

# SOIL SURVEY

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# Leflore County Mississippi

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UNITED STATES DEPARTMENT OF AGRICULTURE  
Soil Conservation Service  
In cooperation with  
MISSISSIPPI AGRICULTURAL EXPERIMENT STATION

# HOW TO USE THE SOIL SURVEY REPORT

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**T**HIS REPORT on Leflore County, Mississippi, will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, ponds, buildings, and other structures; and add to soil scientists' fund of knowledge.

In making this survey, soil scientists dug holes and examined surface soils and subsoils; measured slopes with a hand level; noticed differences in growth of crops, weeds, and brush; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming, grazing, and related uses.

The scientists plotted the boundaries of the soils on aerial photographs. Then, cartographers prepared from the photographs the detailed soil map in the back of this report. Fields, roads, rivers, and many other landmarks can be seen on the map.

## Locating the soils

Use the index to the map sheets to locate areas on the large map. The index is a small map of the county, on which numbered rectangles have been drawn to show where each sheet of the large map is located. On the large map, the boundaries of the soils are outlined and there is a symbol for each kind of soil. All areas marked with the same symbol have the same kind of soil. Suppose, for example,

an area located on the map has the symbol Aa. The legend for the detailed map shows that this symbol represents Alligator clay, level phase. This soil, and all the others mapped in the county, are described in the section, Soil Descriptions.

## Finding information

Different sections of this report will be of special interest to different groups of readers.

*Farmers* can learn about their soils in the section, Soil Descriptions, and how to manage the soils and what yields to expect in the sections, Capability Groups of Soils, and Estimated Yields.

*Soil scientists* will find information about how the soils were formed and how they are classified in the sections, Formation of Soils, and Classification of Soils by Higher Categories.

*Engineers* will find the engineering characteristics of the soils summarized in the section, Engineering Properties of Soils.

*Students, teachers, and other users* will find information about soils and their management in various parts of the report, depending on their particular interest.

The last part of the report gives general information about the history of the county, about its climate, and about the kind of agriculture. It will be of interest to persons not familiar with the county.

# Contents

	Page		Page
<b>Soil associations</b> .....	1	<b>Soil descriptions—Continued</b>	
Dubbs-Dundee-Forestdale association.....	1	Dundee series.....	24
Forestdale-Alligator association.....	1	Dundee very fine sandy loam:	
Alligator-Dowling association.....	1	Nearly level phase.....	24
Collins-Falaya-Hymon-Ina association.....	2	Gently sloping phase.....	25
<b>Capability groups of soils</b> .....	2	Sloping phase.....	25
Capability units.....	3	Dundee silt loam:	
Capability unit 1 (I-1).....	4	Nearly level phase.....	25
Capability unit 2 (I-2).....	6	Gently sloping phase.....	25
Capability unit 3 (IIe-1).....	6	Sloping phase.....	25
Capability unit 4 (IIe-2).....	7	Dundee silty clay loam:	
Capability unit 5 (IIe-4).....	8	Nearly level phase.....	26
Capability unit 6 (IIs-1).....	8	Gently sloping phase.....	26
Capability unit 7 (IIs-3).....	9	Dundee-Bosket soils, sloping phases.....	26
Capability unit 8 (IIs-4).....	9	Falaya series.....	26
Capability unit 9 (IIs-5).....	10	Falaya silt loam.....	26
Capability unit 10 (IIs-6).....	11	Falaya silty clay loam.....	27
Capability unit 11 (IIIe-6).....	11	Falaya silty clay loam, moderately shallow phase.....	27
Capability unit 12 (IIIw-6).....	11	Falaya-Ina-Collins soils.....	27
Capability unit 13 (IIIw-11).....	12	Forestdale series.....	27
Capability unit 14 (IIIw-12).....	12	Forestdale silty clay loam:	
Capability unit 15 (IIIw-13).....	12	Nearly level phase.....	27
Capability unit 16 (IIIs-1).....	13	Nearly level overflow phase.....	27
Capability unit 17 (IIIs-4).....	13	Nearly level moderately shallow phase.....	28
Capability unit 18 (IVe-7).....	13	Gently sloping phase.....	28
Capability unit 19 (IVw-1).....	13	Forestdale silty clay, nearly level phase.....	28
Capability unit 20 (VIIs-1).....	14	Forestdale silt loam:	
<b>Estimated yields</b> .....	15	Nearly level phase.....	28
<b>How soil surveys are made</b> .....	15	Gently sloping phase.....	28
<b>Soil descriptions</b> .....	15	Forestdale very fine sandy loam, nearly level phase.....	28
Alligator series.....	18	Hymon series.....	28
Alligator clay:		Hymon very fine sandy loam.....	29
Nearly level phase.....	18	Ina series.....	29
Level phase.....	19	Ina very fine sandy loam.....	29
Level overflow phase.....	19	Ina silt loam.....	29
Nearly level overflow phase.....	19	Pearson series.....	30
Gently sloping phase.....	19	Pearson silt loam, nearly level phase.....	30
Alligator silty clay loam:		Sandy alluvial land.....	30
Nearly level phase.....	20	Swamp.....	30
Gently sloping phase.....	20	Waverly series.....	30
Alligator silt loam, overwash phase.....	20	Waverly soils, local alluvium phases.....	30
Alligator-Forestdale soils:		<b>Formation of soils</b> .....	31
Gently sloping phases.....	20	Factors of soil formation.....	31
Sloping phases.....	20	Climate.....	31
Strongly sloping phases.....	20	Living organisms.....	32
Alligator, Dowling, and Forestdale soils.....	20	Parent material.....	32
Alligator, Dowling, and Forestdale soils, overflow phases.....	21	Topography.....	33
Alligator and Dowling clays, overflow phases.....	21	Time.....	33
Beulah series.....	21	Genetic processes.....	33
Beulah very fine sandy loam, gently sloping phase.....	21	<b>Classification of soils in higher categories</b> .....	33
Bosket series.....	21	Zonal soils.....	35
Bosket very fine sandy loam:		Gray-Brown Podzolic soils.....	35
Nearly level phase.....	21	Dubbs soils.....	35
Gently sloping phase.....	22	Dundee soils.....	35
Collins series.....	22	Bosket soils.....	37
Collins silt loam.....	22	Pearson soils.....	37
Dowling series.....	22	Intrazonal soils.....	38
Dowling clay.....	22	Low-Humic Gley soils.....	38
Dowling soils.....	23	Alligator soils.....	39
Dubbs series.....	23	Dowling soils.....	40
Dubbs very fine sandy loam:		Falaya soils.....	40
Nearly level phase.....	23	Forestdale soils.....	41
Gently sloping phase.....	23	Waverly soils.....	41
Sloping phase.....	24	Ina soils.....	41
Dubbs silt loam:		Azonal soils.....	42
Nearly level phase.....	24	Regosols.....	42
Gently sloping phase.....	24	Beulah soils.....	42
Sloping phase.....	24	Alluvial soils.....	42
		Collins soils.....	42
		Hymon soils.....	43

CONTENTS

<b>Engineering properties of soils</b> .....	44	<b>General nature of the county—Continued</b>	Page
Engineering classification systems.....	44	Forests and wildlife.....	50
Engineering interpretations.....	44	<b>Flood control</b> .....	50
Soil data related to engineering.....	45	<b>Agriculture</b> .....	51
<b>General nature of the county</b> .....	45	Crops.....	51
Settlement and development.....	45	Livestock.....	51
Climate.....	45	Size and tenure of farms.....	52
Water supply.....	50	<b>Glossary</b> .....	52
		<b>Literature cited</b> .....	53

# SOIL SURVEY OF LEFLORE COUNTY, MISSISSIPPI

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MISSISSIPPI AGRICULTURAL EXPERIMENT STATION AND LEFLORE COUNTY

**L**EFLORE COUNTY is in the northwestern part of Mississippi, on the flood plain of the Mississippi River (fig. 1). Its total area is 588 square miles, or 376,320 acres.

The county is primarily agricultural. It has a humid, warm-temperate climate in which many kinds of crops can be grown. Cotton has always been the principal cash crop. In recent years, other crops and livestock have to some extent displaced cotton as sources of farm income. Much of the acreage is in forest, which is a source of supplementary income. There are no large industries in the county.

This survey was made as part of the technical assistance given by the Soil Conservation Service to the Leflore County Soil Conservation District. Fieldwork was completed in 1957. Unless otherwise specified, information presented in this report refers to conditions at the time of the survey.

## Soil Associations

There are four general soil areas, or soil associations, in Leflore County. Each is named for the dominant soil series that occur within it. The distribution of the soil associations is shown on a colored map in the back of this report. Each of the four associations is described in this section.

### Dubbs-Dundee-Forestdale Association

This association forms an irregular strip that runs from the southwestern corner of the county to the northeastern corner. It consists mostly of moderately fine textured to medium textured, somewhat poorly drained to well drained soils that occupy natural levees or low terraces above ordinary overflow. The relief is nearly level. Included are small areas of poorly drained, fine-textured soils; excessively drained, coarse-textured soils; and gently sloping and sloping soils.

This association comprises about 35 percent of the area of the county. Over half of it consists of the somewhat poorly drained to moderately well drained Dundee soils. A little less than a fourth consists of the poorly drained to somewhat poorly drained Forestdale soils, and less than one-fifth of the moderately well drained to well drained Dubbs soils. The rest consists of scattered areas of the Dowling soils, the well drained to somewhat excessively drained Bosket soils, the somewhat excessively drained to excessively drained Beulah soils, and the poorly drained Alligator soils.

Most of this association is good for agriculture. The included Bosket and Beulah soils are somewhat droughty in summer when rainfall is low, and the included Alligator soils are difficult to till except within a narrow range of moisture content.

Most of the acreage is planted to cotton. Some of it is used for small grains, corn, hay, or soybeans for oil. A very small part is in forest.

The farms in this association range in size from 10 to 7,000 acres. Most are between 300 and 400 acres.

On some of the large farms some livestock is raised and—in addition to the common crops—nuts, truck crops, and other specialty crops are grown.

### Forestdale-Alligator Association

This association forms a narrow strip that runs through the west-central part of the county and extends into the northwestern corner. Other areas are south of Itta Bena, east and west of Sidon, west of Highlandale, and near Greenwood. The association consists mostly of nearly level, moderately fine textured to fine textured, somewhat poorly drained to poorly drained soils on low terraces and slack-water areas. It also includes small areas of medium-textured, moderately well drained to well drained soils and sloping or gently sloping soils.

This association comprises about 20 percent of the area of the county. The poorly drained Alligator soils and the poorly drained to somewhat poorly drained Forestdale soils occur in about equal proportions. A very small part of the association consists of the moderately well drained to well drained Dubbs soils and the somewhat poorly drained to moderately well drained Dundee soils.

These soils are fairly good for agriculture. Most of the acreage can be tilled only within a narrow range of moisture content. Some small areas of the more poorly drained soils are likely to be flooded in wet seasons.

Most of the acreage is used for crops or pasture. Only small, isolated areas are in forest. Cotton is the principal crop, but soybeans, small grains, corn, hay, and sorghum for silage are also grown. Farms range in size and type from small family farms of 80 to 160 acres to large plantations.

### Alligator-Dowling Association

This association occupies several large areas that are scattered throughout the county. The largest is a wide strip along the west side of the county. Others occur south of Morgan City, southwest of Sidon, south of Shellmound, northeast of Minter City, and near Old Orchard

Lake, McIntyre Lake, and Six Mile Lake. The association consists mostly of fine-textured, poorly drained soils on level and nearly level slack-water areas. Included are small areas of medium-textured, somewhat poorly drained to moderately well drained, sloping and gently sloping soils.

This association comprises about 32 percent of the area of the county. About three-fourths of it consists of Alligator soils and about one-fifth of Dowling soils. The rest consists of small areas of the poorly drained to somewhat poorly drained Forestdale soils and the somewhat poorly drained to moderately well drained Dundee soils. Large areas near Morgan City and Shellmound and one area in the western part of the county consist almost entirely of Alligator soils interwoven with long, narrow swags of Dowling soils.

The Alligator and Dowling soils are difficult to till except within a narrow range of moisture content. Ade-

quately drained areas are moderately productive. However, it is sometimes difficult to drain those areas that occur in the low swags because they lack outlets.

Large areas of this association are still in forest; in fact, most of the forest in this county is in this association. Cotton, soybeans, and small grains are the principal crops. All the rice produced in this county is grown on soils of this association. On several farms, livestock is raised. Farms range in size and type from small family farms to large plantations.

### Collins-Falaya-Hymon-Ina Association

This association occupies a narrow strip east of Greenwood along the Carroll County line, a small triangular area southeast of Sidon along the Carroll and Holmes County lines, a narrow strip along the Yazoo River south of Morgan City, and another small area northeast of Minter City near the Tallahatchie County line. The Falaya and Ina soils occur in all these locations, but the Collins and Hymon soils occur mostly in the area east of Greenwood and southeast of Sidon.

This association consists mostly of moderately fine textured to medium textured, somewhat poorly drained to moderately well drained soils developed in recent sediments washed from the Loess Belt. The areas are nearly level, and many are subject to flooding. Small areas of poorly drained to well drained soils and small areas of gently sloping soils are included.

The combined area of this association is 11 percent of the total area of the county. Besides the moderately well drained Collins and Hymon soils and the somewhat poorly drained Falaya and Ina soils, the association includes small areas of the poorly drained Waverly, Dowling, and Alligator soils, the somewhat poorly drained to poorly drained Forestdale soils, and the moderately well drained Pearson soils.

The soils of this association are fairly good for agriculture, but they are likely to be flooded during the growing season. At present they are partly protected from floods, and some additional flood control measures are planned. Most of the acreage in this association is easy to till throughout a wide range of moisture content.

Cotton, corn, soybeans for oil, and small grains are the principal crops. Small acreages are in hay and pasture. Only small areas are in forest, and these, if adequately drained and protected from floods, would become productive cropland. Farms range in size and type from small family farms to large plantations.

### Capability Groups of Soils

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

The capability unit, sometimes called a management group, is the lowest level of grouping. It is identified by an Arabic numeral. A capability unit is made up of soils similar in management needs, in risk of damage, and in general suitability for use.

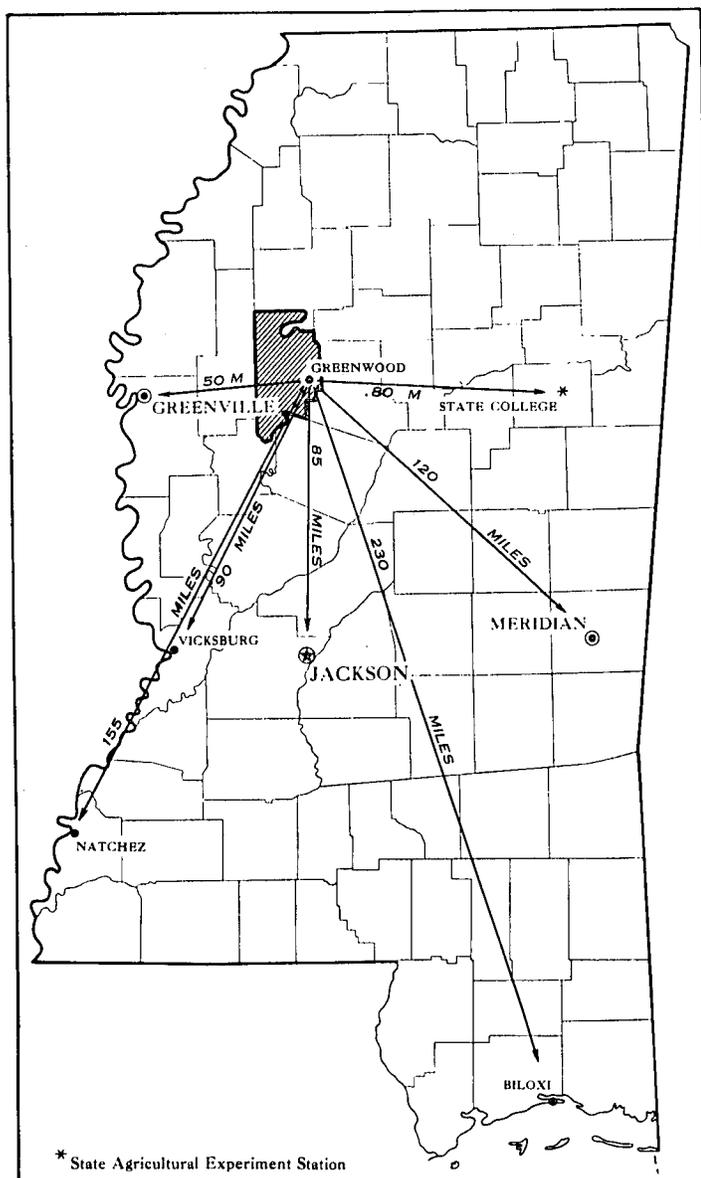


Figure 1.—Location of Leflore County in Mississippi.

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

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

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

Class II soils can be cultivated regularly but do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping; consequently, they need moderate care to prevent erosion. Other soils in class II may be slightly droughty, slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly but have a narrower range of use and need even more careful management.

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

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

Class V soils are nearly level and gently sloping but are droughty, wet, low in fertility, or otherwise unsuitable for cultivation. None of the soils in Leflore County are in class V.

Class VI soils are not suitable for crops because they are steep or droughty or otherwise limited, but they give fair yields of forage or forest products. Some soils in class VI can, without damage, be cultivated enough so that fruit trees or forest trees can be set out or pasture crops seeded. None of the soils in Leflore County are in class VI.

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

In class VIII are soils that have practically no agricultural use. Some of them have value as watersheds, wildlife habitats, or scenery. None of the soils in Leflore County are in class VIII.

The soils of Leflore County are grouped into the following classes, subclasses, and units:

**CLASS I.**—Deep productive soils, suitable for intensive cultivation with practices normally used for good farming.

Unit 1 (I-1): Friable loamy and silty soils on stream terraces and recently deposited alluvium.

Unit 2 (I-2): Very friable loamy soils on stream terraces.

**CLASS II.**—Soils that have moderate limitations if cultivated.

Subclass IIe: Soils subject to slight or moderate erosion.

Unit 3 (IIe-1): Gently sloping and sloping friable soils on stream terraces.

Unit 4 (IIe-2): Gently sloping very friable soils on stream terraces.

Unit 5 (IIe-4): Gently sloping somewhat firm soils on stream terraces.

Subclass IIs: Soils that are limited mainly by unfavorable texture, reaction, or low fertility.

Unit 6 (IIs-1): Somewhat excessively drained to excessively drained soils on stream terraces.

Unit 7 (IIs-3): Somewhat poorly drained to poorly drained soils that have moderately slowly permeable subsoils.

