in Mississippi; 326, A Compilation of Information on Kudzu; and 336, The Value of Legumes for Soil Improvement.

Mississippi Agricultural Experiment Station Circular 74, Vetch.

Mississippi Agricultural Experiment Station Information Sheets (mimeographed) 9, *Lespedeza Sericea*—a Perennial Lespedeza; 11, Crotalaria; 51, Hairy Vetch and Austrian Winter Peas; 67, Corn Fertilization; 81, Vetch Fertilization; 84, Cotton Varieties; and 87, Corn Varieties.

Mississippi Agricultural and Mechanical College Extension Bulletins 36, Pasture Production Manual; and 85, Winter Legumes.

United States Department of Agriculture Farmers' Bulletins 1603, Winter Legumes for Green Manures in the Cotton Belt; and 1724, Farm Practice with Lespedeza.

The control of water on the land, with particular reference to drainage and control of runoff (and erosion), is vital and critical as regards both land use and soil management. This topic is treated in the subsequent section Water Control on the Land.

In conclusion, it needs to be emphasized that adjustments in land use and soil management are frequently very difficult to achieve. They must necessarily be made through the individual farms, and the ability of the individual farmers to make desirable adjustments is limited by a number of factors, many of which are beyond his control. The goal should be, however, to adjust the use so that it fits the natural suitability of the soil, and the management so that it meets the requirements of the soil.

WATER CONTROL ON THE LAND

The discussion of water control on the land in this section concerns only measures to control runoff and artificial drainage, as neither irrigation nor the control of flooding by such devices as dikes is significant in the present agriculture of the county. Both control of runoff and artificial drainage, however, are important to the agriculture of the county, because about three-fourths of the land used for crops and pasture presents a problem in one or the other. Control of runoff is a problem on most soils of the cleared uplands and terraces, an estimated 60,000 acres, or nearly 22 percent of the area of the county. In addition, the extensive areas in the uplands now in woods that are suitable for crop production will present serious problems in control of runoff if they are cleared and brought into production of crops. Nearly 50,000 acres, or nearly 18 percent of the area of the county, present problems in regard to artificial drainage in order to establish suitable moisture conditions for tilled crops. The soils on which runoff needs to be controlled are chiefly on the uplands, whereas those on which artificial drainage needs to be provided are restricted to stream bottoms and flat areas on terraces.

Adequate control of runoff would have a far reaching effect upon soil conservation and crop production, particularly as this problem applies to more than half of the cleared land area of the county. Artificial drainage, where needed, likewise would have a far reaching effect, particularly on the production of corn.

CONTROL OF RUNOFF

The term "control of runoff" is used here in a somewhat restricted sense. It is restricted to the problem of controlling runoff on the fields, pastures, and forests. Previous failure to control runoff in the county has resulted from a failure to adjust the use to the natural capabilities of the soils, and the management to the requirements of

the soils under the selected use. A great number of factors, local and national, come into play affecting the problems of land use and soil management. Under past conditions perfect adjustment of the use and the management of the land to the natural character of the soils could not be expected. Readjustments to effect such harmony must of necessity be brought about gradually. Furthermore, control of runoff should be provided only through correction of conditions that induce wrong land use and soil management and indirectly a great number of other factors that touch every phase of the many-sided agricultural problem of the county.

Although accelerated erosion is only one of the results of the failure to control runoff, it will serve as a measure of the extent to which runoff has not been controlled in Tishomingo County. The two terms "control of runoff" and "control of erosion" are not to be confused, as they are not synonymous. The control of erosion is only one, and not necessarily the most important, result of control of runoff. Accelerated erosion in Tishomingo County is here discussed, therefore, as a measure of the degree to which runoff control has failed in the past.

Much of the land in the county suitable for cultivation has been cleared for many years. During this time erosion has been active, encouraged by a rather heavy rainfall and a prevailingly undulating to hilly relief of the soils of the uplands. More than 85 percent of the acreage of the cultivated uplands has become sufficiently eroded to injure productivity or workability. A large part of the land physically adapted for cultivation has been eroded to the extent that ordinary tillage brings up heavy subsoil material.

Except for cultivating the slopes on the contour, little effort to control runoff and prevent erosion was made in the past. Intertilled crops were grown in the summer, and land was left bare in the winter. Under such management, practically all the sloping land used for agriculture lost a part of its soil.

Recently the construction of broad-base terraces has become popular as a measure of control in this county (*1*). In this regard it needs to be emphasized that terraces are not equally practicable on all soils, owing largely to the differences in physical characteristics of the soils. For example, it is doubtful if terraces are at all practicable on Cuthbert very fine sandy loam, which has a heavy plastic subsoil and a choppy relief, because the terraces are difficult to construct and extremely difficult to maintain and it is difficult to get plants to grow in the terrace channels where the subsoil is exposed. Although terraces can be more easily built and maintained on the Savannah and Prentiss soils, the wisdom of building terraces on them is questionable because of the hardpan in the soils. On the Atwood soils and Ruston fine sandy loam, however, all of which have friable and open subsoils and substrata, properly constructed terraces should be practicable and successful. For adequate control of runoff and the prevention of accelerated erosion on all the sloping land, close-growing crops must be substituted to a great extent for intertilled crops and a vegetative cover must be maintained much or most of the time, which, in turn, entails a great change in the agriculture of the area.

As is evidenced by accelerated erosion, failure to control runoff has been rather common on many of the important agricultural soils of the

uplands, including the Savannah, Atwood, Ruston, and Cuthbert soils. It is significant in this connection that these soils, particularly the Atwood and the Savannah, are for the most part characterized by relatively favorable productivity and workability for crop use; consequently they were among the first to be put under cultivation, and they were used chiefly for the production of cotton and corn, which use does not lend itself well to measures to control runoff. Many of the less productive soils, particularly those associated with rugged lay of the land, have remained in forest; consequently runoff has been controlled on these soils to a considerable extent by the natural vegetation.