Unit 8 (IIs-4): Poorly drained to somewhat poorly drained firm to friable soils.

Unit 9 (IIs-5): Soils that have plastic, very slowly permeable subsoils.

Unit 10 (IIs-6): Somewhat poorly drained to moderately well drained soils on terraces.

**CLASS III.**—Soils that have severe limitations if cultivated.

Subclass IIIe: Sloping soils subject to erosion.

Unit 11 (IIIe-6): Mixed soils on stream terraces.

Subclass IIIw: Soils subject to flooding.

Unit 12 (IIIw-6): Soils on stream terraces subject to backwater flooding.

Unit 13 (IIIw-11): Poorly drained soils subject to local flooding.

Unit 14 (IIIw-12): Poorly drained soils subject to local and backwater flooding.

Unit 15 (IIIw-13): Poorly drained soils in depressions subject to local flooding.

Subclass IIIs: Soils that have unfavorable textures and mixed droughty soils.

Unit 16 (IIIs-1): Mixed very fine sandy loam and silt loam soils.

Unit 17 (IIIs-4): Soils that have unfavorable textures and plastic subsoils.

**CLASS IV.**—Soils that are fairly well suited to limited or occasional cultivation if carefully managed.

Subclass IVe: Strongly sloping soils.

Unit 18 (IVe-7): Mixed soils on stream terraces.

Subclass IVw: Poorly drained soils that are difficult to manage under cultivation.

Unit 19 (IVw-1): Clayey soils in depressions.

**CLASS VII.**—Soils not suitable for cultivation and severely limited for pasture or woodland.

Subclass VIIs: Droughty soils.

Unit 20 (VIIs-1): Deep infertile sandy soils.

## Capability Units

A brief description of each capability unit, a list of the soils in each unit, and suggestions for use and management are given in the pages that follow. The Soil Testing Laboratory at State College will test soils to determine what kinds and amounts of fertilizer are needed. The present use of the acreage in each capability unit is shown in table 1.

TABLE 1.—*Land use by capability units*

Capability unit	Crop-land	Wood-land	Idle-land	Pas-ture	Total	Percent of the county
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	
1 (I-1) .....	47,545	960	48	3,382	51,935	13.8
2 (I-2) .....	1,245	19		95	1,359	.4
3 (IIe-1) .....	17,574	531	67	1,702	19,874	5.3
4 (IIe-2) .....	360				360	.1
5 (IIe-4) .....	2,917	142		428	3,487	.9
6 (IIs-1) .....	152	9			161	( <sup>1</sup> )
7 (IIs-3) .....	24,857	2,566	399	2,433	30,255	8.0
8 (IIs-4) .....	41,064	11,536	798	7,948	61,346	16.3
9 (IIs-5) .....	675			19	694	.2
10 (IIs-6) .....	7,223	161	95	751	8,230	2.2
11 (IIIe-6) .....	143	47	38		228	.1
12 (IIIw-6) .....	351	808	19		1,178	.3
13 (IIIw-11) .....	4,058	3,412	409	104	7,983	2.1
14 (IIIw-12) .....	2,789	28,828	1,047	123	32,787	8.7
15 (IIIw-13) .....	15,651	2,614	95	1,339	19,699	5.2
16 (IIIs-1) .....	1,083	76	95	285	1,539	.4
17 (IIIs-4) .....	37,543	24,205	1,378	8,638	71,764	19.1
18 (IVe-7) .....	38			57	95	( <sup>1</sup> )
19 (IVw-1) .....	12,497	21,476	418	3,402	37,793	10.0
20 (VIIs-1) .....	38	1,205		115	1,358	.4
Totals .....	217,803	98,595	4,906	30,821	352,125	93.5
Miscellaneous areas:						
Homesites .....					4,875	1.3
Pits .....					199	.1
Swamp .....					10,178	2.7
Water .....					6,434	1.7
Bayous .....					2,509	.7
Totals .....					376,320	100.0

<sup>1</sup> Less than 0.1 percent.

#### CAPABILITY UNIT 1 (I-1)

#### *Friable loamy and silty soils on stream terraces and recently deposited alluvium*

These are deep, somewhat poorly drained to well drained, uneroded to slightly eroded soils on nearly level relief. Their surface soils are dark yellowish-brown to pale-brown silt loam and very fine sandy loam. The subsoils are unmottled or faintly mottled brown to yellowish-brown silty clay to friable very fine sandy loam. The substrata, or C horizons, are friable silt loam to very fine sandy loam. Water and air move readily into and through these soils, and the available moisture capacity is moderately high to high. Roots penetrate to a moderate depth.

The soils in this unit are—

- Dundee silt loam, nearly level phase.
- Dundee very fine sandy loam, nearly level phase.
- Dubbs silt loam, nearly level phase.
- Dubbs very fine sandy loam, nearly level phase.
- Pearson silt loam, nearly level phase.
- Collins silt loam.
- Hymon very fine sandy loam.

Except for very small areas of the Pearson, Hymon, and Collins soils, the soils in this unit have been cleared and planted to row crops for many years. They are the best all-round agricultural soils in the county. Most of the acreage is planted to cotton each year. A small acreage is planted to soybeans, small grains, corn, and hay (fig. 2). Good pastures can be maintained, but, because these soils are suited to row crops of high cash value, little of the acreage is used for pasture.

Under good management these soils will produce high yields, even though they are continuously and intensively cultivated. Good tilth and fertility can be maintained by using commercial fertilizers, returning crop residues to the soil, and growing cover crops and green-manure crops annually after the row crop. It is beneficial, however, to rotate row crops with summer legumes and pasture or other sod crops.

*Suitable crops and rotations.*—Under the present agricultural system, it is best to grow cotton on these soils. Other suitable crops are truck crops, small grains, corn, soybeans, and sorghum for grain or silage. Vetch, bur-clover, and rough peas are good winter cover crops and green-manure crops. Orchards do well on these soils.

The following are suitable rotations:

Cotton (6 years); pasture (3 years).

Cotton (3 years); soybeans (2 years).

Cotton (4 years); oats interplanted with lespedeza for hay (2 years).

*Fertility.*—These soils are low in organic matter, medium to high in available phosphorus, and low to medium in available potassium. All crops except legumes need nitrogen. Generally, some commercial nitrogen is needed to supplement organic nitrogen supplied by green-manure crops. Phosphate and potash should be applied only if soil tests indicate they are needed. Potash, if applied under wilt-resistant varieties of cotton, helps to control cotton wilt (5).

Intensive cropping and the use of large amounts of acid-forming nitrogen fertilizers have made these soils acid. Lime is needed, but it should be applied only after soil tests and in the amounts that will meet the needs of the crop that is to be grown.

*Tillage.*—These soils are easily tilled. Fall plowing is a common practice, but it may result in loss of topsoil and plant nutrients because it leaves the soil unprotected from erosion during the months when rainfall is normally high. A better practice is to shred crop residues in fall and prepare seedbeds in spring.

When these soils are cultivated, a plowsole forms below the plow layer. A plowsole is a dense, compacted layer, 2 to 4 inches thick, that restricts the downward movement of water and air, limits the supply of available moisture, and prevents roots from penetrating below the plow layer. Breaking up the plowsole with a chisel or other deep-tillage implement (6) increases the productivity of the soils. The best time to do this is when the soils are dry.

*Surface drainage.*—On the Dundee, Dubbs, and Pearson soils, the crop rows should follow the contour, so as to conserve moisture and fertility. These soils need little or no surface drainage. On the Hymon and Collins soils, the crop rows should be so designed that each row carries the excess water to a properly constructed water outlet. V- or W-shaped ditches are generally adequate to remove excess runoff in low areas. The Collins and Hymon soils need to be protected from floods.

*Irrigation.*—These soils are well suited to irrigation; they are nearly level, they are potentially highly productive, they absorb moisture moderately well, and they are near streams and other outlets into which excess water can be drained. Steep or uneven slopes can be leveled or graded to facilitate border or furrow irrigation (fig. 3). Leveling has not affected yields unfavorably.

General good management is required to assure high yields under irrigation. Irrigated crops, particularly cot-



*Figure 2.*—Cora and cotton on Dundee and Dubbs very fine sandy loams.



*Figure 3.*—Land-leveling operations on Dubbs, Dundee, and Bosket very fine sandy loam.

ton, provide a favorable environment for insects, and unless effective measures are taken to control insects the benefits from irrigation will be lost. The higher yields resulting from irrigation require a greater supply of plant nutrients; consequently, larger amounts of fertilizer are needed to maintain productivity.

*Pasture.*—These soils are suited to most grasses and legumes commonly grown for pasture. All the pasture grasses need nitrogen fertilizer and most of the legumes need applications of lime. Phosphate and potash should be applied if soil tests indicate they are needed.

*Forest.*—Sweetgum, water oak, and other hardwoods are suitable trees for these soils.

#### CAPABILITY UNIT 2 (I-2)

##### *Very friable loamy soils on stream terraces*

Basket very fine sandy loam, nearly level phase, is the only soil in this unit. It is well drained to somewhat excessively drained. Its surface layer is dark-brown very fine sandy loam. The subsoil is very dark grayish-brown friable silty clay loam, and the substratum is dark yellowish-brown friable very fine sandy loam to sandy loam. Permeability is moderately rapid. The available moisture capacity is moderately low. The root zone is fairly deep.

This soil has been cleared and planted to crops for many years. Cotton is the principal crop. A fairly large acreage is planted to small grains, which are either combined for grain or used for winter grazing. Orchard fruits and winter and early spring truck crops do well, but only small acreages are used for these crops.

Many areas of this soil are too small to be worked separately and consequently are under the same management as the adjoining soils. Areas large enough to be farmed separately need pasture plants, summer legumes, or other soil-improving crops in the rotation.

*Suitable crops and rotations.*—Except for some small included areas that are sandy and excessively drained, this soil is good for row crops. It is fairly well suited to cotton and well suited to small grains. It is not suited to late corn, soybeans, or other late-maturing crops. Vetch, rough peas, and burclover are good for winter cover and green manure.

A few suitable rotations are the following:

- Cotton (3 years); pasture (4 years).
- Truck crops harvested in spring and followed by summer legumes (3 years); cotton (2 years).
- Vetch or burclover (3 years); cotton (3 years).

*Fertility.*—This soil is moderately fertile. It is low in organic matter, medium to low in available phosphorus and available potassium, and strongly acid to medium acid.

All crops except legumes need commercial and organic nitrogen. Split applications of nitrogen are suggested because nitrogen is readily leached from this soil. Potash and phosphate should be applied only if a soil test or previous experience indicates they are needed. Potash, if applied under a wilt-resistant variety of cotton, helps to control cotton wilt (5).

Legumes need lime, but most of the row crops commonly grown are acid-tolerant and do not respond to liming. Lime should be applied only after soil tests and in the amounts that will meet the needs of the particular crop.

*Tillage.*—This soil is easy to till. Because it is sandier than the soils in unit 1 (I-1), it is less likely to develop a

plowsole. If a plowsole does form, it should be broken up while the soil is dry.

Fall plowing increases the risk of erosion because, when the soil is bare, rain causes it to crust and pack; consequently, runoff increases and moisture and soil material are lost. A better practice is to shred crop residues in fall and prepare seedbeds in spring. Good tillth is easily maintained by plowing under crop residues and green-manure crops.

*Surface drainage.*—Runoff is slow to medium. There is little or no risk of erosion. Artificial drainage is not generally needed.

*Irrigation.*—This soil is well suited to irrigation; it is nearly level, absorbs moisture rapidly, and is near streams or other outlets into which excess water can be drained. If necessary, it can be leveled to facilitate border or furrow irrigation (fig. 3). Leveling has not affected yields unfavorably. General good management is necessary to insure high yields under irrigation.

*Pasture.*—This soil will provide good grazing in winter and early in spring, but temporary summer pastures and permanent pastures may be damaged by drought late in summer and in fall. Ryegrass, small grains, and crimson clover are good plants for winter and early spring pastures. Ryegrass and small grains need nitrogen fertilizer. Crimson clover should be fertilized according to needs indicated by soil tests.

*Forest.*—This soil will produce good forests, but it is too valuable for crops to be used for trees. Sweetgum, water oak, and other hardwoods are suitable trees.

#### CAPABILITY UNIT 3 (IIe-1)

##### *Gently sloping and sloping friable soils on stream terraces*

These soils are deep, somewhat poorly drained to well drained, and uneroded to slightly eroded. Their surface soils are pale-brown to dark yellowish-brown silt loam and very fine sandy loam. Their subsoils are brown and yellowish-brown firm silty clay to friable silty clay loam or sandy clay loam, slightly mottled or unmottled. The substrata are friable silt loam or very fine sandy loam.

Permeability is moderately slow, and the available moisture capacity is moderately high. The root zone is moderately deep. Runoff is medium. These soils are likely to erode when cultivated.

The soils in this unit are—

- Dundee silt loam, gently sloping phase.
- Dundee silt loam, sloping phase.
- Dundee very fine sandy loam, gently sloping phase.
- Dundee very fine sandy loam, sloping phase.
- Dubbs silt loam, gently sloping phase.
- Dubbs silt loam, sloping phase.
- Dubbs very fine sandy loam, gently sloping phase.
- Dubbs very fine sandy loam, sloping phase.

Except for some very small areas, these soils are cleared and used for crops or pasture. Most of the acreage is planted to cotton, but recently there has been an increase in the acreage used for pasture, small grains, hay, and winter grazing crops.

*Suitable crops and rotations.*—Cotton and corn are suitable crops. Because of the risk of erosion, they should be rotated with soil-conserving and soil-building crops. Other suitable crops are soybeans, sorghum for silage, small grains for grazing and grain, and winter and early spring truck crops. Vetch, burclover, and rough peas are good winter cover crops and green-manure crops. These soils are good sites for orchards.

Although many areas are small and rotations are difficult to plan and carry out, crops should be rotated. A few suitable rotations are the following:

- Pasture (4 years); cotton (2 years).
- Oats interplanted with lespedeza for hay (3 years); cotton (2 years).
- Ryegrass or small grains and crimson clover for winter and spring grazing and fallow through the summer (3 years); cotton (2 years).
- Continuous ryegrass, small grains, and crimson clover for grazing.

*Fertility.*—These soils are low in natural fertility. They contain little organic matter. They are medium to high in available phosphorus and low to medium in available potassium. Nitrogen is needed for all crops except legumes. Phosphate and potash should be applied only if soil tests indicate they are needed. The soils supply enough phosphorus for most of the crops commonly grown. Potash is not needed for row crops on soils that are medium in available potassium. Potash does, however, help to control cotton wilt.

These soils are strongly acid to medium acid. For crops, lime should be applied in the amounts indicated by soil tests. For pastures, enough lime should be used to keep the pH at 6.5.

*Tillage.*—These soils are easy to till. They can be tilled throughout a wide range of moisture content. Good tilth is easily maintained. To prevent erosion, these soils should be tilled on the contour and seedbeds should be prepared in spring.

A plowsole is likely to form below the plow layer. To prevent a decline in productivity, the plowsole should be broken up. The best time to do this is when the soils are dry.

*Surface drainage.*—Runoff is medium, and the risk of erosion is slight to moderate. Because the slopes are rarely more than 100 feet long, simple water-control measures are adequate to prevent erosion. Contour crop rows help to remove excess water. A few sodded outlets may be needed in places.

*Irrigation.*—The soils in this capability unit respond to irrigation in the same way as the soils in capability unit 1 (I-1). A few areas have been leveled to facilitate furrow irrigation. Leveling is expensive because deep cuts have to be made and large amounts of soil have to be moved. Sprinklers can be used successfully. Installing a sprinkler system is cheaper than leveling.

*Pasture.*—These soils are good for pasture. Having good surface drainage, they provide firm footing for livestock during the winter grazing months. Bermudagrass, johnsongrass, dallisgrass, white clover, ryegrass, small grains, and crimson clover are suitable pasture plants. Fescue, red clover, and lespedeza are only fairly suitable.

*Forest.*—Suitable trees are sweetgum, red oak, white oak, water oak, hickory, white ash, and other hardwoods.

#### CAPABILITY UNIT 4 (IIe-2)

##### *Gently sloping very friable soils on stream terraces*

Bosket very fine sandy loam, gently sloping phase, is the only soil in this unit. It is well drained to somewhat excessively drained, and it is slightly eroded to moderately eroded. Some small areas of sloping soils are included.

The surface soil is dark brown. The subsoil is very dark grayish-brown silty clay loam, and the substratum is dark yellowish-brown friable very fine sandy loam to

sandy loam. Permeability is moderately rapid. The available moisture capacity is low. The root zone is deep.

This soil is somewhat limited in use because it erodes easily and lacks moisture late in summer.

*Suitable crops and rotations.*—This soil has been cleared for many years. It is used for row crops, small grains, or pasture. If properly managed, it can be used successfully for cotton, corn, and other row crops part of the time, but it is better suited to small grains, early truck crops, and pasture. It is also well suited to orchards. It is not suited to late-maturing soybeans because it lacks moisture late in summer and in fall. Vetch, rough peas, and burclover are good winter cover crops and green-manure crops.

The cropping system should include small grains, pasture plants; winter cover crops, and green-manure crops. A clean-tilled crop should be followed by a cover crop. A few suitable rotations are the following:

- Pasture (3 years); cotton (2 years).
- Oats for grain interplanted with annual lespedeza for hay (2 years); cotton (1 year).
- Oats (1 year) followed by a cover crop of vetch; volunteer vetch and native grasses (2 years); and cotton (2 years).

This soil is low in organic matter and low to medium in available phosphorus and potassium. Nitrogen is needed for all crops except legumes. Generally, some commercial nitrogen is needed in addition to organic nitrogen supplied by green-manure crops. Split applications of commercial nitrogen are suggested because nitrogen is quickly leached from this soil. Phosphate and potash should be applied if soil tests indicate they are needed.

The acidity of this soil has been rapidly increased by the use of large amounts of acid-forming nitrogen fertilizers. Soil tests should be made to determine how much lime is needed for each crop.

*Tillage.*—This soil is easy to till. A plowsole is likely to form below the plow layer. It should be broken up when the soil is dry, which is generally late in fall. Fall plowing is a common practice, but a better practice is to prepare seedbeds in spring, early enough so that they will be firm at planting time. To prevent erosion, tillage should be on the contour.

*Surface drainage.*—Runoff is not a serious problem, because the slopes are short. Crop rows should be on the contour, so that the excess water can be removed without causing erosion. In some areas, V- or W-shaped ditches or grassed waterways are needed.

*Irrigation.*—This soil is not suited to furrow or flood irrigation. It is gently sloping and has a coarse-textured substratum. Leveling would require deep cutting and would be too expensive to be worthwhile. Sprinkler irrigation is better for this soil.