The agricultural significance of controlling runoff is far-reaching, not only because of the large acreage involved but also because of its many beneficial effects. Among the desirable effects brought about by the control of runoff are (1) control of erosion; (2) more nearly uniform and adequate supply of moisture for growing crops; (3) improved tillage condition, particularly in periods of low rainfall; (4) better conditions for biological (bacterial) activities; and (5) improved conditions for the formation of humus. All of these, in turn, facilitate further conservation and control of water on the land.

Uncontrolled runoff results directly from ill-suited land use, ill-suited land management, and ill-adjusted farm management, and indirectly from a more general maladjustment of agriculture. The remedy is to be sought, therefore, through readjustments of these causal factors. The land on which most of the uncontrolled runoff occurs is operated by individual farmers in small units; therefore adjustments to correct the causal factors on these individual farms must be made through and by each individual farm operator. The approach must be from his viewpoint and adjusted to the limitations and requirements of both the farm and the farm operator. In the last analysis, the problem of controlling runoff is submerged in and becomes a part of the whole problem of management on each individual farm. Each farm offers an individual problem, obviously a highly complex one.

The farmer who attempts to control runoff directly through adjustments in the use and management of his land is confronted with a number of problems that directly or indirectly limit his farm-management program. Among these are the size and type of farm; the physical character of his land, including the soil pattern of the farm; the surrounding social and economic conditions, such as transportation, market, church, and school facilities; the immediate cash demand on the farm income for such items as taxes, indebtedness, and support of family; the relation between prices of farm products and those of other commodities; the farm operator's facilities and resources for operating purposes, including buildings, farm equipment, seed, kind and number of livestock, cash, and credit; the farm operator's ability, aptitude, versatility, and preferences; community cooperation, labor, farm machinery, drainage, water disposal, marketing, and buying; and farm tenure and labor conditions.

The farmer as an individual has full or partial control over some of these; over others he has little or no control, except as a citizen of his community, State, or Nation. A full solution, then, requires individual-community-State-national action embracing all of the problems and influences affecting agriculture.

DRAINAGE

The discussion of drainage here is restricted to those soils whose natural drainage is inadequate for crop use. With regard to drainage condition, the soils of the county may be grouped into three classes, (1) well-drained soils, (2) intermediately drained soils, and (3) poorly drained soils. In this discussion it is the latter two groups that will be considered. By poorly drained soils is here meant soils that are definitely too poorly drained in their natural state for the production of tilled crops. This group includes Myatt silt loam, Bibb silt loam, Bibb fine sandy loam, and the miscellaneous land type alluvial sands. The intermediately drained soils are intermediate in drainage between the well-drained and the poorly drained soils. Certain crops that are somewhat tolerant of wet conditions can be grown on these intermediately drained soils without resort to artificial drainage, but varying degrees of injury to crops from wet conditions are to be expected. Iuka silt loam and Iuka fine sandy loam compose this intermediately drained group.

These poorly and intermediately drained soils are extensive. They cover over 50,000 acres, or nearly 19 percent of the area of the county. Of this area, the poorly drained soils cover nearly 50 percent. All are in the first bottoms except Myatt silt loam, which is on the terraces. Although these soils are mapped in all parts of the county, they occur chiefly in the western two-thirds.

A considerable amount of work in regard to artificial drainage has already been done in the county. Large drainage ditches or canals have been dug in a number of the bottoms, notably the bottoms of Yellow and Mackys Creeks and of some of the tributaries of these streams. Except for the big ditches in the large bottoms, the type of artificial drainage generally used is the small open-ditch type. Many of the drained areas are characterized by a network of small ditches ranging in depth from about 2 to 4 feet. In other areas, particularly in the smaller and narrower bottoms, a ditch is dug along each extremity of the bottom, thereby preventing seepage from the foothills from spreading over the entire bottom. Some measure of artificial drainage has been provided on nearly all of the intermediately drained and poorly drained soils that are used for the production of crops—estimated to be between 65 and 75 percent of the area of the intermediately drained soils and between 10 and 15 percent of the area of the poorly drained soils. In relation to the production of crops, however, the degree of artificial drainage is inadequate in many of the areas.

The agricultural uses to which these soils can be put successfully depend greatly upon the improvement in drainage that can be effected by artificial means. In their natural condition, the intermediately drained soils—Iuka silt loam and Iuka fine sandy loam—are suitable for hay and pasture, provided moderately water-tolerant plants are selected. Plants such as lespedeza, carpet grass, Bermuda grass, Dallis grass, hop clover, and white clover grow successfully on these soils in their natural drainage condition. Corn and other crops equally tolerant of moist conditions can be grown with some degree of success, but experience indicates that corn is frequently injured. Cotton almost invariably fails. Where these soils are artificially drained, they have a much wider range in adaptation to the production of different crops,

and the danger of injury to the more sensitive crops is reduced; and corn, the chief crop grown, rather consistently gives moderate to comparatively high yields. As these soils lie in the first bottoms, they are subject to flooding; and although artificial drainage will prevent some flooding and minimize the injurious effects from flooding that does occur, it is unlikely to prevent all injury from this hazard.

The poorly drained soils in their natural condition are adapted to fewer uses than the intermediately drained ones, as no plants except those that are very tolerant to wet conditions can be grown successfully. This excludes corn, cotton, and practically all of the other tilled crops commonly grown in the county. Certain water-tolerant pasture and hay plants, however, can be grown with a moderate degree of success on all of these soils except the alluvial sands, which have practically no agricultural value. The following hay and pasture plants are grown on some areas of these soils (except the alluvial sands) in their natural drainage condition: Lespedeza, hop clover, Bermuda grass, carpet grass, and Dallis grass. If these soils were drained by artificial means, it is apparent that the range in adaptability to different uses would be greatly broadened and most of the crops common to the area could be successfully produced. In addition, the productivity for hay and pasture would also be enhanced. Where they are adequately drained, corn is the chief crop grown; and some of the highest corn yields in the county have been obtained on one, Bibb silt loam. If adequately drained, it is thought that Bibb silt loam would be the most productive, Bibb fine sandy loam would rank second, and Myatt silt loam third. Even though drained by artificial means, all except Myatt silt loam would be subject to flooding. Although artificial drainage would probably prevent some flooding and reduce the injurious effect on crops from flooding that might occur, it is unlikely that artificial drainage alone would prevent occasional injury to crops from this hazard.