General good management is required to assure high yields under irrigation. Irrigated crops, particularly cotton, provide a favorable environment for insects. Unless effective insect-control measures are taken, the benefits of irrigation will be lost. The higher yields resulting from irrigation require a greater supply of plant nutrients; consequently, larger amounts of fertilizer are needed to maintain productivity.

*Pasture.*—This soil will produce good pasture. It is suited to most of the perennial grasses and perennial and annual legumes commonly grown for pasture, but not to alfalfa. The grasses and legumes may be grown

separately, but better results are obtained if they are grown together.

Bermudagrass, johnsongrass, dallisgrass, whiteclover, and annual lespedeza are suitable plants for permanent pastures. Fescue and red clover are suitable for winter and spring pastures. Sudangrass and millet are good for temporary summer pastures, but they need to be irrigated late in summer and in fall.

All the pasture grasses need nitrogen. If they are grown in combination with legumes, less nitrogen is needed. Legumes will produce good yields without lime, phosphate, or potash, but they will produce even better yields if lime and phosphate are added. If lime and phosphate are applied on fields of clover, lush growths result, especially in spring when rainfall is normally high. However, this may increase the hazard of bloating to the extent that grazing must be stopped.

*Forest.*—Suitable trees are sweetgum, red oak, water oak, white oak, hickory, and white ash.

#### CAPABILITY UNIT 5 (IIe-4)

##### *Gently sloping somewhat firm soils on stream terraces*

Dundee silty clay loam, gently sloping phase, is the only soil in this unit. It is a brown or grayish-brown, firm to moderately friable, slightly to moderately eroded soil. The slightly mottled subsoil is grayish-brown to dark-brown, firm silty clay or silty clay loam. The substratum is brown to yellowish-brown friable silty clay loam, silt loam, or very-fine sandy loam. Permeability is moderately slow. The root zone is fairly deep.

About one-fourth of this soil is in forest. The rest is planted to crops, mostly cotton, or is used for pasture.

*Suitable crops and rotations.*—This soil is suited to most crops commonly grown in the county, but it is only fairly well suited to corn and lespedeza. Because it erodes easily, it should be kept in pasture plants or other sod crops part of the time.

The following rotations are suitable:

Pasture (4 years); cotton (4 years).  
Oats (2 years); row crops (2 years).

*Fertility.*—This soil is moderately low in natural fertility. It is medium to high in available phosphorus and low to medium in available potassium. It contains little organic matter. Nitrogen is needed for all crops except legumes. Potash should be applied as needed. This soil is very strongly acid to medium acid. Lime should be applied if soil tests indicate that it is needed.

*Tillage.*—This soil is somewhat difficult to till. It can be satisfactorily cultivated within only a narrow range of moisture content. A good system is to shred crop residues in fall and prepare seedbeds for row crops in spring.

*Surface drainage.*—Contour crop rows will remove excess surface water with a minimum loss of soil. In some areas small V- and W-shaped ditches are needed as water outlets.

*Irrigation.*—This soil is suited to irrigation. Because of the slope, sprinkling is the most satisfactory system. Leveling to facilitate border or furrow irrigation may be somewhat expensive, but it does not affect yields unfavorably.

*Pasture.*—Good pasture stands can be developed. Bermudagrass, dallisgrass, johnsongrass, ryegrass, crimson clover, millet, sudangrass, and small grains are suitable pasture plants. White clover and red clover are also

suitable, but they do better if seeded with grasses than if seeded by themselves.

*Forest.*—Sweetgum, red oak, water oak, white oak, hickory, white ash, and other hardwoods are suitable trees.

#### CAPABILITY UNIT 6 (IIe-1)

##### *Somewhat excessively drained to excessively drained soils on stream terraces*

Beulah very fine sandy loam, gently sloping phase, is the only soil in this unit. It has a surface soil of dark grayish-brown to yellowish-brown, very friable, uneroded to slightly eroded very fine sandy loam and fine sandy loam. The subsoil is dark-brown to yellowish-brown, very friable very fine sandy loam and fine sandy loam. The substratum is light yellowish-brown, very friable very fine sandy loam to fine loamy sand.

Permeability is rapid. The available moisture capacity is low to moderately low. The root zone is deep.

This soil has been cleared and planted to crops for many years. Cotton and small grains are the principal crops. Small acreages are in pasture. Droughtiness limits the use of this soil to some extent.

*Suitable crops and rotations.*—Orchard fruits, small grains, winter and early spring truck crops, and winter grazing crops are suitable crops. Vetch and burclover are good for winter cover and green manure. Pasture or other soil improving crops should be included in the rotation.

The following rotations are suitable:

Winter pasture and spring pasture, fallowed through each summer (4 years); row crops (2 years).  
Oats, interplanted with vetch that is left on the soil (1 year); volunteer vetch and native grasses (1 year); and cotton (2 years).

*Fertility.*—This soil is moderately low in natural fertility. It is low in organic matter, available phosphorus, and available potassium. All crops except legumes respond favorably to commercial or organic nitrogen. Split applications of commercial nitrogen are suggested because nitrogen is readily leached from this excessively drained soil. Soil tests should be made to determine how much phosphate and potash are needed.

This soil is very strongly acid to medium acid. Lime should be applied after soil tests, in amounts that will meet the needs of each crop.

*Tillage.*—This soil is easy to till. Generally, it is tilled on the contour to conserve moisture. Seedbeds for row crops should be prepared in spring. Good tillage is easily maintained by plowing under crop residues and green-manure crops.

*Surface drainage.*—The rate of infiltration is moderately rapid. Runoff is slow. There is little or no risk of erosion. The steeper slopes are short; consequently, it is not difficult to control runoff and erosion. Normally, no artificial drainage is needed.

*Irrigation.*—This deep soil is well suited to irrigation. It can be leveled to facilitate furrow or border irrigation. Leveling has not affected yields unfavorably. On the stronger slopes, however, leveling may be too expensive to be practical. Irrigation by a well-designed sprinkler system is better for this soil than furrow or border irrigation. General good management is needed to insure high yields under irrigation.

*Pasture.*—This soil will provide good grazing in winter and in spring, but permanent pastures and temporary

summer pastures may be damaged by drought late in summer and in fall, when rainfall is normally low. Small grains, ryegrass, and crimson clover are good plants for winter and spring pasture.

All of the pasture grasses need nitrogen. Crimson clover responds to applications of phosphate and potash. Enough lime should be used to keep the pH value at 6.5.

*Forest.*—Sweetgum, water oak, red oak, white oak, hickory, hackberry, elm, white ash, and other hardwoods are suitable trees.

#### CAPABILITY UNIT 7 (IIb-3)

*Somewhat poorly drained to poorly drained soils that have moderately slowly permeable subsoils*

This unit consists of uneroded to slightly eroded, nearly level and gently sloping soils. The surface soils are grayish-brown to pale-brown friable silt loam and very fine sandy loam.

The subsoil of the Forestdale soils is light-gray to light brownish-gray, firm, mottled clay to silty clay, and the substratum is gray, firm to friable, mottled silty clay loam.

Permeability is moderately slow to slow. The available moisture capacity is moderately high to high. The root zone is shallow.

The subsoils of the Falaya and Ina soils are light brownish-gray to grayish-brown, friable, mottled silt loam and very fine sandy loam. These soils have a high water table. Runoff, the rate of moisture infiltration, and the depth of the root zone depend in part on the depth to the water table. The available moisture capacity is high.

The soils in this unit are—

- Forestdale silt loam, nearly level phase.
- Forestdale silt loam, gently sloping phase.
- Forestdale very fine sandy loam, nearly level phase.
- Falaya silt loam.
- Ina silt loam.
- Ina very fine sandy loam.

Most of this unit has been cleared and planted to crops. A small part is in pasture, and another small part is in forest. Cotton is the principal crop, but large acreages are planted each year to soybeans and small grains, generally in rotation with cotton. Small acreages are planted to corn, hay, sorghum for grain or silage, and pasture plants.

Adequately drained areas of these soils are easy to cultivate. These areas include Ina and Falaya soils that have been protected from floods. However, the planting of cotton, corn, and other crops on these soils may be delayed because of the high water table.

*Suitable crops and rotations.*—Rice and most other crops commonly grown in the county are suited to these soils. Vetch and rough peas are good winter cover crops.

A few suitable rotations are the following:

- Grass and legume pasture (3 years); cotton (3 years).
- Oats interplanted with lespedeza for hay (1 year); soybeans (2 years); cotton (3 years).
- Soybeans (2 years); cotton (2 years).

*Fertility.*—These soils are low in natural fertility. They are low in organic matter, medium to high in available phosphorus, and low to medium in available potassium. All crops except legumes respond favorably to organic and commercial nitrogen. Potash should be applied in fields where the supply of available potassium is small.

These soils are strongly acid to medium acid. Soil tests should be made to determine how much lime to apply for a particular crop.

*Tillage.*—The very fine sandy loams in this unit can be tilled over a wide range of moisture content, but the silt loams can be tilled only over a rather narrow range. Because internal drainage is poor, preparation of seedbeds or cultivation of crops may be delayed after heavy rains. Deep tillage and frequent cultivation will improve aeration and keep the surface soil from crusting. If row crops are grown annually, commercial fertilizers should be applied and crop residues and green-manure crops should be plowed under to help maintain fertility and good tilth.

*Surface drainage.*—Except for Forestdale silt loam, gently sloping phase, all of these soils need artificial surface drainage. Crop rows should be designed so they will carry excess water to outlets, but the fall in each row should not be enough to cause erosion. V- or W-shaped ditches that are located in the low areas and drain to properly constructed water outlets will generally remove any excess runoff. Improved levees and canals along the smaller streams are needed to protect the Falaya and Ina soils from overflow.

Forestdale silt loam, gently sloping phase, should be tilled on the contour to prevent erosion and to conserve moisture and fertility.

*Irrigation.*—These soils are level, and they have adequate outlets for excess surface water, but their suitability for irrigation is limited by poor drainage and the slow to moderately slow rate of infiltration. If irrigated, these soils need artificial drainage to remove excess surface water.

The Falaya and Ina soils can be leveled to facilitate furrow and border irrigation. Leveling of these soils has not affected their physical characteristics or their productivity unfavorably. Surface drainage is improved by grading to fill in low areas and to make the slopes uniform. However, leveling of Forestdale very fine sandy loam and silt loam has changed the physical characteristics of these soils and has resulted in reduced yields, especially in areas where 4 inches or more of surface soil has been removed.

*Pasture.*—These soils are excellent for pasture. Most pasture grasses and legumes grow well, either separately or in combination. Pastures that are to be grazed in winter and early in spring need thick sods to keep them from becoming boggy during long wet periods.

All pasture grasses need nitrogen. Legumes respond well to phosphate. Phosphate and potash should be applied if soil tests indicate they are needed. Enough lime should be used to keep the pH value at 6.5.

*Forest.*—Sweetgum, water oak, pecan, hackberry, elm, white ash, and willow are the native trees.

#### CAPABILITY UNIT 8 (IIb-4)

*Poorly drained to somewhat poorly drained firm to friable soils*

These are moderately deep to shallow, uneroded to slightly eroded soils. Most of the unit is nearly level; a little of it is gently sloping. The surface soils are grayish brown to brown.

The Alligator and Forestdale soils in this unit have mottled subsoils of light-gray to light brownish-gray, firm to very firm clay and silty clay. They have moderately high available moisture capacity. The root zone is shallow.

The Falaya soils have a mottled subsoil of light brownish-gray to grayish-brown, firm to friable silty clay loam. They have a high water table in wet weather. Perme-

ability, the available moisture capacity, and the depth of the root zone depend on the depth to the water table.

The soils in this unit are—

- Alligator silty clay loam, nearly level phase.
- Alligator silty clay loam, gently sloping phase.
- Forestdale silty clay loam, nearly level phase.
- Forestdale silty clay loam, gently sloping phase.
- Forestdale silty clay loam, nearly level moderately shallow phase.
- Falaya silty clay loam.
- Falaya silty clay loam, moderately shallow phase.
- Falaya-Ina-Collins soils.

Most of the acreage is cleared and planted to crops, but a fairly large acreage is in pasture and a little is in forest. Cotton is the principal crop; soybeans and small grains are also important. Smaller areas are in pasture, hay, corn, and sorghum for silage. The suitability of these soils for row crops is somewhat limited. It could be improved by artificial surface drainage.

*Suitable crops and rotations.*—These soils are well suited to rice, soybeans, and annual lespedeza hay. Adequately drained areas are moderately good for cotton and small grains. The Falaya soils are suited to corn, but the Forestdale and Alligator soils are not. Vetch and rough peas are good for winter cover crops and green-manure crops. These crops, however, have to be turned under in spring, and this may delay the planting of the next crop.

Rotations that include grass and legume sods, summer legumes, and green-manure crops help to improve tilth and increase yields.

A few suitable rotations are the following:

- Grass and legume pasture (4 years); cotton (2 years).
- Soybeans (2 years); cotton (1 year).
- Oats interplanted with lespedeza for hay (2 years); cotton (2 years).
- Rice (2 years); pasture or soybeans (2 years); cotton (2 years).

*Fertility.*—These soils are low in natural fertility. They are medium to high in available phosphorus and low to medium in available potassium. Row crops give little response to potash and phosphate, but all crops except legumes are benefited by nitrogen. Good yields of soybeans are obtained without fertilizer.

These soils are strongly acid to medium acid. Row crops, however, give little response to lime.

*Tillage.*—Tilth is not good, but it can be improved by turning under crop residues and green-manure crops, growing summer legumes, and including pasture plants in the cropping system.

These soils can be tilled within only a narrow range of moisture content. Poor drainage and the moderately high water-holding capacity may delay seedbed preparation in spring and cultivation of crops after a heavy rainfall. Preparing seedbeds in fall will improve tilth and structure and will insure firm seedbeds and better stands of spring-planted crops.

*Surface drainage.*—Some water-control measures are needed. On the gently sloping areas, contour crop rows will remove excess surface water with a minimum loss of soil. On the nearly level areas, crop rows should be designed so that each row will carry the excess water to a properly constructed water outlet. In the low areas, V- or W-shaped ditches that drain to larger ditches are needed to remove excess run off and to prevent ponding. Improved levees and canals are needed to protect the Falaya soils from overflow from the smaller streams.

*Irrigation.*—These soils can be irrigated if they are also drained to overcome the difficulties caused by poor internal drainage, a slow rate of infiltration, and lack of outlets for excess water. If excess irrigation water or rainwater is allowed to stand on the fields, the growing crops may be damaged by lack of aeration (4). General good management, including drainage and effective control of insects, is needed to insure good yields of irrigated crops.

*Pasture.*—These soils will produce good pasture. They are suited to most of the pasture grasses and legumes commonly grown in the county. Their usefulness for winter grazing is somewhat limited because of the poor drainage. Thick sods and good surface drainage are needed to prevent them from becoming boggy in wet weather.

Pastures should be fertilized with potash and phosphate if soil tests show that these amendments are needed. Enough lime should be used to keep the pH at 6.5.

*Forest.*—Profitable yields of forest products can be obtained from these soils if the forests are well managed. Sweetgum, water oak, and other hardwoods are suitable trees.

#### CAPABILITY UNIT 9 (IIs-5)

##### *Soils that have plastic, very slowly permeable subsoils*

Alligator silt loam, overwash phase, is the only soil in this unit. It is uncrusted, poorly drained, and nearly level. It has a grayish-brown friable surface soil that is underlain by gray and light-gray, firm, mottled clay.

Permeability is slow. The available moisture capacity is moderately high. The root zone is shallow. The clay content of this soil is high; consequently, the soil contracts and cracks when dry.

This soil has been cleared and planted to crops, mostly cotton. Some of it is planted to soybeans, corn, and small grains. Small areas are used for pasture. Many areas are too small to be farmed separately and are under the same management as the adjoining soils.

*Suitable crops and rotations.*—This soil is good for soybeans, rice, sorghum for silage, and lespedeza for hay. It is only fairly well suited to cotton and corn. If adequately drained, it is good for small grains.

Areas large enough to be planted and managed separately can be used for the same rotations as the soils in capability unit 8 (IIs-4).

*Fertility.*—This soil is moderately high in natural fertility. It is low in organic matter but moderately high in available phosphorus and potassium. All crops except legumes respond to nitrogen. Row crops show little or no response to phosphate and potash, and these amendments should be applied only if soil tests show that they are needed. Good yields of soybeans are obtained without fertilizer.

This soil is strongly acid to medium acid. Lime should be applied only if soil tests indicate it is needed. Row crops generally show little or no response to lime.

*Tillage.*—This soil can be tilled satisfactorily within only a narrow range of moisture content. Tilth is good and is easy to maintain. Seedbeds should be prepared in spring. After heavy rains it may be necessary to delay the preparation of seedbeds and the cultivation of crops. Deep tillage, frequent cultivation, and additions of organic matter will improve aeration, infiltration, and structure.

*Surface drainage.*—Poor drainage limits yields on this soil. Crop rows designed to carry excess surface water to V- or W-shaped ditches that drain to larger ditches will provide drainage without causing erosion.

*Irrigation.*—Slow infiltration of moisture, a moderately high water-holding capacity, and lack of drainage outlets make this soil difficult to irrigate. The surface soil is so shallow that leveling is likely to have adverse effects on texture, structure, rate of infiltration, aeration, and tilth. Nevertheless, irrigation is possible if the facilities are well planned and well constructed. Water should not be allowed to pond, because poor aeration will damage the growing crops (4).

*Pasture.*—This soil is good for pasture. It is suited to all of the perennial and summer grasses and the perennial and annual legumes commonly grown. It is not good for winter grazing because it is poorly drained and is likely to become boggy in wet weather.

Pastures should be fertilized with potash and phosphate if soil tests indicate these amendments are needed. Enough lime should be used to keep the pH at 6.5.

*Forest.*—Sweetgum, water oak, hackberry, elm, ash, and other hardwoods are suitable trees.

#### CAPABILITY UNIT 10 (IIe-6)

*Somewhat poorly drained to moderately well drained soils on terraces*

Dundee silty clay loam, nearly level phase, is the only soil in this unit. It has a grayish-brown or brown, friable to firm surface soil. The subsoil is grayish-brown to dark-brown, firm, mottled clay or silty clay, and the substratum is yellowish-brown, firm to friable silty clay loam to very fine sandy loam.

Because the subsoil is firm, permeability is moderately slow. The available moisture capacity is moderately high. The root zone is fairly deep.

Most of this soil is cleared and planted to crops. Cotton is the chief crop. About 10 percent is in forest. Small areas are used for soybeans, hay, small grains, sorghum for silage, and pasture. Fairly good yields can be obtained and fertility and tilth can be maintained by adding commercial fertilizers, returning crop residues to the soil, and growing green-manure crops after nonlegume row crops.