The feasibility of artificial drainage depends upon a number of factors. An important one is the character of the soils themselves, because they differ in the ease with which they can be drained and in the productivity after they are drained. The Iuka soils would be expected to be the easiest ones to drain adequately, because they are naturally better drained than the other soils and would therefore require less improvement, and they are open and permeable and allow a relatively free movement of water. Ranking second to the Iuka soils in ease of drainage are the Bibb soils. Owing to their permeability, these soils would be expected to drain well if other conditions were favorable. Preliminary observations indicate that the Myatt soils would be rather difficult to drain adequately, owing probably to the silty texture.

It is also essential to know the engineering aspects in order to determine the feasibility of draining these soils. As no adequate studies have been made in regard to the engineering phase of this problem, no complete discussion of this part of the problem is attempted. It might be added, however, that difficulty in regard to obtaining adequate fall might arise in attempting to drain the Iuka and Bibb soils, praticularly the Bibb soils, as the streams in most of the bottoms where the Bibb soils predominate are generally sluggish.

Still another important aspect of the drainage problem is the effect that the improvement of drainage in one area might have upon

areas farther downstream. Frequently improvement in drainage upstream results in injury to areas downstream. Striking examples of this are to be found on Yellow Creek and Mackys Creek in this county. In the mouths of the canals in the bottoms of these creeks, considerable areas have been converted into virtual wasteland.

Assuming that artificial drainage is feasible so far as the characteristics of the soils and the engineering problems are concerned, its practicability rests with the individual farmers who make their living from the land. It involves changes and adjustments in the use and management of the land; and, as brought out in the subsection on Control of Runoff, the adjustments that a farmer can make in the use and management of his land are limited by a number of factors, many of which are beyond his immediate control.

MORPHOLOGY AND GENESIS OF SOILS

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

In attempting to account for the development of the different soil series in the county, an examination of these different factors is therefore in order.

The climate of the county is of the humid, warm, continental type, with a mean annual rainfall of about 52 inches, a mean summer temperature of about 79° F., and a mean winter temperature of about 43°. Having developed in such a climate, the mature soils are highly leached, are low in organic matter, and have well-developed podzolic features. The climate, however, is practically uniform over the entire county; and, owing to this uniformity, differences in soils within the county cannot be explained on the basis of differences in climate.

In regard to the native vegetation in the county, which is a mixture of deciduous and coniferous trees, no great differences exist. Differences in soils, therefore, cannot be explained on the basis of differences in vegetation. Although some rather minor variations in vegetation are associated with different soils, it seems likely that these variations are chiefly the result and not the cause of differences in the soils. That a reciprocal relation now exists or once existed, however, cannot be denied.

The parent material of the soils of the county is similar in a number of respects. With the probable exception that some of it has been deposited by winds, all has been deposited by water, either

by the waters of the old gulf or by the streams that developed subsequent to the recession of the old gulf. Practically all of the parent material is unconsolidated, in the uplands consisting chiefly of gravel, sand, silt, and clay, and on the terrace lands and bottom lands consisting chiefly of sand, silt, and clay. The parent materials of all the soils in the county are acid in reaction.

Even though the parent materials over the county are similar in a number of respects, they differ enough so that the chief differences between the soils of the Atwood, Ruston, Cuthbert, Guin, and probably the Savannah series can be attributed chiefly to differences in parent material, although relief has also been a very influential factor. The parent material of the Atwood soils is a rather uniform fine or very fine sandy clay. That of the Ruston soils is also rather uniform but is higher in sand and lower in clay. The parent material of the Cuthbert soils differs from those of both the Atwood and the Ruston soils in containing thin platy shalelike layers of clay, and the parent material of the Guin soils is distinctive in that it consists chiefly of gravel. It appears very probable that the Savannah soils have been influenced to some extent by loess. At any rate, it seems apparent that the material from which these soils developed was high in silt and very fine sand. Geologically, two of the oldest formations on the Coastal Plain, the Tuscaloosa and the Eutaw,[17] cover practically all of the county. The Tuscaloosa formation consists chiefly of gravel, sand, and clay, and it is from this formation that all the gravelly soils have developed. The Eutaw formation is reported to consist chiefly of sand, clay, and marl. During the progress of mapping, however, no marl was observed. The nongravelly soils of the uplands are developed over this formation.

Relief, or lay of the land, varies greatly, and it is apparent that differences in this factor have influenced the development of different properties in the soils of the county. Relief affects soil formation through its control upon drainage, runoff, and other water effects, including normal erosion. It is significant that the well-developed soils in the county that have a red B horizon are associated with undulating, rolling, or hilly areas where the drainage is good; that the soils with a yellow B horizon are associated chiefly with level or gently sloping areas where the drainage is slow; and that the mottled gray soils are associated with flat or slightly depressioned areas where the drainage is poor. It is also significant that the development of a hardpan layer is associated with the lay of the land, as, with few exceptions, this layer occurs only in the soils that occupy level or gently sloping areas; that is, those areas where the yellow and gray soils have developed.

Differences in age account for differences in the characteristics of some of the soils. Two soils, for example, may be very different in their characteristics, even though their environmental conditions of parent material, relief, vegetation, and climate are similar. If one is old, or mature, and the other is young, or immature, the mature one will manifest well-defined genetic soil horizons, whereas the immature one will show little or no genetic horizon differentiation. Mature soils have been defined as those that "have already developed their characteristic properties and are in equilibrium with their

[17] See footnote 7, p. 6

environment" (*4, p. 16*). The combination of a relatively high rainfall and high temperature has made for relatively rapid attainment of maturity; and nearly all of the soils of the county, except those of the bottom lands, may be considered as mature or nearly mature soils.