*Suitable crops and rotations.*—This soil is well suited to cotton, soybeans, small grains, lespedeza and other hay, sorghum for silage, and pasture. It is not suited to corn. Pasture plants and summer legumes should be included in the cropping system. The following rotations are suitable:

Grass-legume pasture (3 years); cotton (4 years).

Soybeans (2 years); cotton (2 years).

Small grains interplanted with lespedeza for hay (2 years); cotton (2 years).

*Fertility.*—This soil is moderately low in natural fertility. It is low in organic matter, medium to high in available phosphorus, and low to medium in available potassium. All crops except legumes respond favorably to organic and commercial nitrogen. Fields that are low in available potassium need potash. If applied under wilt-resistant cotton, potash helps to control the wilt diseases (5).

This soil is very strongly acid to medium acid. Tests should be made to determine how much lime is needed for each crop.

*Tillage.*—This soil can be tilled satisfactorily only within a narrow range of moisture content. Because it is moderately fine textured, it is somewhat difficult to till; consequently, there may be a delay in preparing the seedbed in spring and in cultivating crops after heavy rains.

Because of its moderately high clay content, this soil shrinks and cracks when dry and expands when wet. The shrinking and expanding tend to prevent the formation of a plowsole. Nevertheless, under certain moisture conditions, a plowsole may develop. It should be broken up when the soil is dry. If it is not broken up, crop yields are likely to decrease (6).

*Surface drainage.*—This soil needs little or no surface drainage by open ditches. Contour crop rows are generally sufficient to remove excess surface water without causing erosion.

*Irrigation.*—This soil is suited to irrigation because it is nearly level and is located near streams or other outlets into which excess water can be drained. Leveling to facilitate border or furrow irrigation has not affected yields unfavorably. Because of the moderately slow rate of infiltration, sprinkler irrigation may be somewhat expensive. For this reason, border or furrow systems are preferred. Ponding or excess water in the soil may damage growing crops (4). General good management is required to obtain high yields under irrigation.

*Pasture.*—This soil is good for pasture. Most of the perennial and summer grasses and perennial and annual legumes commonly grown in the county are suitable pasture plants. Lime, phosphate, and potash should be used if soil tests show they are needed.

*Forest.*—This soil is better suited to crops than to forest. Sweetgum, water oak, white oak, red oak, hickory, white ash, and other hardwoods are suitable trees.

#### CAPABILITY UNIT 11 (IIIe-6)

*Mixed soils on stream terraces*

This unit consists of Alligator-Forestdale soils, sloping phases, a mixture of poorly drained Alligator soils and poorly drained to somewhat poorly drained Forestdale soils.

Permeability is moderately slow to slow. The root zone is moderately shallow to shallow, and the available moisture capacity is moderately low to moderately high.

Most of the acreage is in forest, a use to which these soils are well suited. Cleared areas should be planted to pasture plants or other sod crops. If row crops are grown, all cultivation should be on the contour.

#### CAPABILITY UNIT 12 (IIIw-6)

*Soils on stream terraces subject to backwater flooding*

Forestdale silty clay loam, nearly level overflow phase, is the only soil in this small unit. This soil is uneroded and somewhat poorly drained to poorly drained. It has a brown, friable surface soil. The subsoil is brownish-gray to light-gray, firm, mottled silty clay. The substratum is light-gray, friable silty clay loam. Permeability is moderately slow to slow. The root zone is moderately shallow. The available moisture capacity is moderately high.

All of this unit is cleared and planted to crops, mostly soybeans, hay, and summer pasture plants. It is better suited to trees or summer pasture than to crops because it is flooded every year. Sweetgum, water oaks, and other

hardwoods are suitable trees. If this soil were protected from floods, it could be managed in the same way as the soils in capability unit 8 (II-4).

**CAPABILITY UNIT 13 (IIIw-11)**

*Poorly drained soils subject to local flooding*

Alligator clay, level phase, is the only soil in this unit. It has a grayish-brown, firm, uneroded surface soil and a mottled, gray, firm clay subsoil. Permeability is slow. The available moisture capacity is high. The root zone is shallow.

Some of this soil is in forest, but most of it is cleared and used for crops or pasture. Rice and soybeans are the principal crops. Cotton, hay, small grains, and corn are minor crops.

*Suitable crops and rotations.*—Because of poor surface drainage, this soil is unsuited to cotton, corn, and small grains. It is fairly well suited to soybeans and sorghum for silage. If drained and protected from floods, it is suited to rice, hay, and summer pasture. The following rotations are suitable:

Rice (2 years); pasture (2 years); soybeans (2 years).  
Soybeans (4 years); rice (2 years).

*Fertility.*—This soil is moderately high in natural fertility. It is medium to high in available phosphorus and potassium and moderately high in organic matter. All crops except legumes respond to additions of nitrogen. Alfalfa is the only crop that responds to phosphate and potash.

This soil is strongly acid to medium acid. Lime should be applied after soil tests and in the amounts that will meet the need of each particular crop.

*Tillage.*—This soil is difficult to till. It can be worked satisfactorily within only a narrow range of moisture content. Heavy rains may delay seedbed preparation and cultivation. Seedbeds for row crops should be prepared in fall or early in winter.

*Surface drainage.*—Runoff is slow to ponded. Surface drainage is needed to make this soil suitable for crops. Crop rows should be designed so they will carry excess water to V- or W-shaped ditches that drain to larger ditches or canals. Some areas are difficult to drain because they lack outlets.

*Irrigation.*—Because the rate of infiltration is slow, this soil is not suited to sprinkler irrigation. It is suited to furrow or border irrigation. It should not be over-irrigated. Excess water should be removed immediately because it will damage growing crops.

*Pasture.*—Because of poor surface drainage, this soil is not well suited to pasture. During wet weather it provides poor footing for cattle. Some pasture plants may die because they lack aeration. Bermudagrass, johnsongrass, and whiteclover will grow fairly well. Sudangrass and millet are fairly good for summer grazing.

Pastures should be treated with enough lime to keep the pH at 6.5.

*Forest.*—Forestry is a suitable use for undrained areas of this soil. Sweetgum, water oak, hackberry, elm, ash, and other hardwoods are suitable trees.

**CAPABILITY UNIT 14 (IIIw-12)**

*Poorly drained soils subject to local and backwater flooding*

The soils in this unit are level and uneroded. The surface soils are grayish-brown firm clay. The subsoils are gray, firm, mottled clay that may be several feet deep.

Permeability is slow. The root zone is shallow. The available moisture capacity is high.

The soils in this unit are—

Alligator clay, level overflow phase.  
Alligator clay, nearly level overflow phase.  
Alligator, Dowling, and Forestdale soils, overflow phases.  
Alligator and Dowling clays, overflow phases.

Most of this unit is in forest, but small areas are cleared and planted to crops or used for pasture. When this soil is adequately protected from floodwaters, it can be planted to the same crops and managed in the same way as the soils in capability unit 13 (IIIw-11).

*Forest.*—Sweetgum, water oak, hackberry, elm, ash, and other hardwoods are suitable trees.

**CAPABILITY UNIT 15 (IIIw-13)**

*Poorly drained soils in depressions subject to local flooding*

The soils in this unit are uneroded. Their surface soils are dark grayish-brown to light-gray firm silty clay loam or friable silt loam. In places the lower part is mottled with yellow and brown. The subsoils are grayish-brown to light-gray mottled firm clay and may be several feet deep.

The available moisture capacity is high. The root zone is shallow. Permeability is very slow to slow.

The soils in this unit are—

Dowling soils.  
Waverly soils, local alluvium phases.

Most of this unit is cleared and used for crops or pasture. Because the soils occur in depressions, many areas are used as locations for drainage ditches. Many of the areas are small and are planted to the same crops as the adjoining soils, although the risk of crop failure is serious.

*Suitable crops and rotations.*—These soils are not suited to cotton, corn, or small grains, but adequately drained areas are suited to rice, sorghum for silage, and soybeans. The following rotations are suitable:

Pasture (4 years); soybeans (4 years).  
Soybeans (2 years); sorghum for silage (2 years).

*Fertility.*—These soils are high in natural fertility. They are high in available phosphorus and potassium and moderately high in organic matter. All crops except legumes respond favorably to organic and commercial nitrogen, but they need less additional nitrogen than crops on other soils. Phosphate and potash are not generally needed.

These crops are medium acid to slightly acid. Lime is not generally needed.

*Tillage.*—Tilling these soils is fairly easy to difficult. Heavy rains may cause delay in the preparation of seedbeds and the cultivation of crops.

*Surface drainage.*—These soils are difficult to drain because they lack outlets. If cultivated, they should be protected from runoff from the adjoining soils. Crop rows should be designed so they will drain excess water to V- or W-shaped ditches and from these to larger ditches and canals.

*Pasture.*—If adequately drained, these soils can be used for pasture. Bermudagrass is the best pasture plant. Fescue, johnsongrass, and whiteclover do fairly well. Sudangrass and millet are fairly good for summer grazing.

*Forest.*—Undrained areas of these soils can be used for forest. Sweetgum, water oak, hackberry, elm, ash,

overcup oak, bitter pecan, and other hardwoods are suitable trees.

**CAPABILITY UNIT 16 (III<sub>s</sub>-1)**

*Mixed very fine sandy loam and silt loam soils*

This unit consists of Dundee-Bosket soils, sloping phases, a complex that generally occurs near areas of Dundee, Dubbs, and Bosket soils. Because the areas are small, this unit is usually used in the same way as the adjacent soils. The strongly sloping areas and about half of the sloping areas are in forest.

Crop rows that follow the contour will help both to conserve moisture and to remove excess surface water without causing erosion. Rotations should include pasture plants or sod crops. Nitrogen is needed for all crops except legumes. Other fertilizers should be applied to meet the needs indicated by soil tests.

**CAPABILITY UNIT 17 (III<sub>s</sub>-4)**

*Soils that have unfavorable textures and plastic subsoils*

The soils in this unit are uneroded and poorly drained. The relief is predominantly nearly level but ranges from level to gently sloping. The surface soils are grayish-brown, firm clay, and the subsoils are gray, firm clay mottled with shades of gray and brown. Permeability is slow. The root zone is shallow. The available moisture capacity is moderately high.

The soils in this unit are—

- Alligator clay, nearly level phase.
- Alligator clay, gently sloping phase.
- Forestdale silty clay, nearly level phase.
- Alligator, Dowling, and Forestdale soils.
- Alligator-Forestdale soils, gently sloping phases.

This is the largest capability unit in the county. About half the acreage is in forest, and the rest is cleared and used for crops or pasture. Adequately drained areas produce fair yields of cotton, which is the principal cash crop. Large acreages are planted to soybeans and small grains, and smaller acreages are used for rice, hay, sorghum for silage, and pasture.

*Suitable crops and rotations.*—Rice, soybeans, and small grains are better suited to these soils than cotton. Many different cropping systems, including the following, are suitable.

- Rice (2 years); pasture or soybeans (2 years); cotton (2 years).
- Pasture (4 years); cotton (2 years).
- Soybeans (2 years); small grains interplanted with lespedeza for hay (2 years); cotton (2 years).
- Soybeans (3 years); cotton (2 years).

*Fertility.*—These soils are moderately high in natural fertility. They are medium to high in available phosphorus and potassium and moderately low in organic matter. All crops except legumes respond to nitrogen. Phosphate and potash should be applied if soil tests indicate they are needed.

These soils are strongly acid to medium acid. Soil tests should be made to determine how much lime to apply for a particular crop.

*Tillage.*—These soils are difficult to till. They can be tilled only within a narrow range of moisture content. Tiltage can be improved by returning all crop residues to the soil and by turning under summer legumes. Seedbeds for row crops should be prepared in fall or early in winter so they will be firm at planting time.

*Surface drainage.*—Runoff is slow to ponded on most of this unit. Surface drainage can be improved by design-

ing crop rows so they will carry excess water to drainage outlets. The outlets are usually V- or W-shaped ditches in low areas. They drain into larger ditches, which in turn drain into canals or natural drainageways. Some low areas where water used to pond have been filled in by leveling, but open ditches are still needed because runoff is slow.

*Irrigation.*—Except when these soils are dry and cracked, the rate of infiltration is slow. These soils are not well suited to irrigation, but they can be irrigated by the border or furrow method. Sprinkler irrigation is not suitable. Rice does well under irrigation, but results with other crops are uncertain.

Irrigation should be started when the crops are young, after the soils crack but before the cracks are large. Water should be applied when the cracks are no more than half an inch wide or when crops begin to show the effects of lack of moisture. Water should be applied in larger amounts and at longer intervals than on sandier soils.

*Pasture.*—These soils are good for pasture (fig. 4). Bermudagrass, johnsongrass, dallisgrass, fescue, white clover, red clover, and lespedeza are suitable pasture plants. Ryegrass and small grains are good for winter grazing, and sudangrass and millet are good for temporary summer grazing. Good surface drainage and thick sods will help to keep the pastures from becoming boggy during wet weather.

*Forest.*—Large areas of these soils are in hardwood forest. Some of the forest is in level areas that are difficult to drain, and some in areas that are not adequately protected from overflow. Only a few areas have been managed properly. If cleared and adequately drained, most of the forested areas would be productive cropland. Sweetgum, water oak, and other species of hardwoods are suitable trees.

**CAPABILITY UNIT 18 (IV<sub>e</sub>-7)**

*Mixed soils on stream terraces*

This unit consists of Alligator-Forestdale soils, strongly sloping phases, a complex of poorly drained Alligator soils and poorly drained to somewhat poorly drained Forestdale soils. Permeability is slow. The root zone is shallow. The available moisture capacity is moderately high.

About half of this mapping unit is in forest. The rest is farmed with the adjoining soils or is used for pasture. These soils are good for pasture and forest but not for row crops. Sweetgum, water oak, hackberry, elm, ash, and other hardwoods are suitable trees.

**CAPABILITY UNIT 19 (IV<sub>w</sub>-1)**

*Clayey soils in depressions*

Dowling clay is the only soil in this unit. It is poorly drained and uneroded and occurs on concave slopes. The surface soil is dark grayish brown. The subsoil is grayish-brown to gray, very firm clay mottled with shades of brown and gray. Permeability is very slow to slow. The root zone is shallow. The available moisture capacity is high.

Approximately one-third of this unit is in forest, and the rest is cleared and used for crops or pasture. The principal crops are soybeans, pasture plants, and cotton.

*Suitable crops and rotations.*—Adequately drained areas are suited to rice, soybeans, sorghum for silage, and sudangrass for temporary summer grazing. It is risky to



Figure 4.—Good pasture on Alligator clay soils.

plant cotton or corn. Small grains are not suitable crops. The following rotations are suitable:

Soybeans (2 years); temporary summer pasture (2 years).  
Rice (2 years); soybeans (2 years).

*Fertility.*—This soil is high in natural fertility. It is high in available phosphorus, available potassium, and organic matter. All crops except legumes respond to additions of nitrogen, but too much nitrogen will cause excessive plant growth at the expense of fruiting. No phosphate or potash is needed.

This soil is medium acid. Crops do not respond to additions of lime.

*Tillage.*—This soil is difficult to till. It can be tilled only within a very narrow range of moisture conditions. If row crops are grown, it is best to prepare seedbeds in fall or early in winter. After rains, preparation of seedbeds and cultivation of crops may have to be delayed until the soil dries out.

*Surface drainage.*—Without drainage, this soil is unsuitable for any crop except trees. Many areas are difficult to drain because they lack drainage outlets at lower elevations. Properly designed crop rows and open ditches that drain into larger canals or natural drainageways are needed to remove excess surface water.

*Irrigation.*—Generally, this soil is not irrigated unless it is part of a larger field that is irrigated. It is not well suited to irrigation, because water tends to pond and the resulting poor aeration damages growing crops. If this soil is irrigated, the border or furrow method is best.

*Pasture.*—Adequately drained areas are suited to pasture. Good pastures can be developed. Bermudagrass and fescue are good for pasture; dallisgrass and white clover are fairly good, but johnsongrass and red clover are not suitable. Sudangrass and millet are good crops for temporary summer grazing. This soil is not suited to winter grazing.

*Forest.*—If properly managed, this soil will produce good yields of forest products. The native trees are cypress, tupelo gum, and some species of water-tolerant oaks. Other suitable species are overcup oak, bitter pecan, willow; cypress, swamp blackgum and other hardwoods.

#### CAPABILITY UNIT 20 (VII<sub>s</sub>-1)

##### *Deep infertile sandy soils*

This capability unit consists of one land type, Sandy alluvial land. It is nearly level, uneroded, and excessively drained. It is subject to periodic flooding. The entire profile consists of coarse-textured sand. Permeability is

rapid. During floods, material may be deposited on or removed from this land type. Most of this infertile sand has been deposited over more fertile soils. Better protection from floods is needed to prevent further damage to good cropland.

This capability unit includes small areas of deep infertile sand that is bare of vegetation; areas of deep sand covered with thick to scattered stands of willows or cottonwoods or both; and some areas of shallow sand covered with bermudagrass. The bermudagrass that grows on this sand has little nutritive value. Since it will support no other pasture plants, this land type is not good for pasture.

This unit is good for forest or for shelter for wildlife. Except for the cottonwoods, the present trees have little commercial value. Good stands of cottonwoods can be developed under good management.

## Estimated Yields

The estimated average acre yields of the principal crops of Leflore County under two levels of management are given in table 2. The yields in columns A are those that can be obtained without drainage or fertilization or other good management practices. The yields in columns B are those that can be obtained by improved management, including drainage, fertilization, selection of suitable varieties of crops, and control of insects; but not including irrigation.

## How Soil Surveys Are Made

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

**FIELD STUDY.**—The soil scientist bores or digs many holes, about 40 inches deep, to see what the soils are like. The holes are not spaced in a regular pattern; they are located according to the lay of the land. Normally, the borings are not more than a quarter of a mile apart, and in some areas they are much closer together. In most soils there are several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from others in the profile and to learn the things about the soil that influence its ability to support plant growth.

**Color** is normally related to the amount of organic matter. The darker the surface soil, as a rule, the more organic matter it contains. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration.

**Texture**, or the content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers, and it is later checked by laboratory analysis. Texture determines how well a soil retains moisture, plant nutrients, and fertilizer; to what degree it may crack during dry weather; and whether it is easy or difficult to cultivate.

**Structure**, which is the way the individual soil particles are arranged in larger aggregates and the amount of pore space between grains, gives clues to the ease or difficulty

with which the soil is penetrated by plant roots and by moisture.

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

**Other characteristics** observed in the course of the field study and considered in classifying the soils include the following: The depth of the soil over compact layers; the content of organic matter; the depth of root penetration; the steepness and pattern of slopes; the degree of erosion; the nature of the underlying rocks or other material from which the soil has developed; and the acidity or alkalinity of the soil, as measured by chemical tests.

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

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

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

**Soil phase.**—Because of differences other than kind, thickness, and arrangement of layers, some soil types are divided into two or more phases. Differences in slope, degree of erosion, depth of the soil over the substratum, or type of drainage (natural or artificial) are examples of characteristics that suggest dividing a soil type into phases.

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

**Soil complex.**—If two or more different kinds of soils are so intricately associated in small areas that it is not practical to show them separately on the soil map, they are mapped together as a soil complex. Dundee-Bosket soils, sloping phases, is a complex mapped in Leflore County.

**Undifferentiated soils.**—Two or more soils that are not regularly associated geographically may be mapped as an undifferentiated group—a single unit—if the differences between them are too slight to justify a separation. An example is Alligator and Dowling clays, overflow phases.

**Miscellaneous land types.**—Areas that have little true soil, such as fresh stream deposits, stony areas, and severely gullied areas, are not classified into types and series but are identified by descriptive names. Swamp is a miscellaneous land type in Leflore County.

## Soil Descriptions

Descriptions of the soil series and mapping units follow. Comparisons of the outstanding characteristics of the different soil series can be made easily and quickly by

TABLE 2.—Estimated average acre yields of principal crops under two levels of management

[Yields in columns A are those obtained under common management; those in columns B are obtained under improved management. Absence of figure indicates that the soil is not suitable for the particular crop]

Capability unit	Soil	Cotton (lint)		Soybeans		Oats		Corn		Lespedeza		Alfalfa		Rice <sup>1</sup>		Permanent pasture	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Alligator clay:	<i>Lb.</i>	<i>Lb.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Acres per animal unit <sup>2</sup></i>	<i>Acres per animal unit <sup>2</sup></i>
17 (IIIs-4)	Nearly level phase	300	550	15	45	35	80	20	55	1.5	2.5	1.5	3.5	60	90	6.0	3.0
13 (IIIw-11)	Level phase		250	10	40									50	90	6.5	4.0
14 (IIIw-12)	Level overflow phase			7	15											7.0	4.5
14 (IIIw-12)	Nearly level overflow phase			7	15									50	90	7.0	4.5
17 (IIIs-4)	Gently sloping phase	350	550	15	45	35	80	20	50	1.5	2.5	1.5	3.5			6.0	3.0
	Alligator silty clay loam:																
8 (IIs-4)	Nearly level phase	350	500	20	45	35	80	25	65	1.5	2.5	1.5	2.5	50	90	5.5	2.8
8 (IIs-4)	Gently sloping phase	350	500	15	45	35	80	25	60	1.5	2.5	1.5	2.5			5.6	2.8
9 (IIs-5)	Alligator silt loam, overwash phase	450	650	20	45	35	80	25	55	1.5	2.5	1.0	2.5	60	90	5.5	2.8
	Alligator-Forestdale soils:																
17 (IIIs-4)	Gently sloping phases			12	35	25	75	20	40	1.0	2.5	1.0	2.5			6.0	3.0
11 (IIIe-6)	Sloping phases					25	50			1.0	1.5					5.5	3.5
18 (IVe-7)	Strongly sloping phases									.75	1.5					8.0	6.0
17 (IIIs-4)	Alligator, Dowling and Forestdale soils			7	15	50	70	20	40	1.0	2.0	1.0	2.0	50	90	7.0	4.5
14 (IIIw-12)	Alligator, Dowling and Forestdale soils, overflow phases													40	70	7.0	4.5
14 (IIIw-12)	Alligator and Dowling clays, overflow phases													50	90	7.0	4.5
6 (IIs-1)	Beulah very fine sandy loam, gently sloping phase	450	700	7	12	40	65	30	70	1.0	2.0					5.0	2.5
	Bosket very fine sandy loam:																
2 (I-2)	Nearly level phase	450	700	10	15	30	65	25	80	1.0	1.5					5.0	2.5
4 (IIe-2)	Gently sloping phase	350	600	7	12	30	60	20	70	1.0	2.0					5.0	2.6
1 (I-1)	Collins silt loam	500	750	20	45	25	60	45	100	1.5	2.5	1.0	2.0			4.0	2.1
19 (IVw-1)	Dowling clay			7	15											6.0	4.0
15 (IIIw-13)	Dowling soils	100	450	15	30			10	45					45	90	5.0	2.3
	Dubbs very fine sandy loam:																
1 (I-1)	Nearly level phase	600	900	12	35	30	70	35	100	1.0	2.5	1.0	2.5			4.2	2.2
3 (IIe-1)	Gently sloping phase	450	850	10	30	35	75	25	90	1.0	2.5	1.0	2.5			4.2	2.4
3 (IIe-1)	Sloping phase					25	60			.75	2.0	.75	2.0			4.5	2.5
	Dubbs silt loam:																
1 (I-1)	Nearly level phase	500	800	12	35	30	70	30	100	1.0	2.5	1.0	2.5			4.2	2.2
3 (IIe-1)	Gently sloping phase	450	750	15	30	30	65	30	80	1.0	2.5	1.0	2.5			4.2	2.4
3 (IIe-1)	Sloping phase					25	60			1.0	2.0	.75	2.0			4.5	2.5
	Dundee very fine sandy loam:																
1 (I-1)	Nearly level phase	500	775	15	35	30	70	30	100	1.0	2.5	1.0	2.5			4.2	2.2
3 (IIe-1)	Gently sloping phase	425	750	12	30	30	65	30	80	1.0	2.5	1.0	2.5			4.2	2.4
3 (IIe-1)	Sloping phase					25	60			1.0	2.0	.75	2.0			4.5	2.5
	Dundee silt loam:																
1 (I-1)	Nearly level phase	450	700	15	35	45	70	30	100	1.0	2.5	1.0	2.5			4.2	2.2
3 (IIe-1)	Sloping phase					30	65			1.0	2.0	1.0	2.0			4.5	2.4
3 (IIe-1)	Gently sloping phase	375	625	12	30	35	65	25	75	1.0	2.5	1.0	2.5			4.2	2.4
	Dundee silty clay loam:																
10 (IIs-6)	Nearly level phase	350	650	15	35	35	80	30	55	1.0	2.0	2.0	2.5	50	70	4.5	2.5
5 (IIe-4)	Gently sloping phase	300	500	15	40	30	60	25	55	1.0	2.0	1.5	2.5			4.5	2.6
16 (IIIs-1)	Dundee-Bosket soils, sloping phases					25	55			1.0	2.0					6.0	3.0
7 (IIs-3)	Falaya silt loam	450	600	20	45	25	60	35	90	1.5	2.0			50	90	4.2	2.2
8 (IIs-4)	Falaya silty clay loam	300	500	20	45	25	60	20	55	1.5	2.5			50	80	5.5	2.5
8 (IIs-4)	Falaya silty clay loam, moderately shallow phase	300	400	20	45	25	60	20	55	1.5	2.5			50	80	5.5	2.5
8 (IIs-4)	Falaya-Ina-Collins soils															6.0	4.0

	Forestdale silty clay loam:																	
8 (IIs-4)	Nearly level phase	450	650	20	45	35	80	20	55	1.5	2.5	1.0	2.0	45	90	5.5	2.8	
12 (IIIw-6)	Nearly level overflow phase			7	15									30	90	6.0	3.0	
8 (IIs-4)	Nearly level moderately shallow phase	350	500	15	45	30	80	20	50	1.5	2.5	1.0	2.0	45	90	5.5	2.8	
8 (IIs-4)	Gently sloping phase	400	650	15	40	35	80	20	50	1.5	2.5	1.0	2.0			5.5	2.8	
17 (IIIs-4)	Forestdale silty clay, nearly level phase	300	550	15	45	30	80	20	55	1.5	2.5	1.5	3.5	60	90	6.0	3.0	
	Forestdale silt loam:																	
7 (IIs-3)	Nearly level phase	450	650	20	40	35	70	35	85	1.5	2.0			60	90	4.2	2.2	
7 (IIs-3)	Gently sloping phase	300	600	15	35	35	70	30	80	1.5	2.0					4.2	2.2	
7 (IIs-3)	Forestdale very fine sandy loam, nearly level phase	500	750	15	35	35	70	35	90	1.5	2.0			60	90	4.2	2.2	
1 (I-1)	Hymon very fine sandy loam	450	650	10	25	25	60	20	75	1.0	2.0	1.0	2.0			4.5	2.6	
7 (IIs-3)	Ina very fine sandy loam	350	500	20	45	30	65	35	90	1.5	2.0			50	90	4.2	2.2	
7 (IIs-3)	Ina silt loam	350	500	20	45	25	60	35	90	1.5	2.0			50	90	4.2	2.2	
1 (I-1)	Pearson silt loam, nearly level phase	500	700	15	35	45	70	20	90	1.0	2.5	1.0	2.0			4.5	2.5	
20 (VIIIs-1)	Sandy alluvial land															25.0	15.0	
15 (IIIw-13)	Waverly soils, local alluvium phases	100	300	15	30			15	35						90	5.0	2.3	

<sup>1</sup> After 2 or 3 years of continuous rice, yields decrease sharply in many places. Rice should be rotated with grasses, legumes, soybeans, or other soil-improving crops, or the soils should be fallowed after 2 or 3 years of rice.

<sup>2</sup> Average number of acres required to furnish adequate grazing for one animal unit for 221 days (the average grazing season) without injury to pasture. An animal unit is 1 cow, steer, or horse; 5 hogs; or 7 sheep.

TABLE 3.—Approximate acreage and proportionate extent of soils and miscellaneous areas

Soil	Acres	Percent	Soil	Acres	Percent
Alligator clay:			Dundee silt loam:		
Nearly level phase.....	61, 955	16. 5	Nearly level phase.....	11, 452	3. 0
Level phase.....	7, 983	2. 1	Gently sloping phase.....	4, 143	1. 1
Level overflow phase.....	66	( <sup>1</sup> )	Sloping phase.....	294	. 1
Nearly level overflow phase.....	8, 772	2. 3	Dundee silty clay loam:		
Gently sloping phase.....	3, 536	. 9	Nearly level phase.....	8, 230	2. 2
Alligator silty clay loam:			Gently sloping phase.....	3, 487	. 9
Nearly level phase.....	17, 545	4. 7	Dundee-Bosket soils, sloping phases.....	1, 539	. 4
Gently sloping phase.....	836	. 2	Falaya silt loam.....	5, 294	1. 4
Alligator silt loam, overwash phase.....	694	. 2	Falaya silty clay loam.....	1, 587	. 4
Alligator-Forestdale soils:			Falaya silty clay loam, moderately shallow phase.....	1, 368	. 4
Gently sloping phases.....	1, 103	. 3	Falaya-Ina-Collins soils.....	5, 217	1. 4
Sloping phases.....	228	. 1	Foresdale silty clay loam:		
Strongly sloping phases.....	95	( <sup>1</sup> )	Nearly level phase.....	28, 967	7. 8
Alligator, Dowling, and Forestdale soils.....	5, 094	1. 4	Nearly level overflow phase.....	1, 178	. 3
Alligator, Dowling, and Forestdale soils, overflow phases.....	2, 338	. 6	Nearly level moderately shallow phase.....	817	. 2
Alligator and Dowling clays, overflow phases.....	21, 611	5. 7	Gently sloping phase.....	5, 009	1. 3
Beulah very fine sandy loam, gently sloping phase.....	161	( <sup>1</sup> )	Forestdale silty clay, nearly level phase.....	76	( <sup>1</sup> )
Bosket very fine sandy loam:			Forestdale silt loam:		
Nearly level phase.....	1, 359	. 4	Nearly level phase.....	14, 152	3. 8
Gently sloping phase.....	360	. 1	Gently sloping phase.....	3, 111	. 8
Collins silt loam.....	2, 622	. 7	Forestdale very fine sandy loam, nearly level phase.....	5, 360	1. 4
Dowling clay.....	37, 793	10. 0	Hydon very fine sandy loam.....	275	. 1
Dowling soils.....	19, 604	5. 2	Ina very fine sandy loam.....	1, 340	. 4
Dubbs very fine sandy loam:			Ina silt loam.....	998	. 3
Nearly level phase.....	12, 526	3. 3	Pearson silt loam, nearly level phase.....	1, 321	. 4
Gently sloping phase.....	6, 509	1. 7	Sandy alluvial land.....	1, 358	. 4
Sloping phase.....	896	. 2	Swamp.....	10, 178	2. 7
Dubbs silt loam:			Waverly soils, local alluvium phases.....	95	( <sup>1</sup> )
Nearly level phase.....	1, 254	. 3	Miscellaneous areas:		
Gently sloping phase.....	703	. 2	Bayous.....	2, 509	. 7
Sloping phase.....	48	( <sup>1</sup> )	Home sites.....	4, 875	1. 3
Dundee very fine sandy loam:			Pits.....	199	. 1
Nearly level phase.....	22, 485	6. 0	Water.....	6, 434	1. 7
Gently sloping phase.....	6, 158	1. 6			
Sloping phase.....	1, 123	. 3			
			Total acreage.....	376, 320	100. 0

<sup>1</sup> Less than 0.1 percent.

turning to the supplement at the back of this report. Table 3 gives the approximate acreage and proportionate extent of the mapping units and miscellaneous areas.

### Alligator series

The soils of the Alligator series are deep and poorly drained. They are level to sloping but predominantly nearly level. They have formed on slack-water sediments of the Mississippi River flood plain. The native vegetation consists of mixed hardwoods and some cypress.

The surface soil is grayish-brown, dark grayish-brown, or dark-gray clay. It is underlain by gray or light-gray clay. When dry, these soils shrink and form cracks 1 to 4 inches wide and as much as 4 feet deep.

These soils are moderately high in fertility. They are strongly acid to medium acid and moderately high in organic matter. The water-holding capacity is moderately high. Under good management these soils can be used intensively.

The Alligator series is the most extensive in the county. The largest areas of these soils are on the west side of the county, north of Ellison Lake and west of Itta Bena and Schlater. Other large areas are south of Morgan City, northeast of Greenwood, and in the vicinity of Tippo Bayou and Little Tippo Bayou. These soils are associated with the more poorly drained Dowling soils.

**Alligator clay, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Ac).—This is the most extensive Alligator soil mapped in the county. The following profile was observed in a cultivated area 3 miles southeast of Money and 1 mile south of Little Tippo Bayou.

- A<sub>p</sub> 0 to 4 inches, grayish-brown, firm clay; moderate fine granular structure; contains many fine roots.  
 C<sub>11k</sub> 4 to 27 inches, gray, firm clay mottled with shades of gray and brown; weak fine subangular blocky structure.  
 C<sub>12k</sub> 27 to 40 inches, gray, firm clay mottled with shades of yellow and brown; massive.

The surface soil is 3 to 5 inches thick. Below depths of 40 to 48 inches, there is generally a layer that contains carbonates or gypsum. Included are small areas of Dowling soils.

Air and water move slowly through this soil. The root zone is shallow. Runoff is slow. There is little or no risk of erosion. Under good management this soil is easily conserved. Tillth is poor.

*Present use and capability.*—About 75 percent of this soil is cleared and used for crops or improved pasture (fig. 5). Some is planted to rice and some to row crops.

All of this soil needs artificial drainage to make it suitable for crops or improved pasture. Generally, adequate drainage can be provided by properly designed crop rows and by V- or W-shaped ditches that drain to larger ditches. Adequately drained areas are suited to



Figure 5.—Pasture of clover on Alligator clay, nearly level phase.

pasture plants, rice, soybeans, and small grains and are fairly well suited to cotton. Plowing under crop residues and growing summer legumes and sod crops in rotation with row crops will improve structure and tilth. Preparing the seedbed late in fall or early in winter insures better yields and, also improves structure and tilth. This soil is in capability unit 17 (III<sub>s</sub>-4).

**Alligator clay, level phase** (0 to ½ percent slopes) (Aa).—This soil contains more organic matter than Alligator clay, nearly level phase. Runoff is very slow to ponded. There is no risk of erosion, and the soil is easily conserved. Small areas of Dowling soils and areas of Alligator clay, nearly level phase, are included in this mapping unit.

*Present use and capability.*—Most of this soil is planted to rice and soybeans or is in pasture. It needs artificial drainage to make it suitable for crops or improved pasture. Adequate drainage can be provided by properly designed crop rows and by V- or W-shaped ditches that drain to large ditches and drainage canals. Adequately drained areas are suited to rice, hay crops, and summer pasture. Undrained areas are best suited to forest. Grass sods and summer legumes help to improve tilth. This soil is in capability unit 13 (III<sub>w</sub>-11).

**Alligator clay, level overflow phase** (0 to ½ percent slopes) (Ab).—This soil is subject to backwater flooding. To what extent it will be protected by flood-control structures now being built is yet to be determined.

*Present use and capability.*—Most of this soil is in forest, but some has been planted to crops and some is in pasture.

In some years row crops can be grown; in other years the soil is either too wet for most crops to be planted or is flooded after the crops are planted.

Until the flood hazard is eliminated, it is best to use this soil for trees. This soil is in capability unit 14 (III<sub>w</sub>-12).

**Alligator clay, nearly level overflow phase** (½ to 2 percent slopes) (Ad).—This soil is subject to flooding by backwater from the Yazoo River or the Quiver River or their tributaries.

*Present use and capability.*—Most of this soil is in forest. Some has been used, with varying results, for row crops and some for improved pasture. Until the flood hazard is eliminated, timber is the most dependable crop. It is risky to plant cotton, and, because of the overflow hazard, small grains, winter legumes, and perennial and winter grasses are not well suited. Rice, sorghum, millet, sudangrass, lespedeza, and late-planted soybeans are fairly well suited. Surface drainage would be beneficial but would be ineffective without flood protection. This soil is in capability unit 14 (III<sub>w</sub>-12).

**Alligator clay, gently sloping phase** (2 to 5 percent slopes) (Ae).—Most of this soil occurs on long narrow areas next to present or former stream channels. The plow layer (A<sub>p</sub> horizon) may be somewhat thinner than that of Alligator clay, nearly level phase, and the color may be somewhat lighter throughout the profile because this soil contains less organic matter. When this soil is moist, runoff is medium to rapid; when it is dry and

cracked, runoff is very slow to slow. This soil is somewhat difficult to conserve. The risk of erosion is slight to moderate. Included are small areas of nearly level, sloping, and strongly sloping relief.

*Present use and capability.*—Most of this soil is used for row crops or for pasture. Some of the steeper slopes are forested. This soil is well suited to pasture and to small grains, winter legumes, and similar crops. It is only fairly well suited to cotton and is not suited to corn.