Each soil may be thought of as a product of some particular combination of these five main factors affecting soil formation. It has been brought out that climatic and biologic factors are practically uniform over the entire county and that the development of different soils cannot be attributed to them. This leaves parent material, relief, and age as the three variables chiefly responsible. With the exception of the soils of the bottom lands, however, most of the soils are mature or nearly mature, a condition that eliminates age as an important variable accounting for the development of different characteristics of most of the soils of the uplands and terraces. This leaves differences in parent material and relief as the two chief variable factors. As will be shown subsequently, most of the well-developed soils of the county are characterized by a particular combination of parent material and relief.

As has been previously brought out, the soils of Tishomingo County have developed in an environment of a high rainfall, a high temperature, and a forest vegetation consisting of a mixture of coniferous and deciduous trees. As a result of having developed in such an environment, the soils are rather thoroughly leached of their bases and other soluble material, and in addition they show that there has been considerable translocation of colloidal material from the A to the B horizon. The well-developed, well-drained soils in the county are highly podzolized. They have an ashy-gray, well-defined, light-textured, thoroughly leached A horizon and a red or yellow considerably heavier textured B horizon. Owing largely to the intense activity of micro-organisms and the relatively small annual addition of organic matter to the soil from the native vegetation, the soils are low in organic matter and humus.

The most widely distributed and most extensive soils in the county are the members of the Cuthbert series of the uplands. These soils are zonal—Red Podzolic soils (*18*). They are highly podzolized and have well-defined A, B, and C horizons. They are well-drained and morphologically characterized by a yellowish-gray loose A horizon and a yellowish-red heavy plastic and sticky B horizon. Both the parent material and the relief of these soils are distinctive. The parent material is a mixture of sandy clay and sandy loam with conspicuous thin shalelike horizontal layers of clay ranging from about 1/16 to 1 inch in thickness. The rolling and hilly relief of the Cuthbert soils, which has a dominant gradient of 10 to 35 percent, comprises choppy and abrupt slopes, sharply contrasting with the more or less symmetrical slopes of the other soils in the county. It is significant that where the relief is strong but the parent material is free from this shalelike material, soils other than the Cuthbert have developed. It seems rather conclusive, therefore, that the particular combination of a comparatively strong relief with sandy parent material containing this shalelike clay is chiefly responsible for the development of the Cuthbert soils in this county.

The following profile description of a virgin area on a 10-percent slope under a forest cover of blackjack oak, post oak, and shortleaf

pine, taken 1 mile west of Iuka, is typical of Cuthbert very fine sandy loam, the main type in the series in this county:

A_1. 0 to ½ inch, gray light very fine sandy loam stained dark with organic matter. It is loose and fluffy and has a single-grain structure. It contains a large quantity of partly decomposed leaves, small twigs, and bark. The pH value is 5.0 to 5.5.[18]

A_2 ½ to 9½ inches, light grayish-yellow very fine sandy loam that on drying changes to light yellowish gray When exposed to the sun it bleaches to very light gray or almost white. It is loose and easily breaks into single grains. Roots are abundant. The pH value is 4.5.

B_1. 9½ to 13 inches, material that is transitional between that in A_2 and that in B_2. The texture is chiefly clay loam, and the color is brownish red that becomes lighter when the material is crushed. This material is friable and has a soft subangular nutlike structure, the aggregates ranging from ¼ to ½ inch in diameter. It contains many roots. The pH value is 4.0 to 4 5. This layer grades into the one below.

B_2. 13 to 27 inches, yellowish-red heavy very fine sandy clay that changes to reddish yellow when crushed. The material contains a few scattered splotches of yellow, which become more numerous with increase in depth. Although the material can be dug out only with considerable difficulty, the displaced pieces quite readily break down into distinct blocky aggregates. The aggregates range from ¼ to 1 inch in diameter, and the larger ones generally can be easily broken down into the smaller ones. The natural breakage surfaces have a shiny or metallic luster. Some micaceous material is present. The material is sticky and plastic when wet and very hard when dry. Some roots are present, chiefly on the cleavage planes or in the cracks. The pH value is 4.0. This horizon grades into the one below.

B_3. 27 to 45 inches, material similar to that in B_2 but differing from it in having many more splotches and mottlings of yellow, light yellow, and red. It also contains more sand in its lower part and more micaceous material. This grades into the material below. The pH value is 3 0 to 4.0.

C_1. 45 to 60 inches, fine sandy loam highly mottled with red and yellow and containing some micaceous material. It has a pH value of 4 0.

The parent material of this soil is mainly a light fine sandy loam or fine sand mixed with thin, shalelike horizontal layers of clay. It is derived from the Eutaw formation.

Like the Cuthbert soils, the Ruston soils are zonal, belonging to the great soil group of Red Podzolic soils (*10*, *18*). The Ruston soils occur in the uplands in association with the Cuthbert soils and have developed under similar conditions of climate and vegetation. Like the Cuthbert soils, the Ruston soils also have a rolling and hilly relief; but in contrast with the short and abrupt slopes of the Cuthbert, the slopes of the Ruston are longer and more or less symmetrical. In regard to the genetic factors giving rise to these soils, the chief difference appears to be in the character of the parent material. The parent material of the Ruston soils consists of rather uniform sandy loam or light sandy clay, which, in contrast with that of the Cuthbert soils, is free from thin shalelike layers of clay. Like the Cuthbert, the Ruston are highly podzolized, are well drained, and have well-developed profiles. Morphologically they differ from the Cuthbert chiefly in having thicker A horizons and lighter textured and more friable B horizons. The Ruston soils have yellowish-gray loose fine sandy loam A horizons, about 14 inches thick, and friable reddish-brown or brownish-red fine sandy clay loam or fine sandy clay B horizons, about 16 inches thick.

[18] pH determinations given in this profile description and in the ones that follow were obtained by the Soiltex method in the field.