It is best to cultivate on the contour and to grow only crops that will supply organic matter. Seedbeds should be prepared early so they will be firm by planting time. This soil is in capability unit 17 (IIIs-4).

**Alligator silty clay loam, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Ag).—The surface layer of this soil is more friable and somewhat lighter colored than that of the Alligator clays. Permeability is more rapid and the root zone is deeper. The available moisture capacity is moderately high. Tilth is moderately good, and the soil is easy to conserve. Small acreages are flooded annually. Included are areas of Dowling soils, Alligator clays, and Forestdale soils.

*Present use and capability.*—This soil is used mostly for crops or pasture. A very small percentage is in forest. This soil is well suited to soybeans, lespedeza, rice, small grains, and sorghum, and fairly well suited to cotton. It is not suited to corn. It is suited to most of the grasses and legumes grown for hay and pasture.

This soil should be drained by V- or W-shaped ditches and by crop rows designed so they will divert water into properly constructed outlets. Until the flood hazard is eliminated, it is best to use the small flooded areas for trees. This soil is in capability unit 8 (IIs-4).

**Alligator silty clay loam, gently sloping phase** (2 to 5 percent slopes) (Ah).—This soil has lost some of its surface soil through erosion. The present thin surface layer is a mixture of surface soil and subsoil material. Runoff is medium. The risk of erosion is moderate. Moderate conservation practices are needed. This mapping unit includes small areas of Forestdale soils.

*Present use and capability.*—Most of this soil is cleared and used for crops or pasture. This soil is well suited to soybeans, annual lespedeza, small grains, vetch, rough peas, and sorghum. It is suited to most of the legumes and grasses grown for pasture and hay. It is fairly well suited to cotton but not to corn or alfalfa.

Contour crop rows will help to remove excess water without causing erosion. The rotation should include crops that help to maintain the supply of organic matter and to improve tilth and structure. Nitrogen fertilizer is needed. Poor internal drainage may cause delay in preparing the seedbed in spring and in cultivating the crops after rains. This soil is in capability unit 8 (IIs-4).

**Alligator silt loam, overwash phase** ( $\frac{1}{2}$  to 2 percent slopes) (Af).—This is a nearly level, friable soil. Its surface soil is 5 to 10 inches thick. The available moisture capacity is moderately high. The root zone is shallow but deeper than that of the Alligator clays. Runoff is slow to medium. This soil is more likely to accumulate soil material through deposition than to lose it through erosion. It is easy to work and needs few conservation practices. Tilth is good. Included are small areas of Forestdale soils.

*Present use and capability.*—This soil is cleared and planted to row crops, mostly cotton, or is used for pasture. It is well suited to soybeans, small grains, rice, and

sorghum but only fairly well suited to cotton, corn, millet, sudangrass, and annual lespedeza. It is suited to most of the grasses and legumes commonly grown for pasture.

Poor drainage may cause delay in preparing the seedbed and in cultivating the crops after rains. Crop rows that drain into V- or W-shaped ditches will remove excess surface water. For all crops except legumes, nitrogen is needed. Soil tests should be made to determine other fertilizer needs. This soil is in capability unit 9 (IIs-5).

**Alligator-Forestdale soils, gently sloping phases** (2 to 5 percent slopes) (Ao).—These soils occur on narrow slopes adjacent to present or former stream channels. The mapping unit is a mixture of poorly drained Alligator soils and of somewhat poorly drained to poorly drained Forestdale soils. In some areas the profile resembles that of the Alligator soils, in some others it resembles that of the Forestdale soils, and in others it differs somewhat from both.

These soils are associated with the Alligator soils on the slack-water areas and with the Dundee, Dubbs, and Forestdale soils on low terraces.

The relief is irregular. Runoff is medium, and the risk of erosion is slight to moderate.

*Present use and capability.*—Practically all of this unit is cleared and is used for cotton, soybeans, corn, small grains, and pasture. Yields are only fairly good. Sod crops, fertilizers, crop residues, and green-manure crops will increase fertility and improve tilth. Excess surface water can be removed without causing erosion by tilling on the contour. This mapping unit is in capability unit 17 (IIIs-4).

**Alligator-Forestdale soils, sloping phases** (5 to 8 percent slopes) (Ap).—This mapping unit resembles Alligator-Forestdale soils, gently sloping phases. Runoff is medium to rapid, and the risk of erosion is moderate. Moderate conservation practices are needed. Included are some areas of gently sloping relief.

*Present use and capability.*—A small part of this mapping unit is forested. Most of it is cleared and farmed with the adjoining soils. It is suited to forest and pasture but not to crops. Most of the common legumes and grasses grow well. These soils are in capability unit 11 (IIIe-6).

**Alligator-Forestdale soils, strongly sloping phases** (8 to 12 percent slopes) (Ar).—These soils occur on the steepest slopes in the county. Runoff is rapid, and the available moisture capacity is low. The risk of erosion is moderate. If cultivated, this unit needs intensive conservation practices.

These soils are associated with the Dundee, Dubbs, and Forestdale soils. Included in the mapping unit are some small areas of gently sloping or sloping relief.

*Present use and capability.*—About half of this mapping unit is in forest; the rest is farmed with the adjoining areas. These soils are suited to pasture and forest but not to row crops. The strong slopes make it difficult to use mechanical equipment. This mapping unit is in capability unit 18 (IVe-7).

**Alligator, Dowling, and Forestdale soils** (0 to 5 percent slopes) (Am).—This mapping unit consists of Alligator soils on level and nearly level relief, Forestdale soils on gently sloping relief, and Dowling soils in depressions. These soils are described in detail in the descriptions of the Alligator, Dowling, and Forestdale series. The mapping unit also includes some small areas of Dundee soils.

*Present use and capability.*—This mapping unit is in

forest. The stands are thin and the quality of the trees is poor. Yields could be increased by improving cutting methods, removing cull trees, and protecting the stands from fire.

If these soils are cleared and used for row crops or pasture they will be suited to the same crops and will require the same management practices as the Alligator, Dowling, or Forestdale soils that are mapped separately. This mapping unit is in capability unit 17 (III<sub>s</sub>-4).

**Alligator, Dowling, and Forestdale soils, overflow phases** (0 to 5 percent slopes) (A<sub>n</sub>).—This mapping unit is subject to backwater flooding. In winter and spring it is covered by floodwater for long periods of time.

*Present use and capability.*—This mapping unit is in forest and should be kept in forest until the flood hazard is eliminated. Timber yields could be increased by improving cutting methods, removing cull trees, and protecting the stands from fire. This mapping unit is in capability unit 14 (III<sub>w</sub>-12).

**Alligator and Dowling clays, overflow phases** (0 to 2 percent slopes) (A<sub>k</sub>).—This mapping unit consists of Alligator clay on low, flat relief and Dowling clay in depressions. The areas are difficult to reach because they are covered by a fairly thick stand of hardwoods, a heavy undergrowth of brush, vines, briars, and canes, a few rushes, and some swamp grasses. These soils are described in detail under the Alligator and Dowling series.

*Present use and capability.*—This mapping unit is in forest. Most of it is subject to local or backwater flooding. Yields could be increased by improving cutting methods, removing cull trees, and protecting the stands from fire. Until the flood hazard is eliminated, it is best to use these soils for forest. These soils are in capability unit 14 (III<sub>w</sub>-12).

#### **Beulah series**

The soils of the Beulah series are deep, somewhat excessively drained to excessively drained, and very strongly acid to medium acid. They are nearly level to gently sloping. The individual areas are small. These soils have formed on medium textured to moderately coarse textured sediments of the Mississippi River flood plain. The native vegetation was mixed hardwoods, canes, and vines.

The subsoil is dark-brown and yellowish-brown very fine sandy loam to fine sandy loam. The B horizon differs from the A horizon and the C horizon in color only. In the associated Dundee, Dubbs, and Bosket soils the B horizon differs somewhat in texture and structure from the A horizon and the C horizon.

**Beulah very fine sandy loam, gently sloping phase** (2 to 5 percent slopes) (B<sub>a</sub>).—The following profile was observed in a cultivated area 3 miles southwest of Quito.

- A<sub>p</sub> 0 to 6 inches, yellowish-brown, very friable very fine sandy loam; single grain; contains many fine roots.
- B 6 to 22 inches, dark-brown, very friable very fine sandy loam; single grain; contains pockets of very dark brown sand; many fine roots in the upper part and some in the lower part.
- C 22 to 40 inches, yellowish-brown, very friable very fine sandy loam; single grain; contains a few fine roots and pores.

The surface layer is 6 to 12 inches thick. The depth to the C horizon ranges from 18 to 24 inches. The plow layer and the B horizon are very fine sandy loam or fine sandy loam; the C horizon is very fine sandy loam to fine

loamy sand. The plow layer is grayish brown to yellowish brown, the B horizon is dark brown or yellowish brown, and the C horizon is yellowish brown or light yellowish brown. Included are some sand blows—spots of coarse-textured materials—and small areas of Bosket soils.

This soil is low to medium in fertility and low in organic matter. Permeability is rapid. Runoff is slow. There is little or no risk of erosion. The available moisture capacity is low to moderately low. The root zone is deep, and tilth is good. This soil is easy to work and to conserve. It is not well suited to irrigation.

*Present use and capability.*—All of this soil is cleared and planted to cotton, corn, or small grains. It is well suited to early truck crops, small grains, and winter pasture, but its use is limited by excessive drainage. It is fairly well suited to cotton but not to other common row crops.

This soil needs nitrogen, which should be applied in two applications. Other fertilizers should be applied if soil tests indicate they are needed. Properly designed crop rows will help to conserve water. This soil is in capability unit 6 (II<sub>s</sub>-1).

#### **Bosket series**

The soils of the Bosket series are deep, well drained to somewhat excessively drained, and strongly acid to slightly acid. They are nearly level to gently sloping but predominantly gently sloping.

The subsoil is grayish brown to yellowish brown. These soils have formed on stratified beds of moderately fine textured to moderately coarse textured sediments of the Mississippi River flood plain. The native vegetation consisted of mixed hardwoods, canes, vines, rushes, and swamp grasses.

These soils occur in small areas scattered throughout the low terraces. They are associated with the somewhat poorly drained to moderately well drained Dundee soils, the moderately well drained to well drained Dubbs soils, and the somewhat excessively drained to excessively drained Beulah soils. The Bosket series is one of the minor series in the county.

The soils in this series are cleared and used for row crops or pasture. They are suited to cultivation, but in the excessively drained areas growing crops may wilt during short dry spells.

**Bosket very fine sandy loam, nearly level phase** (½ to 2 percent slopes) (B<sub>b</sub>).—The following profile was observed in a cultivated area 4 miles west of Quito and 4.5 miles southwest of Itta Bena.

- A<sub>p</sub> 0 to 6 inches, dark-brown, very friable very fine sandy loam; massive; contains many fine roots.
- B 6 to 21 inches, very dark grayish-brown, friable silty clay loam; weak medium subangular blocky structure; slightly sticky when wet and slightly hard when dry; contains a few fine roots and a few fine pores.
- C 21 to 40 inches, dark yellowish-brown, friable very fine sandy loam; massive; contains a few fine pores.

The plow layer is from 5 to 10 inches thick. The depth to the C horizon ranges from 17 to 24 inches. The C horizon is very fine sandy loam to sandy loam. Included are small areas of Dubbs or Beulah soils.

This soil is moderately high in fertility but contains little organic matter. Permeability is rapid, and the available moisture capacity is moderately low. The root zone is fairly deep. Runoff is slow to medium, and there is little or no risk of erosion. Tilth is good. This soil is easy to work and easy to conserve.

*Present use and capability.*—This soil is planted to cotton or small grains or is used for pasture. It is suited to early truck crops, cotton, and small grains, but planting late corn, soybeans, millet, or sudangrass is risky. Bermudagrass, johnsongrass, and crimson clover are suitable pasture plants, but fescue, dallisgrass, alfalfa, and lespedeza are not. Because drainage is somewhat excessive, late-growing crops may wilt unless irrigated.

This soil needs a cropping system that will help to maintain the supply of organic matter and increase fertility. It needs nitrogen, which is best applied in two applications. Other fertilizers should be applied to meet the needs indicated by soil tests. Crop rows that follow the contour help to conserve moisture. This soil is in capability unit 2 (I-2).

**Bosket very fine sandy loam, gently sloping phase** (2 to 5 percent slopes) (Bc).—This soil resembles Bosket very fine sandy loam, nearly level phase, except that the plow layer is somewhat thinner and, because of stronger slopes, the available moisture capacity is somewhat lower. Runoff is medium, and the risk of erosion is slight to moderate. Moderate conservation practices are needed.

*Present use and capability.*—This soil is planted to row crops or small grains or is used for pasture. Crop rows that follow the contour will help both to conserve moisture and to remove excess surface water without causing erosion. Rotations should include pasture plants or sod crops. This soil needs nitrogen for all crops except legumes. Other fertilizers should be applied to meet the needs indicated by soil tests. This soil is in capability unit 4 (IIe-2).

### **Collins series**

The soils of the Collins series are nearly level, deep, and moderately well drained. They are strongly acid to medium acid. The subsoil, or C<sub>1</sub> horizon, is light yellowish-brown or yellowish-brown silt loam.

These soils have formed on medium-textured, recent alluvium washed from the Loess Belt and deposited over slack-water clay. The native vegetation consists of a mixture of hardwoods, some cypresses, and an understory of canes, vines, and swamp grasses.

These soils occur on the flood plains of Abiacha Creek, Palusha Creek, and Big Sand Creek. The total acreage is small. Generally, the Collins soils are associated with the Vicksburg, Falaya, and Waverly soils. In this county, however, no Vicksburg soils were mapped, and the Collins soils lie adjacent to the moderately well drained Hymon soils or the somewhat poorly drained Ina soils, both of which are sandier than the Collins soils. Generally, the Falaya soils contain more clay than the Collins soils and are less well drained. The Waverly soils are more poorly drained than either the Collins or the Falaya soils.

**Collins silt loam** (½ to 2 percent slopes) (Ca).—The following profile was observed in a cultivated area ½ mile east of United States Highway No. 49E and ¾ mile north of the Abiacha Creek Diversion Canal.

- A<sub>p</sub> 0 to 6 inches, yellowish-brown, friable silt loam; weak fine granular structure; contains many fine roots.
- C<sub>11</sub> 6 to 18 inches, light yellowish-brown, very friable silt loam; thin layers of very pale brown and white silt in the lower part; massive; contains many fine roots.
- C<sub>12</sub> 18 to 40 inches, yellowish-brown, friable silt loam streaked with gray and yellow; massive; many dark-brown stains

and splotches and a few dark-brown and black concretions in the lower part.

The plow layer is from 5 to 8 inches thick. The depth to the mottled horizon ranges from 18 to 24 inches. The depth to slack-water clay ranges from 30 inches to many feet. The color of the C<sub>12</sub> horizon is grayish brown to yellowish brown.

This soil is medium in fertility. It contains only a little organic matter. Permeability is moderate. Runoff is slow, and there is little or no risk of erosion. During wet seasons the water table is high. The available moisture capacity is high. The root zone is fairly deep, except when the water table is near the surface. Tillage is good, and few conservation practices are needed.

*Present use and capability.*—About 15 percent of this soil is forested. The rest is planted to general row crops or small grains or is used for pasture.

This soil is suited to most row crops, to small grains, and to the commonly grown pasture plants. Under good management it produces good yields. It is suited to intensive cultivation, but it needs surface drainage and protection from floods. The existing levees are inadequate. Surface drainage can be controlled by properly designed crop rows and by V- or W-shaped ditches that drain to larger ditches.

This soil needs nitrogen on all crops except legumes. Phosphate, potash, and lime should be applied if soil tests indicate they are needed. This soil is in capability unit 1 (I-1).

### **Dowling series**

The soils of the Dowling series are poorly drained. They are level to slightly concave. They have formed on fine-textured alluvial sediments, some deposited by overflow waters and some of local origin. The native vegetation is cypress, tupelo-gum, water-tolerant oaks, vines, canes, button bushes, and swamp grasses.

The texture of the surface soil ranges from clay to silt loam, and the color from very dark grayish brown to gray. The subsoil is very dark gray, very dark grayish-brown, or light gray clay. The reaction is medium acid.

These soils occur in long, narrow, low swags or depressions throughout the county. They are associated with the Alligator, Forestdale, Dundee, and Dubbs soils. Generally, those Dowling soils that formed from local alluvium are associated with the better drained Forestdale, Dundee, and Dubbs soils. They resemble the Alligator soils but are darker colored and have a thicker surface layer.

About one-third of this series is in forest. The remainder is planted to row crops or used for pasture. The use of these soils is limited by poor drainage and poor physical characteristics.

**Dowling clay** (0 to 1 percent slopes) (Da).—The following profile was observed in a cultivated area ½ mile north of United States Highway No. 82 and ½ mile east of the Sunflower County line, on the east side of a field road.

- A<sub>px</sub> 0 to 4 inches, dark grayish-brown, firm clay; weak fine granular structure; contains many fine and a few medium-sized roots.
- C<sub>11x</sub> 4 to 11 inches, grayish-brown, very firm clay mottled with shades of brown and gray; massive; contains a few fine roots and pores.
- C<sub>12x</sub> 11 to 40 inches, gray, very firm clay; massive; many brown mottles.

Only where this soil has formed from local alluvium is the surface soil more than 6 inches thick. Included are areas of silty clay and very small areas of silty clay loam.

Permeability is very slow to slow. Runoff is ponded to very slow. The available moisture capacity is high. The root zone is shallow. This soil is fertile and is moderately high in organic matter, but, because of poor drainage and poor physical properties, it is not highly productive. Tilth is poor. This soil needs few conservation practices. It is more likely to accumulate material by deposition than to lose it through erosion.

*Present use and capability.*—About one-third of this soil is in forest. The rest is planted to hay crops, soybeans, or cotton, or is used for pasture. This soil is fairly well suited to sudangrass, millet, and other summer grazing crops, and to soybeans, sorghum for silage, and pasture. It is risky to plant cotton or corn.

This soil is difficult to drain, but unless it is drained it is not suitable for any crop except timber. Because it occurs in narrow, low swags, it can be used for secondary and primary drainage ditches. For most common crops, nitrogen is the only fertilizer needed. This soil is in capability unit 19 (IVw-1).

**Dowling soils** (0 to 1 percent slopes) (Db).—This mapping unit occurs in small areas, but the total acreage is large. The surface soil is silty clay loam or silt loam and is 6 to 15 inches thick. It is lighter colored than the surface soil of Dowling clay. In some places it is massive, and in others it has a weak fine granular structure. It is slightly firm to friable when moist.