Like the Cuthbert and Ruston soils, the Atwood soils are highly podzolized and well drained, and belong to the great soil group of Red Podzolic soils. They occur in the uplands and have developed under conditions of climate and vegetation similar to those under which the Cuthbert and Ruston soils have developed. The Atwood soils, however, have developed from parent material that is somewhat different from that of either the Cuthbert or the Ruston. The parent material of the Atwood soils differs from that of the Cuthbert in having no thin shalelike layers of clay and from that of the Ruston in being heavier in texture. The parent material of the Atwood soils is rather uniform fine or very fine sandy clay. Dominantly undulating to rolling, the relief of the Atwood soils is more gentle than that of either the Ruston or the Cuthbert. The gradient ranges from 4 to 12 percent. Morphologically the Atwood soils resemble the Ruston soils but are heavier textured throughout and have thinner A horizons and thicker B horizons.

The following description of a profile observed on a 4-percent slope used for woodland pasture, about 6 miles south of Iuka, is considered typical of Atwood very fine sandy loam, the chief type of the series. Pine, hickory, red oak, and white oak were the principal trees growing on this soil.

A_1. 0 to 2 inches, gray very fine sandy loam stained almost black with organic matter. It is loose and structureless, contains a large quantity of partly decomposed leaves, small twigs, and bark, and has a pH value of 5.5 to 5.0.

A_2. 2 to 9 inches, brownish-gray loose friable very fine sandy loam that easily breaks into a single-grain structure. It is relatively uniform in color and texture and contains numerous roots. The pH value is 4.5.

B_1. 9 to 12 inches, yellowish-red heavy loam containing a considerable amount of very fine sand. It is friable and easily breaks into a single-grain structure. The pH value is the same as in A_2.

B_2. 12 to 24 inches, brownish-red very fine sandy clay. It is friable, and displaced lumps easily break into poorly defined subangular nutlike aggregates ranging from ¼ to ¾ of an inch in diameter. These are very easily crushed to a uniform single-grain mass. It also assumes a slightly yellowish color when crushed. Numerous roots penetrate the material. It has the same pH value as A_2.

B_3. 24 to 39 inches, reddish-brown to yellowish-brown fine sandy loam that is friable and easily breaks into a single-grain structure. In place it has a slight suggestion of brittleness. No mottlings are apparent. The pH value is the same as above.

C. 39 to 60 inches, red fine sandy clay with a large number of yellow splotches. The materials of these splotches are lighter in texture than the red fine sandy clay that surrounds them. The horizon is rather compact in place and comes out in brittle chunks that break into a single-grain mass. The pH value is 4.0.

The parent material consists of light sandy clay of the Eutaw formation, but no thin shalelike layers of clay are apparent in this material as in that underlying the Cuthbert soil.

Another series of soils in the uplands that is important is the Savannah. The Savannah soils have very light gray A horizons, yellow B horizons, and hardpans just below the B horizons. In view of their hardpans, they can be considered as intrazonal soils, being Planosols (*18*). In this regard, however, it is apparent that in morphology and genesis they are entirely different from the soils with claypans in the Middle West that are also classified as Planosols.

438331—44——7

There is some doubt as to the exact nature and origin of the parent material from which the Savannah soils have developed; that is, whether they have developed chiefly from loess, a mixture of loess and Coastal Plain material, chiefly Coastal Plain material, or old stream alluvium. The available evidence leads to the belief that loess must have constituted at least a part of the parent material. The fact that the A horizon is prevailingly a silt loam, whereas the underlying geological material is generally more or less sandy, indicates that the present soil must have come from finer textured material than much of the geological material that now underlies the soil. On the other hand, the fact that some of the Savannah soils have a relatively high content of gravel, even in the A horizon, indicates that if loess were deposited in this area the deposition very likely was shallow; but this gravelly condition does not preclude the possibility of a loessial deposit at least several inches thick. Some of the larger areas of the Savannah soils, particularly in the southeastern part of the county, have a terracelike topography. Although this suggests the possibility of old alluvium, it is quite obvious that these areas are not terraces of any of the existing streams. In altitude many of the areas of the Savannah soils are among the highest in the county, which indicates that they might be undissected remnants of the old Coastal Plain floor. Some occur at lower levels. Therefore, even though the greater part of the Savannah soils occupies what appears to be undissected areas of the Coastal Plain, some of the soils occupy younger, smaller, lower, nearly level areas in the more or less dissected areas. The fact that these soils occur on level areas at different elevations indicates that loess might have been deposited after the present relief was established and that it was eroded off the slopes but remained on the level or nearly level areas, where it exerted considerable influence on the subsequent soil development. Although the available evidence does not prove conclusively the origin and nature of the parent material for the Savannah soils, it is quite obvious that the parent material was high in silt and very fine sand and low in clay and coarse sand.

The Savannah soils have developed under conditions of a level to gently undulating lay of the land. Under such conditions the amount of surface runoff has been little and the rate of runoff has been slow. The proportionate quantity of water percolating through the solum has therefore been great, and the solum has been severely leached. Owing to the relatively small amount and slow rate of runoff, there has been very little or practically no normal erosion; consequently the gradual renewal of the material in the soil profile by removal of the material from the top and the incorporation of fresh material from below has not taken place. As a result, the Savannah soils are old, not only as regards soil morphology but also in years. With only a few exceptions, all areas in the uplands having a slope of less than 5 percent include the Savannah soils. Furthermore, the areas having a slope in excess of 5 percent that are occupied by the Savannah soils are relatively few, and in these areas the soil profile is generally not so well developed as it is in the level or nearly level areas.

A conspicuous development in the Savannah soils is the hardpan layer at a depth of about 2 feet. This layer is not a zone of high concentration of clay; but, on the contrary, the clay content, judging

from field observations, appears to be rather low. The material is hard and cementlike. It is very strongly acid in reaction. Although it does not appear to be entirely impervious to water, it is obvious that it greatly impedes the movement of water. It contains many concretions and is highly mottled with gray, yellow, red, and brown. The highly mottled condition and the abundance of concretions indicate that this layer has developed under conditions of a fluctuating water table. A hardpan similar to the one in the Savannah soils also occurs in the Prentiss soils of the terraces. The genesis of hardpans in both those soils is obviously similar. It is significant that wherever a hardpan has formed in this county, it has developed on a level or gently sloping lay of the land where drainage has been slow and imperfect and from parent material that was high in silt and very fine sand and low in clay and coarse sand.

The following profile description taken 1 mile south of Belmont is considered typical of Savannah silt loam, the main type in the series. The surface is nearly level (1½-percent slope), and the vegetation consists of hickory, white oak, pine, and persimmon.

A_0. ½ to 0 inches, partly decomposed leaves, twigs, and bark, having a pH value of 4.5 to 5.0.

A_1. 0 to 2½ inches, light yellowish-gray light silt loam stained dark with organic matter. On drying it becomes a very light gray to almost white. It is held together by a mass of small roots. The pH value is 4.0 to 4.5.

A_2. 2½ to 9 inches, yellowish-gray mellow and friable silt loam that easily breaks into a single-grain structure. The organic-matter content is low. The pH value is 4.0.

B_1. 9 to 22 inches, light brownish-yellow silty clay loam that is very friable and breaks into subangular pieces of varying sizes, which, in turn, crush to a smooth but slightly plastic and sticky mass. It contains a few tiny black concretions and in the lower part of this horizon some large brown and yellow concretions ¼ to ½ inch in diameter. The large ones can be crushed between the fingers. The pH value is 4.0. This horizon rests abruptly on the one below.

B_2. 22 to 60 inches, hardpan that is mainly yellow but highly mottled with gray, red, brown, and yellow. It contains very many concretions ⅛ to ½ inch in diameter. Most of these are black or dark brown on the surface and red or rusty brown or yellow on the inside. The texture ranges from very fine sandy loam to clay loam. Gritty material is present throughout. This layer is cemented and can be dug only with difficulty. The displaced particles are very angular, jagged, and brittle. Considerable pressure has to be applied to a displaced lump before it will break, but once it does break it falls apart quickly. An exaggerated analogy would be to say that it breaks up like a dry cracker. This layer also contains a few scattered tiny holes that range from very small to 1/16 inch in diameter. Although this horizon very likely retards the downward movement of water, it is not entirely impervious to water. The upper part appears to be somewhat more firmly cemented than the lower part, but the difference apparently is not great. The pH value is 4.0.

Coastal Plain material of the Eutaw formation, probably influenced by loess, makes up the parent material.

The typical Guin soils are azonal, being Lithosols (*18*). Those classified as Guin in this county consist chiefly of gravel, show but very little profile development, and occupy hilly and steep areas in which the gradient ranges from about 15 to 50 percent. In wooded areas these soils generally have a surface layer, 1 or 2 inches thick, consisting of gravelly loam stained dark with organic matter. This is generally underlain by a light-gray very gravelly loam or fine

sandy loam layer, ranging in thickness from about 4 to 7 inches. Gravel constitutes from 20 to 70 percent of the soil mass. The material below this layer is generally nearly pure gravel. These soils, therefore, appear to have a rather definite A_1 horizon, a faintly developed A_2, but no discernible B horizon. This lack of profile development in the Guin soils is due to two conditions, (1) the highly resistant character of the parent geological material, and (2) the rugged relief. On the one hand, gravel, which comprises the greater part of the underlying material, is highly resistant to disintegration and comminution and becomes available for actual soil formation at an extremely slow rate. On the other hand, owing to the strong relief with the consequent rapid runoff, little water remains for plant growth and the energy of soil formation is low, and in addition the soil material tends to be removed rather rapidly. Actually, therefore, the parent material does not become available fast enough and does not remain in place long enough for the dynamic soil-forming agencies, climate and vegetation, to bring about the development of a complete zonal profile.

Included in areas mapped as the Guin soils are loose boulders of sandstone and conglomerates and sandstone ledges. Also included in areas mapped as the Guin soils are less gravelly soils having a hilly relief and weakly developed zonal profiles, soils that have a light gray gravelly A horizon and a yellow or red gravelly B horizon. The areas mapped as the Guin soils, therefore, represent a mixed condition, but everywhere the soils are gravelly and for the most part are Lithosols.

The soils of the terraces are classified into three series, namely, the Cahaba, Prentiss, and Myatt. These, of course, have developed under similar climatic conditions. Likewise, their parent material is also similar except for minor differences in texture. The parent material consists of old alluvium practically all of which has been derived from the local uplands. This alluvium consists chiefly of silty material, together with some sandy material, and is acid in reaction. The native vegetation of all the soils was forest, but the trees on the poorly drained Myatt soils probably were of different species from those on the moderately well drained Prentiss soils or the well-drained Cahaba soils. This difference in vegetation, however, is probably the result of differences among the soils and not the cause of them. Although only minor differences in lay of the land are manifest, it seems apparent that these differences with their attendant differences in drainage have been chiefly responsible for the development of the different soils on the terrace lands.

The Cahaba soils of the terraces are apparently zonal and belong to the group of Red Podzolic soils. These soils, which are of small extent in this county, occur only in well-drained positions. Typically, they occupy small areas on the slight rise near the edges of many of the terraces close to the boundary between the terraces and the bottom lands. It is in such positions that the drainage, both internal and external, is good and that normal erosion can take place. Morphologically, the Cahaba soils resemble the Atwood soils of the uplands. They have brownish-gray loose very fine sandy loam A horizons, about 6 inches thick, and friable brownish-red B horizons about 20 inches thick.

The Prentiss soils of the terraces, like the Savannah soils of the uplands, apparently belong to the Planosol group of intrazonal soils, which is characterized by a hardpan or claypan. The Prentiss soils are the most extensive ones on the terraces in this county. They occupy relatively broad, level or nearly level areas where the external drainage is slow. Morphologically, the Prentiss soils of the terraces are strikingly similar to the Savannah soils of the uplands. Although the soils of these series presumably have developed from parent material of different origin, the materials are similar in that they are high in silt and very fine sand and low in clay and coarse sand. It seems quite obvious that the Prentiss and Savannah soils have developed under similar conditions of drainage—slow internal and external drainage. In the matter of years, the Prentiss soils are, of course, younger than the Savannah soils; but in morphological development they are similarly old. The Prentiss soils have yellowish-gray mellow silt loam A horizons, about 7 inches thick; brownish-yellow friable B horizons, about 15 inches thick; and mottled thick hardpan layers below the B horizons.