The soils of this unit have good tilth. They have a deeper root zone than Dowling clay. They are more permeable and have somewhat better available moisture capacity. Small areas of clay, silty clay, or very fine sandy loam are included.

*Present use and capability.*—Most of this mapping unit is cleared. It is planted to cotton, corn, or soybeans or is used for pasture. Rice, sorghum, and soybeans are well suited, but it is risky to plant cotton, corn, or small grains. Because the areas are small, many are planted to the same crops as the adjacent soils, even if there is a risk of crop failure. Adequately drained areas are good for pasture and hay. Most of the common pasture plants are fairly well suited.

The low swags in which these soils occur are good locations for ditches to drain the more productive adjoining soils. Some areas are used entirely for drainage ditches.

These soils are hard to manage because of their poor physical properties and the lack of drainage outlets. They are not suitable for crops unless they are drained and protected from runoff from the adjoining soils. Generally, V- or W-shaped ditches that drain to larger ditches are needed for drainage. Nitrogen is needed on all crops except legumes, but it should be used carefully, especially if applied under cotton. Too much nitrogen will encourage weed growth and reduce yields. These soils are in capability unit 15 (IIIw-13).

### Dubbs series

The soils of the Dubbs series are moderately well drained to well drained. They are nearly level to sloping. They have formed on stratified beds of moderately fine textured to moderately coarse textured alluvial sediments

of the Mississippi River flood plain. The native vegetation was a mixture of hardwoods, vines, canes, and swamp grasses.

The surface soil is brown or yellowish-brown very fine sandy loam or silt loam. The subsoil is dark-brown to yellowish-brown silty clay loam or sandy clay loam. These soils are very strongly acid to medium acid.

The soils of this series occur in rather small areas on natural levees. They are associated with the poorly drained to somewhat poorly drained Forestdale soils, the somewhat poorly drained to moderately well drained Dundee soils, the well drained to somewhat excessively drained Bosket soils, and the somewhat excessively drained to excessively drained Beulah soils.

**Dubbs very fine sandy loam, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Df).—This is the most extensive Dubbs soil mapped in the county. The following profile was observed in a cultivated area 200 yards west of Bear Creek and 5 miles south of Berclair.

- A<sub>p</sub> 0 to 5 inches, brown, very friable very fine sandy loam; single grain; contains many fine roots.
- B 5 to 27 inches, dark yellowish-brown, firm, silty clay loam; grades to yellowish brown in the lower part; moderate to weak fine and medium subangular blocky structure; contains many fine roots and pores.
- C 27 to 40 inches+, yellowish-brown, friable very fine sandy loam; contains pockets of gray sand; massive; contains a few fine roots and a few fine pores.

The color ranges from dark brown to yellowish brown. The A<sub>p</sub> horizon is 4 to 9 inches thick. The depth to the C horizon ranges from 16 to 27 inches. The B horizon is silty clay loam or sandy clay loam, and the C horizon is very fine sandy loam or fine sandy loam. Included are small areas of Dundee and Bosket soils.

This soil is low to medium in fertility and low in organic matter. Permeability is slow to moderate. The available moisture capacity is moderately high. Runoff is slow to medium. There is little or no risk of erosion. Tilth is good, and, except for small areas on sloping relief, this soil needs only moderate conservation practices.

*Present use and capability.*—This mapping unit is cleared. It is planted to cotton, corn, small grains, soybeans, or is used for pasture. It is well suited to cotton, corn, small grains, soybeans, sorghum, millet, sudangrass, and early truck crops and to vetch and rough peas for cover crops. It is also suited to most of the common pasture grasses and legumes.

This is the best all-around agricultural soil in the county. If well managed, it will give continuous high yields. Crop rows should be designed so that they will remove excess surface water and help conserve moisture. Good tilth can be preserved and the supply of organic matter maintained by planting winter cover crops after all row crops except legumes. Cover crops are not needed after soybeans or in rotations that include pasture. Nitrogen is needed on all crops except legumes. Other fertilizers and lime should be applied to meet the needs indicated by soil tests. This soil can be irrigated successfully. It is in capability unit 1 (I-1).

**Dubbs very fine sandy loam, gently sloping phase** (2 to 5 percent slopes) (Dg).—This mapping unit is found on narrow ridges or on long narrow slopes adjacent to former or present stream channels. It resembles Dubbs very fine sandy loam, nearly level phase, but is shallower. The plow layer (A<sub>p</sub> horizon) is only 4 to 6 inches thick, and the depth to the C horizon is 14 to 20 inches. In small

areas enough soil has been lost through erosion so that the plow layer is a mixture of surface soil and subsoil. Included are areas of nearly level and sloping relief.

Runoff is medium, and the risk of further erosion is slight to moderate. The available moisture capacity is somewhat lower than that of the nearly level phase. Moderate conservation practices are needed.

*Present use and capability.*—All of this soil is cleared. It is planted to cotton, corn, small grains, or soybeans or is used for pasture. Crop rows should be designed so they will help both to conserve moisture and to remove excess surface water without causing erosion. To improve tilth and protect the soil from erosion, pasture plants and other sod crops should be included in the cropping system. This soil is in capability unit 3 (IIe-1).

**Dubbs very fine sandy loam, sloping phase** (5 to 8 percent slopes) (Dh).—This soil resembles Dubbs very fine sandy loam, nearly level phase, except that the surface soil is thinner and the depth to the C horizon ranges from 16 to 20 inches. In small areas where nearly all of the original surface soil has been lost, the plow layer is a mixture of surface soil and subsoil. Runoff is medium. The risk of further erosion is moderate. Moderate conservation practices are needed.

*Present use and capability.*—This soil is cleared. It is used for row crops, small grains, or pasture. It is not well suited to row crops but is good for pasture and hay. Crop rows should follow the contour so they will help to conserve moisture and to remove excess surface water without causing erosion. Pasture plants or other sod crops should be on the soil at least half the time. This soil is in capability unit 3 (IIe-1).

**Dubbs silt loam, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Dc).—This soil resembles Dubbs very fine sandy loam, nearly level phase, except that it has a darker brown B horizon that is generally from 20 to 26 inches thick. The plow layer has a weak fine granular structure. The depth to the C horizon ranges from 20 to 32 inches. Included are small areas of Dundee and Bosket soils and small areas of Dubbs very fine sandy loam.

*Present use and capability.*—This soil is used for row crops, small grains, or pasture. It is suited to cotton, corn, small grains, soybeans, sorghum, and early truck crops. It is good for pasture and is suited to almost all the perennial and annual grasses and legumes commonly grown for pasture. It is well suited to irrigated farming.

Simple conservation practices are needed. Planting winter legumes after row crops other than legumes, returning crop residues to the soil, and applying nitrogen and other fertilizers will help to keep the soil in good tilth, to maintain its fertility, and to supply it with organic matter. This soil is in capability unit 1 (I-1).

**Dubbs silt loam, gently sloping phase** (2 to 8 percent slopes) (Dd).—This soil is shallower than Dundee very fine sandy loam, nearly level phase. The depth to the C horizon is 16 to 26 inches. The plow layer, which is a mixture of surface soil and subsoil, is thinner than that of the Dubbs very fine sandy loams. Runoff is slow to medium. The risk of erosion is slight to moderate. Small areas of Dundee and Bosket soils are included.

*Present use and capability.*—This soil is used for row crops, small grains, and pasture. It needs simple conservation practices. Crop rows should be designed so they will help to conserve moisture and will remove excess

surface water without causing erosion. This soil is in capability unit 3 (IIe-1).

**Dubbs silt loam, sloping phase** (5 to 8 percent slopes) (De).—This soil resembles Dubbs very fine sandy loam, nearly level phase, except that the plow layer is only 4 or 5 inches thick. In small areas that are eroded, the plow layer is a mixture of surface soil and subsoil. Runoff is medium. The risk of further erosion is moderate. Moderately intensive conservation practices are needed. Included are small areas of gently sloping or strongly sloping relief.

*Present use and capability.*—This soil is cleared and used for row crops, small grains, and pasture. Although it is suited to most of the common crops, it is best suited to small grains and pasture. If row crops are grown, they should be rotated with small grains, hay, or pasture and the soil should be in hay or pasture at least half of the time. Crop rows should be designed so that they will remove excess surface water without causing erosion. This soil is in capability unit 3 (IIe-1).

### Dundee series

The Dundee series consists of deep soils that are somewhat poorly drained to moderately well drained. They are nearly level to sloping. They have formed on stratified beds of fine-textured to medium-textured sediments of the Mississippi River flood plain. The native vegetation consists of hardwood trees, canes, vines, and swamp grasses.

The surface soil is generally dark yellowish-brown, friable, sandy material. It is underlain by light yellowish-brown silty clay or silty clay loam. These soils are strongly acid to medium acid.

The Dundee soils are the most extensive of the soils that occur on the natural levees along old or present stream channels. They are common to all such areas in the county. They are associated with the Forestdale, Dubbs, and Bosket soils. The Dubbs and Bosket soils occur higher on the levees, and the Forestdale soils lower.

Except for small areas of Dundee silty clay loam, all of these soils have been cleared and farmed for a long time. They are suited to cultivation, and most of them are suited to irrigation.

**Dundee very fine sandy loam, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Dr).—The following profile was observed in a cultivated area  $\frac{1}{2}$  mile northeast of Quito.

- A<sub>p</sub> 0 to 5 inches, dark yellowish-brown, very friable, very fine sandy loam; single grain; contains many fine roots.
- B 5 to 27 inches, light yellowish-brown, firm silty clay loam; faintly mottled; moderate medium subangular blocky structure; contains many fine roots and pores.
- C<sub>g</sub> 27 to 48 inches +, pale-brown, very friable silt loam; faintly mottled; massive; contains pockets of grayish-brown sand; a few roots, and many fine pores.

The surface soil is 4 to 7 inches thick. The depth to the C horizon ranges from 24 to 30 inches. The surface soil is dark yellowish brown to pale brown; the B horizon is grayish brown, brown, or light yellowish brown; and the C horizon is pale brown, brown, or yellowish brown. The surface soil ranges from silty clay loam to very fine sandy loam; the B horizon is silty clay, silty clay loam, or sandy clay loam; and the C horizon is silty clay loam to very fine sandy loam.

This soil is low in fertility and contains little organic matter. The available moisture capacity is moderately

high. Permeability is moderately slow to moderate. Runoff is slow to rapid, and the risk of erosion is non-existent to moderate. Tilth is good. This soil is easy to work and very easy to moderately difficult to conserve.

*Present use and capability.*—This soil is used for row crops—principally cotton—and for small grains and pasture. It is suited to cotton, corn, soybeans, small grains, sorghum, and early truck crops. It produces good pasture and is suited to almost all grasses and legumes commonly grown, including some of the winter legumes. Small grains can also be grown for pasture plants.

To maintain fertility and good tilth, all crop residues should be returned to the soil. Fertilizers should be applied, and green-manure crops should be planted after row crops. Nitrogen is needed on all crops except legumes. Lime, phosphate, and potash should be applied to meet the needs indicated by soil tests. This soil is in capability unit 1 (I-1).

**Dundee very fine sandy loam, gently sloping phase** (2 to 5 percent slopes) (Ds).—The plow layer of this soil is 3 to 5 inches thick. In some small areas it is a mixture of surface soil and subsoil. Runoff is medium. The risk of erosion is slight to moderate. Moderate conservation practices are needed. Tilth is not so good as on the nearly level phase, and this soil is somewhat more difficult to work. Small areas of nearly level and sloping relief and areas of Dubbs and Bosket soils are included.

*Present use and capability.*—This soil is planted to row crops or small grains or is used for pasture. Crop rows should be on the contour, to help slow down runoff reduce soil losses, and remove excess surface water (fig. 6). At least one-third of the time, this soil should be kept in pasture plants or other sod crops. It is in capability unit 3 (IIe-1).

**Dundee very fine sandy loam, sloping phase** (5 to 8 percent slopes) (Dt).—The plow layer of this soil is 3 to 5 inches thick. In some small areas it is a mixture of surface soil and subsoil, and in others it consists entirely of subsoil. In the eroded spots tilth is less favorable, infiltration is slower, and the available moisture capacity is lower than where the soil is uneroded. Runoff is medium. The risk of erosion is moderate. Areas of gently sloping and strongly sloping relief and areas of Dundee and Bosket soils are included.

*Present use and capability.*—This soil is planted to row crops or small grains or is used for pasture. It is suited



Figure 6.—Contour crop rows on Dundee very fine sandy loam.

to most of the common crops, but it is best suited to pasture. It is good for either permanent or temporary winter and spring pastures, but during long dry spells it does not supply enough moisture for temporary summer pastures.

If cultivated, this soil needs moderately intensive conservation practices. Crop rows should be on the contour, to help conserve moisture and to remove excess surface water without causing erosion. Some areas need grassed waterways. This soil is in capability unit 3 (IIe-1).

**Dundee silt loam, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Dk).—Because it is finer textured, this soil is less absorbent and is more difficult to work and to manage than Dundee very fine sandy loam, nearly level phase. It has a tendency to crust and to pack. Tilth is not so good as on the very fine sandy loam. Few conservation practices are needed. Small areas of Forestdale, Dubbs, and Dowling soils are included.

*Present use and capability.*—This mapping unit has been cleared and farmed for many years. Most of it is planted to cotton; some is used for other row crops and small grains, and some for pasture. Properly designed crop rows and V- or W-shaped ditches are needed to help remove excess surface water and to prevent ponding in small areas. Turning under green-manure crops and crop residues will improve tilth, reduce the tendency to crust, and increase productivity.

This soil is suited to irrigation, but, if the furrow or the border method is used, the surface may have to be smoothed. This soil is in capability unit 1 (I-1).

**Dundee silt loam, gently sloping phase** (2 to 5 percent slopes) (Dm).—Runoff is medium on this soil, and the risk of erosion is slight to moderate. Small areas have lost about half of their surface soil and now have a plow layer that is a mixture of surface soil and subsoil. In the eroded spots this soil is less fertile than where it is uneroded; it absorbs and holds less moisture, and it has a shallower root zone. Included are areas of nearly level and sloping relief and small areas of Forestdale and Dubbs soils.

*Present use and capability.*—This soil is used for row crops, small grains, and pasture. Crop rotations should include pasture plants or other sod crops. To remove excess surface water without causing erosion, crop rows should be on the contour. Green-manure crops that are turned under in spring and crop residues that are returned to the soil will reduce crusting and will supply organic matter. This soil is in capability unit 3 (IIe-1).

**Dundee silt loam, sloping phase** (5 to 8 percent slopes) (Dn).—This soil occurs on short slopes adjacent to present or old stream channels. The plow layer is 3 to 5 inches thick. In small areas, about half of the surface soil has been lost through erosion and the plow layer is a mixture of surface soil and subsoil. The depth to the C horizon ranges from 20 to 26 inches. Runoff is medium to moderately rapid. The risk of erosion is moderate. Moderately intensive conservation practices are needed. This soil has poorer tilth than Dundee very fine sandy loam, nearly level phase, and is less easy to work. Included are gently sloping and strongly sloping areas and small areas of Forestdale and Dubbs soils.

*Present use and capability.*—This soil is used for row crops, small grains, and pasture. Although it is suited to most of the common crops, it is best suited to pasture.

It is good for permanent winter and spring pastures but is likely to be droughty late in summer.

If this soil is used continuously for pasture, no conservation practices are needed. If row crops are grown, they should be rotated with pasture plants or other sod crops; and sod crops should be on the soil at least half of the time. Contour crop rows will help to remove excess surface water without causing erosion. This soil is in capability unit 3 (IIe-1).

**Dundee silty clay loam, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Do).—This soil occurs in small areas. The plow layer is grayish-brown or brown, friable to firm silty clay loam and has a moderate fine granular structure. The subsoil extends to depths of 24 to 32 inches. It is grayish-brown to dark-brown firm clay or silty clay mottled with gray and yellow. The substratum is yellowish-brown, massive, firm silty clay loam to friable very fine sandy loam and is mottled with gray and yellow. This soil is associated with Forestdale and Dubbs soils and with other Dundee soils.

This soil is somewhat more difficult to manage than Dundee very fine sandy loam, nearly level phase. It absorbs moisture more slowly. The root zone is shallower than that of the very fine sandy loam, and tilth is not so good. Runoff is medium. There is little or no risk of erosion. This soil is easy to conserve.

*Present use and capability.*—Approximately 10 percent of this soil is in forest. The rest is in row crops, small grains, or pasture. Cotton, to which this soil is well suited, is the principal crop.

Generally, properly designed crop rows provide adequate drainage, but in some areas V- or W-shaped ditches are needed to remove excess surface water. To improve the tilth and structure and increase the rate of infiltration, row crops should be rotated with pasture plants or other sod crops, green-manure crops should be turned under in spring, and crop residues should be returned to the soil. This soil is in capability unit 10 (IIs-6).

**Dundee silty clay loam, gently sloping phase** (2 to 5 percent slopes) (Dp).—This soil is less productive than other Dundee soils and lower in available moisture capacity. It has a thinner plow layer and a shallower root zone. Runoff is medium to moderately rapid. The risk of erosion is moderate. Moderately intensive conservation practices are needed.

About one-third of this soil is on sloping relief; some small areas are nearly level and others strongly sloping. Included are small areas of Forestdale and Dubbs soils and other Dundee soils.

*Present use and capability.*—Approximately one-fourth of this soil is in forest. The rest is in row crops, small grains, or pasture. Cotton is the principal crop. Although this soil is suited to most of the common crops, it is best suited to pasture and small grains. It is in capability unit 5 (IIe-4).

**Dundee-Bosket soils, sloping phases** (5 to 8 percent slopes) (Du).—This mapping unit consists of Dundee silt loam and very fine sandy loam, Dubbs silt loams and very fine sandy loams, and Bosket very fine sandy loam. The individual areas are too small to map separately. Associated with the soils are other Dundee, Dubbs, and Bosket soils and also Forestdale and Beulah soils. Most of this mapping unit is gently sloping and sloping, but some of it is strongly sloping.

*Present use and capability.*—All of the strongly sloping areas and about half of the sloping areas are in forest. The rest of the unit is planted to crops. Cotton is the principal crop, but it is being replaced by soybeans, small grains, pasture plants, and similar crops. Crop rows should be designed so that they will provide drainage without causing erosion. This soil is in capability unit 16 (IIIs-1).

#### **Falaya series**

The soils of this series are somewhat poorly drained. They are level to gently sloping. They have formed on moderately fine textured to medium textured alluvium washed from soils of the Loess Belt. The native vegetation is a mixture of hardwood trees, brush, vines, briars, canes, and swamp grasses.