The Myatt soils are the gray, poorly drained soils of the terraces. They occupy flat areas or slight depressions where there is practically no surface drainage. The native vegetation consists of water tolerant trees, such as water oak, willow oak, willow, sweetgum, and alder. These soils have developed under conditions of a high and fluctuating water table. In periods of high rainfall the water table rises to the surface; in periods of relative drought it sinks to below a depth of 30 inches. This condition undoubtedly has had a great influence on the development of the Myatt soils. Crawfish holes are numerous in areas of Myatt soils, and it is likely that crawfish have impaired the development of the soil profile by continually bringing material from the subsoil to the surface.

Except for a surface layer an inch or two in thickness, the Myatt soils show practically no consistent horizon differentiation to a depth of 30 inches or more, but the texture tends to become slightly heavier with increase in depth. The surface inch or two consists of a light-brown silt loam that has a lot of roots and partly decayed organic matter. Below this and continuing to a depth of 30 inches or more, the material is chiefly light gray with numerous mottlings of blue, yellow, brown, and reddish brown. This material has an abundance of black, red, yellow, and brown concretions. The black ones are so hard that they can scarcely be crushed with the fingers, but the others are not so hard. The concretions generally increase in number with depth. The texture, which is generally very silty, ranges from silt loam to silty clay loam. When dry the material is rather hard and somewhat brittle; when wet it is friable. In a few areas a mottled hardpan has been observed below a depth of 30 to 40 inches. Although enough observations to this depth were not made in this soil to ascertain definitely whether such a hardpan is a consistent characteristic on the soils classified as Myatt in this county, one would expect to find it in many areas. If this is true, the Myatt soils as mapped in this county also belong to the intrazonal group of soils known as Planosols.

The soils of the bottom lands are young or immature and show little or no development of genetic horizons. They are all azonal

soils—alluvial soils. They consist of recent alluvium nearly all of which has come from the local uplands—uplands that are underlain by sandy Coastal Plain material. All the soils of the bottom lands in this county are medium to strongly acid in reaction, and they are all subject to periodic flooding. They differ chiefly in drainage condition, color, and texture. The soils of the bottom lands have been classified into three series and one miscellaneous separation. The three series are differentiated largely on the basis of drainage and constitute a catena in which the Ochlockonee soils are well drained, the Iuka intermediately drained, and the Bibb poorly drained. The Ochlockonee soils are light brown or yellowish brown to a depth of 30 inches or more; the Iuka soils are brownish yellow or yellowish brown to depths of about 12 inches, below which they are highly mottled; and the Bibb soils are highly mottled from the surface downward. The miscellaneous separation, called alluvial sands, consists of recent sandy wash that has been deposited at the mouth of some of the drainage canals.

For the tabular summary of the characteristics of the soils of the different series, see table 4, page 26.

SUMMARY

Tishomingo County, covering an area of 436 square miles, is situated in the extreme northeastern corner of Mississippi. The land ranges from level to steep, and the predominating relief is hilly. The climate is of the warm, humid, continental type. Summers are warm and winters are mild. The mean annual rainfall is about 52 inches.

The present agriculture consists chiefly of producing cotton for cash, growing corn for feed and food, and producing enough vegetables and raising enough livestock to supply the local needs. Other crops grown are cowpeas, soybeans, lespedeza, peanuts, vetch, Austrian Winter peas, sorgo, sweetpotatoes, potatoes, and a number of garden vegetables.

The land in the county is used chiefly for forestry and agriculture. At present about two-thirds of the area of the county is still in forest. Most of the cleared land is used chiefly for the production of corn and cotton, and a relatively small part is used for hay land and pasture.

The soils of the county are highly leached, and as a result they are acid in reaction and relatively low in content of plant nutrients. Silt loams and very fine sandy loams are the predominant textures of the surface soil. The soils of the county differ in characteristics such as texture, structure, consistence, color, fertility, relief, erosion, and drainage. Based upon such characteristics, they have been classified and mapped into 18 soil types, 17 soil type phases, and 3 miscellaneous separations.

Soils of the uplands occupy about 75 percent of the area of the county. All these soils have a yellowish-gray or brownish-gray, fairly light textured surface soil and either a red or a yellow subsoil. In general, the Savannah and Atwood soils are comparatively well suited to the production of crops, the Ruston soils are less suited, the Cuthbert are very poorly suited, and the Guin soils are almost wholly unsuited. Distinguishing characteristics of the Savannah soils are the presence of a hardpan just below the subsoil and a prevailingly gentle relief. The Atwood and Ruston soils have progressively

lighter textured surface layers and a stronger relief than the Savannah but do not have a hardpan. The Cuthbert soils have a plastic and sticky consistence and a well-defined blocky structure, whereas all the other soils in the county are friable and have no well-defined structure. The Guin soils are gravelly and have a strong relief. A very small area on the uplands represents gravel pits.

Although they occupy only about 4 percent of the area of the county, the soils of the terraces are important in the agriculture of the county. Members of the Prentiss series, the most extensive soils in this group, resemble the Savannah soils of the uplands, having a conspicuous hardpan just below the subsoil. The Cahaba soils resemble the Atwood soils of the uplands. Being mellow and better drained than the Prentiss, they are very productive, but they cover only a small total area. Poor drainage limits the use of the Myatt soils to hay land and pasture unless artificial drainage is provided.

Soils of the bottom lands are subject to periodic flooding, but they generally contain more plant nutrients than the other soils of the county. They cover about 21 percent of the area of the county. Members of the Ochlockonee series, having comparatively good drainage for soils of the first bottoms and favorable physical properties, are well adapted to crops, particularly corn. The Iuka soils are intermediately drained; the Bibb soils and alluvial sands, an almost worthless land type, are poorly drained.

In the section on Productivity Ratings and Physical Land Classification the productivity index for each soil for the chief crops—corn and cotton—is tabulated, and the soils are grouped into five classes on the basis of their relative physical suitability for use in the present agriculture. For practical purposes, the First-class soils may be said to comprise good cropland; the Second-class soils, fair cropland; the Third-class soils, poor cropland; the Fourth-class soils, land that in its natural condition is unsuitable for the production of crops but is suitable for hay land and pasture; and Fifth-class soils, land that is considered unsuitable for the production of either crops or pasture plants but is suitable for forestry. First-class soils comprise about 3 percent of the county, Second-class soils about 23 percent, Third-class soils about 17 percent, Fourth-class soils about 8 percent, and Fifth-class soils about 49 percent.

Although, in general, crops are produced chiefly on land that is suitable for such use, conspicuous examples exist of attempts to produce tilled crops on land that should be used only for close-growing crops. Adjustment of management, however, is a more pressing problem in this county than adjustment of land use. Increased attention to liming, use of fertilizers, and, on the soils of the terraces and uplands, rotations that include legumes, would increase and maintain the productivity of the soil.

Control of runoff by contour tillage, terracing where feasible, and growth of cover crops are especially needed in the uplands. Provision of artificial drainage would benefit most of the poorly and intermediately drained soils of the bottom lands and terraces. The solution of the problems of runoff and artificial drainage, however, involve complex factors, many of which the individual farmer may not control.

Of the soil-forming factors of climate, vegetation, relief, parent material, and age, relief and parent material are chiefly responsible

for the differences among the soils of this county. Developed under a heavy rainfall, high temperature, and mixed coniferous and deciduous forest, all the soils are leached. The well-drained mature soils are podzolized and are members of the Red Podzolic soil group. The more slowly drained Savannah and Prentiss soils are intrazonal, belonging to the group of Planosols. The alluvial soils, being young, show little profile development.

LITERATURE CITED

(1) COPELAND, J. T.
1937. TERRACING IN MISSISSIPPI BY THE SOIL EROSION INDEX SYSTEM. Miss. Agr. Col. Ext. Bul. 34, 20 pp., illus. (Revised.)
(2) FENNEMAN, NEVIN M.
1938. PHYSIOGRAPHY OF EASTERN UNITED STATES. 714 pp., illus. New York and London.
(3) HILGARD, EUG. W.
1860. REPORT ON THE GEOLOGY AND AGRICULTURE OF THE STATE OF MISSISSIPPI. 391 pp., illus. Jackson, Miss.
(4) KELLOGG, CHARLES E.
1936. DEVELOPMENT AND SIGNIFICANCE OF THE GREAT SOIL GROUPS OF THE UNITED STATES. U. S. Dept. Agr. Misc. Pub. 229, 40 pp., illus.
(5)———
1937. SOIL SURVEY MANUAL. U. S. Dept. Agr. Misc. Pub. 274, 136 pp., illus.
(6) KINCER, JOSEPH B.
1922. PRECIPITATION AND HUMIDITY. *In* Atlas of American Agriculture, Part II, Climate, Sect. A., U. S. Dept. Agr. Adv. Sheets 5, 48 pp., illus.
(7)———
1928. TEMPERATURE, SUNSHINE, AND WIND. *In* Atlas of American Agriculture, Part 2, Climate, Sect. B, U. S. Dept. Agr. Adv. Sheets 7, 34 pp., illus.
(8) LOGAN, WILLIAM N.
1916. THE SOILS OF MISSISSIPPI. Miss. Agr. Expt. Sta. Tech. Bul. 7, 84 pp., illus.
(9) LOWE, E. N.
1920. ROAD-MAKING MATERIALS OF MISSISSIPPI. Miss. State Geol. Survey Bul. 16, 139 pp., illus.
(10) MARBUT, C. F.
1935. SOILS OF THE UNITED STATES. *In* Atlas of American Agriculture, Part 3, U. S. Dept. Agr. Adv. Sheets 8, 98 pp., illus.
(11) MATTOON, W. R., and BEAL, J. M.
1925. COMMON FOREST TREES OF MISSISSIPPI. Miss. Agr. Col. Ext. Bul. 32, 80 pp., illus. (Revised 1931.)
(12) MELLEN, FREDERIC FRANCIS.
1937. THE LITTLE BEAR RESIDUUM. Miss. State Geol. Survey Bul. 34, 36 pp., illus.
(13) MORSE, WILLIAM CLIFFORD.
1930. PALEOZOIC ROCKS. Miss. State Geol. Survey Bul. 23, 212 pp., illus.
(14) ———
1935. THE HIGHLAND CHURCH SANDSTONE AS A BUILDING STONE. Miss. State Geol. Survey Bul. 26, 30 pp., illus.
(15) ——— and BROWN, CALVIN S.
1936. TISHOMINGO STATE PARK. Miss. State Geol. Survey Bul. 32, 77 pp., illus.
(16) ROWLAND, DUNBAR.
1907. ENCYCLOPEDIA OF MISSISSIPPI HISTORY. 2 v. Madison, Wis.
(17) SHANTZ, H. L., and ZON, RAPHAEL.
1924. NATURAL VEGETATION. *In* Atlas of American Agriculture, Part I, The Physical Basis of Agriculture, Sect. E, U. S. Dept. Agr. Adv. Sheets 6, 29 pp., illus.
(18) UNITED STATES BUREAU OF CHEMISTRY AND SOILS, SOIL SURVEY DIVISION.
1938. SOILS OF THE UNITED STATES. U. S. Dept. Agr. Yearbook (Soils and Men) 1938: 1019–1161, illus.

U. S. GOVERNMENT PRINTING OFFICE: 1944

Accessibility Statement

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

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

Nondiscrimination Statement

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

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

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

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

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

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

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

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