The subsoil is light brownish-gray to grayish-brown, firm silty clay loam or friable silt loam. These soils have a high water table and are subject to overflow.

These soils occur on the flood plains of Abiacha Creek, Big Sand Creek, and Palusha Creek and in small isolated areas near the Yazoo River and the Tallahatchie River. Generally, they are associated with the Collins soils, but in places they are next to the moderately well drained sandy Hymon soils and the somewhat poorly drained sandy Ina soils.

The total acreage is small. Approximately one-fourth is in forest. The rest is cultivated or is used for pasture. Because of poor drainage and the risk of flooding, the use of these soils is somewhat limited.

**Falaya silt loam** ( $\frac{1}{2}$  to 2 percent slopes) (Fa).—The following profile was observed in a cultivated area 6 miles east of Swiftown and 100 yards west of the Yazoo River.

- A<sub>p</sub> 0 to 6 inches, brown, friable silt loam; massive; contains many fine roots.
- C<sub>11k</sub> 6 to 24 inches, light brownish-gray, mottled, friable silt loam; massive; contains many fine roots and pores.
- C<sub>12k</sub> 24 to 48 inches+, light brownish-gray, mottled, friable silt loam; massive; contains many fine pores but only a few roots.

The surface soil ranges from grayish-brown to brown friable silt loam or firm to friable silty clay loam. The subsoil ranges from light-gray to grayish-brown, friable silt loam or firm to friable silty clay loam. It may consist of stratified layers of silt loam and silty clay loam.

This soil is low to medium in fertility and very low in organic matter. Tilth is good. Permeability is moderately slow. The root zone is deep, and the available moisture capacity is high. This soil is strongly acid to medium acid. It is easy to work. It may accumulate or lose material during floods. It needs few conservation practices. It is not adequately protected from floods.

*Present use and capability.*—Most of this soil is planted to cotton, soybeans, and corn. Some is planted to small grains, and some is used for pasture. About one-fourth is in forest. This soil is suited to soybeans, sorghum, corn, and rice. Areas that are adequately drained and protected from flooding are suited to cotton and small grains. Winter cover crops may be damaged by floods.

This soil is well suited to permanent and temporary summer pasture but not to winter and early spring pasture. It is suited to most grasses and to most legumes except alfalfa.

Crop rows should be designed so that excess water will drain to V- or W-shaped ditches and from those into

larger ditches. To maintain good tilth and fertility, crop residues should be returned to the soil, row crops should be rotated with pasture, and fertilizers should be applied. This soil needs nitrogen for all crops except legumes. It is generally moderately low to low in phosphorus, potassium, and lime. These amendments should be applied to meet the needs indicated by soil tests. This soil is in capability unit 7 (IIs-3).

**Falaya silty clay loam** ( $\frac{1}{2}$  to 5 percent slopes) (Fb).—This nearly level to gently sloping soil is somewhat more difficult to work and to manage than Falaya silt loam. It has poorer tilth, and it loses more moisture by runoff. Permeability is moderately slow. The plow layer has a weak fine granular structure.

About 15 percent of this mapping unit consists of Ina silty clay loam. Also included are areas of Falaya silt loam. In places the relief is level.

*Present use and capability.*—Approximately one-fourth of this soil is in forest. The rest is planted to row crops or small grains or is used for pasture. This soil can be cultivated, but it needs improved drainage facilities and better protection from floods. It is suited to soybeans, sorghum, hay crops, summer pasture, and permanent pasture. It is well suited to forest. It is only fairly well suited to cotton, small grains, and winter grazing crops. It is in capability unit 8 (IIs-4).

**Falaya silty clay loam, moderately shallow phase** (0 to 2 percent slopes) (Fc).—This soil is 20 to 30 inches deep over clay. Runoff is very slow. Permeability is slow. Approximately 5 percent of this mapping unit is less than 20 inches deep.

*Present use and capability.*—All of this soil is cultivated. Most of it is planted to soybeans or hay crops or is used for pasture. This soil was not suitable for cultivation until it was drained and protected from floods. Some areas still need improved drainage, and all of the areas need better protection from floods. Soybeans, sorghum, hay crops, and pasture are the most suitable crops. Growing small grains and cotton is risky. This soil is in capability unit 8 (IIs-4).

**Falaya-Ina-Collins soils** ( $\frac{1}{2}$  to 8 percent slopes) (Fd).—This mapping unit consists of Falaya, Collins, and Ina silt loams and of Ina very fine sandy loam. The individual areas are too small to map separately. Most of this unit is frequently flooded. The relief is nearly level to sloping. Small areas of Hymon and Waverly soils are included.

*Present use and capability.*—Small areas of these soils have been cleared and cultivated. At present all of the acreage is in forest. Until adequate drainage is provided and flooding is eliminated, these soils should be kept in forest. These soils are in capability unit 8 (IIs-4).

### Forestdale series

The soils of the Forestdale series are poorly drained to somewhat poorly drained. They are nearly level to sloping but predominantly gently sloping. They have formed on stratified beds of medium-textured to fine-textured alluvial sediments of the Mississippi River flood plain. The native vegetation consists of a rather dense growth of hardwood trees, vines, brush, canes, and swamp grasses.

The surface soil is generally grayish-brown firm silty clay loam to friable very fine sandy loam. It is underlain by gray or grayish-brown firm clay to silty clay loam.

These soils occur on the lowest parts of the natural levees, along old or present stream channels. They are associated with the better drained Dundee, Dubbs, and Bosket soils and the more poorly drained Alligator and Dowling soils. They are transitional between the slack-water soils and the soils of the low terraces and commonly occur between the two groups. The Dundee, Dubbs, and Bosket soils, which have formed on coarser textured slack-water sediments and at higher elevations, are better agricultural soils than the Forestdale soils. The Dowling soils occur in low swags and are poor for agriculture.

A small percentage of the acreage is in forest. The rest is cultivated. These soils are suited to cultivation, but, because of poor drainage and poor physical properties, they need careful management.

**Forestdale silty clay loam, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Fh).—The following profile was observed in a cultivated area 2.5 miles north of Itta Bena and 100 yards south of a gravel road.

- A<sub>p</sub> 0 to 5 inches, brown, friable silty clay loam; weak fine granular structure; contains many fine roots.
- B<sub>g</sub> 5 to 27 inches, light brownish-gray, mottled, firm silty clay that grades to light gray in the lower part; moderate medium subangular blocky structure; contains many dark-colored concretions, many fine roots, and many fine pores.
- C<sub>g</sub> 27 to 48 inches+, light gray, mottled, friable silty clay loam; massive; contains many dark-brown and black concretions and a few pores.

The surface soil is 4 to 7 inches thick. The structure is massive to weak fine granular. The depth to the C horizon is 24 to 32 inches. The surface soil is grayish-brown, brown, or pale-brown, firm silty clay to friable very fine sandy loam. The subsoil is grayish-brown to light-gray firm clay to silty clay loam, and the substratum is light brownish-gray to light-gray firm to friable silty clay loam. Small areas of Dundee, Alligator, and Dowling soils and areas of level or sloping Forestdale soils are included.

This soil is medium in fertility. It contains little organic matter. It is strongly acid to medium acid. Permeability is moderately slow to slow. The available moisture capacity is moderately high. Runoff is slow to medium, and there is little or no risk of erosion. The root zone is moderately shallow. This soil is easy to work and to conserve. Tilth is medium to good.

*Present use and capability.*—Most of this soil is cultivated. Some is used for woodland and some for pasture. Soybeans, rice, small grains, sorghum, annual lespedeza, and most of the common grasses and legumes are well suited. If adequately drained, this soil produces good yields of cotton but not of corn.

This soil needs surface drainage. Crop rows should be designed so that excess water will drain into V- or W-shaped ditches and from there into larger ditches. Tilth and fertility can be improved by adding commercial fertilizers, by returning crop residues to the soil, and by turning under green-manure crops. Nitrogen is needed on all crops. Soil tests should be made to determine whether other fertilizers are needed. This soil is in capability unit 8 (IIs-4).

**Forestdale silty clay loam, nearly level overflow phase** ( $\frac{1}{2}$  to 2 percent slopes) (Fm).—This soil occurs at low elevations. For several weeks each year it is covered with backwater, which remains on the soil long enough to make regular cultivation hazardous.

*Present use and capability.*—Most of this soil is cultivated, principally to soybeans. In some years soybeans, sorghum, and summer pasture plants can be grown successfully. Growing other crops is very risky. Until it is adequately protected from floods, this soil should be used for forest. It is in capability unit 12 (IIIw-6).

**Forestdale silty clay loam, nearly level moderately shallow phase** ( $\frac{1}{2}$  to 2 percent slopes) (Fk).—This soil is underlain by beds of clay. The depth to the clay layer ranges from 20 to 30 inches. The water table is high, and the root zone is shallow. Runoff is very slow to slow. Small areas are covered by backwater for several weeks each year. Deposition of soil material is more likely than erosion.

*Present use and capability.*—A small percentage of this mapping unit is in forest. The remainder is planted to cotton or soybeans or is used for pasture. This soil is suited to pasture, soybeans, rice, and sorghum and is fairly well suited to cotton. It is not suited to corn. If cultivated, it needs surface drainage. This soil is in capability unit 8 (IIs-4).

**Forestdale silty clay loam, gently sloping phase** (2 to 5 percent slopes) (Fn).—The plow layer of this soil is generally 3 to 5 inches thick, and small areas of the subsoil are exposed. The depth to the C horizon is 20 to 28 inches. Tilth is not so good as on the nearly level phase. Runoff is medium. The risk of erosion is slight to moderate. Moderately intensive conservation practices are needed.

This soil is associated with the Dundee and Dowling soils and other Forestdale soils. It includes some small areas of nearly level and sloping relief and some areas of Dundee soils.

*Present use and capability.*—All of this soil is cultivated. It is used mostly for soybeans, small grains, and pasture. It is best suited to small grains, hay, and pasture. It can also be used for cotton, soybeans, and sorghum. Crop rows should be on the contour. This soil is in capability unit 8 (IIs-4).

**Forestdale silty clay, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Fg).—This soil occurs in two principal areas. One is 3 to 5 miles north of Shellmound and the other is northwest of Greenwood. It is somewhat more fertile than the other Forestdale soils and contains more organic matter. The B horizon extends to depths of 30 inches or more. This soil is slowly permeable. Its available moisture capacity is high. Runoff is slow, and there is no risk of erosion. Tilth is poor, and the soil is hard to work.

*Present use and capability.*—All of this soil is cultivated. Cotton, corn, soybeans, and small grains are the principal crops. Soybeans, rice, sorghum, and pasture are the most suitable crops. To obtain maximum yields, tilth must be improved and adequate drainage must be provided. This soil is in capability unit 17 (IIIs-4).

**Forestdale silt loam, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Fe).—The plow layer of this soil is 4 to 6 inches thick. The depth to the C horizon is 22 to 27 inches. The surface soil is more friable than that of Forestdale silty clay loam, nearly level phase, and absorbs moisture more easily. The root zone is deeper. Tilth is good. This soil is easy to work and to conserve, but if left bare it will crust and pack when wet. Areas of Dundee soils and areas of other Forestdale soils are included.

*Present use and capability.*—Only a very small part of this soil is in forest. Most of it is planted to cotton.

Small acreages are planted to soybeans, small grains, and corn.

This soil is well suited to soybeans, sorghum, and rice. If adequately drained, it is suited to cotton, corn, and small grains. It is good for pasture. All of the common perennial and summer grasses and legumes can be grown.

Crop rows that drain into V- or W-shaped ditches are needed to remove excess surface water. The supply of organic matter should be maintained, to improve structure and to reduce the tendency to crust. This soil is in capability unit 7 (IIs-3).

**Forestdale silt loam, gently sloping phase** (2 to 5 percent slopes) (Ff).—The plow layer of this soil is only  $\frac{3}{4}$  to 5 inches thick. In some small areas it is a mixture of surface soil and subsoil. Tilth is not so good as on Forestdale silty clay loam, nearly level phase. Runoff is medium. The risk of erosion is slight to moderate. Moderate conservation practices are needed. Included are small areas of nearly level relief and areas of Dundee soils and other Forestdale soil types.

*Present use and capability.*—Most of this mapping unit is cultivated, but small areas are in forest. Crop rows should be on the contour. The cropping systems should include soil-improving crops. This soil is in capability unit 7 (IIs-3).

**Forestdale very fine sandy loam, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Fo).—The plow layer of this soil is 5 to 6 inches thick. Generally it is massive. This soil is more permeable than Forestdale silty clay loam, nearly level phase, and has a deeper root zone. It has better tilth and is easier to work and to conserve than any of the other soils in the Forestdale series. The available moisture capacity is high. Small areas of Dundee or Dowling soils and small areas of level and sloping Forestdale soils are included.

*Present use and capability.*—This soil is used for row crops, small grains, and pasture. Cotton is the principal row crop. Drainage is needed if crops are grown. Crop rows should be designed to drain excess surface water into V- or W-shaped ditches. Fieldwork sometimes has to be delayed because of poor drainage and slow runoff.

This soil is suited to cotton, corn, small grains, sorghum, and rice. It is good for pasture. All of the common perennial and summer grasses and legumes can be grown. This soil is in capability unit 7 (IIs-3).

### *Hymon series*

The soils of the Hymon series are level to gently sloping and are moderately well drained. They have formed on stratified beds of medium-textured alluvium washed from the Loess Belt. The native vegetation consists of a mixture of hardwood trees, vines, and swamp grasses.

The subsoil is yellowish brown to grayish brown and very friable. It consists generally of alternating layers of silt loam and very fine sandy loam. In places the color grades from yellowish brown in the upper part of the profile to pale brown or grayish brown in the lower part. In other places the color is uniform throughout the profile.

The only Hymon soil mapped in this county occurs on the flood plains of Big Sand Creek, Palusha Creek, and Abiacha Creek and, in small areas, near some of the large streams. It is associated with the more poorly drained Ina and Falaya soils and the moderately well drained Collins soils. The Ina and Falaya soils have grayish-brown subsoils. They occur on lower elevations than the

Hymon soil. The Collins soils contain more silt and less sand. Other soils that developed from similar materials are the well drained Shannon soils, the somewhat poorly drained Ina soils, and the poorly drained Beechy soils. No Shannon or Beechy soils are mapped in this county.

Most of the acreage is cleared. It is used for row crops, mostly cotton, or for pasture.

**Hymon very fine sandy loam** (0 to 5 percent slopes) (Ha).—The following profile was observed in a cultivated area:

- A<sub>p</sub> 0 to 6 inches, brown, very friable very fine sandy loam; single grain; contains many fine roots.
- C<sub>11</sub> 6 to 24 inches, yellowish-brown, mottled, friable very fine sandy loam; massive; contains pockets of light brownish-gray sand and a few roots and pores.
- C<sub>12</sub> 24 to 36 inches, pale-brown, mottled, friable very fine sandy loam; massive; contains pockets of light-gray fine sand, a few fine roots, and a few pores.
- C<sub>13</sub> 36 to 60 inches, grayish-brown, mottled, slightly firm silt loam; massive; contains a few black concretions and a few fine pores.

The surface layer is 6 to 10 inches thick. There are small areas where the profile is only 20 to 30 inches deep. Included in the mapping unit are small areas of the more poorly drained Ina and Falaya soils, small areas of the Collins soils, and small sandy areas (locally called sand blows).

This soil is low in natural fertility and contains little organic matter. It is slightly acid. Permeability, available moisture capacity, runoff, and depth of the root zone depend largely on the depth to the water table. In wet seasons, the water table is high. There is no risk of erosion. Tilth is good. The soil is easy to work and needs few conservation practices. It is well suited to irrigation.

*Present use and capability.*—A very small acreage of this soil is in forest, and the rest is planted to row crops or is used for pasture. Cotton is the chief crop. Cotton, small grains, sorghum, and truck crops are suitable, but late-planted corn is not suitable because it is likely to wilt during short dry spells.

Crop rows designed to drain to V- or W-shaped ditches help remove excess surface water. Present flood control measures are not adequate and need to be improved. Good tilth can be maintained and organic matter supplied by including pasture plants, other sod crops, and green-manure crops in the rotation and by returning crop residues to the soil. Nitrogen is needed on all crops except legumes. Other fertilizers should be supplied to meet needs indicated by soil tests. This soil is in capability unit 1 (I-1).

### Ina series

The soils of the Ina series are somewhat poorly drained. They are nearly level to sloping but predominantly nearly level. They have formed on stratified beds of medium-textured alluvium washed from the Loess Belt. The native vegetation consists of willow, cottonwood, oak, maple, pecan, and cypress trees and vines, canes, and swamp grasses.

In places these soils are light brownish-gray to yellowish-brown, friable very fine sandy loam. In other places they consist of alternating layers of very fine sandy loam and silt loam.

These soils occur on the flood plains of Abiacha Creek, Big Sand Creek, and Palusha Creek, and in small isolated

areas near large streams. The Ina soils are associated with the somewhat poorly drained Falaya soils and the better drained Hymon soils. The Falaya soils contain more silt and clay than the Ina soils.

Other soils that developed from the same kind of parent material are the well drained Shannon soils, the moderately well drained Hymon soils, and the poorly drained Beechy soils. No Shannon or Beechy soils are mapped in this county.

Most of the acreage is suited to cultivation, but poor drainage and flooding limit its use.

**Ina very fine sandy loam** ( $\frac{1}{2}$  to 2 percent slopes) (Ib).—The following profile was observed in a cultivated area 5 miles northeast of Minter City, on the south bank of an old river lake.

- A<sub>p</sub> 0 to 6 inches, grayish-brown, very friable very fine sandy loam; massive; contains many fine roots.
- C<sub>11g</sub> 6 to 18 inches, grayish-brown, mottled, very friable very fine sandy loam; massive; contains many fine roots and pores.
- C<sub>12g</sub> 18 to 60 inches, grayish-brown, mottled, very friable very fine sandy loam; massive; contains a few fine roots and a few fine pores.

The plow layer is 5 to 10 inches thick. In places it is silt loam instead of very fine sandy loam. There are a few small areas where the profile is only 10 to 20 inches deep over clay and a few where the profile is 20 to 30 inches deep over clay. Included are small areas of Falaya, Hymon, and Collins soils.

The depth to the water table ranges from a few inches in wet weather to several feet in dry weather. Permeability, available moisture capacity, runoff, and depth of the root zone are affected by the depth to the water table.

This soil is low in natural fertility and contains little organic matter. It is strongly acid to medium acid. Periodic floods deposit fresh soil material. Tilth is good. This soil is easy to work and needs few conservation practices. It is suited to irrigation.

*Present use and capability.*—All of this soil is cleared and used for row crops, small grains, and pasture. Cotton is the chief row crop. This soil is suited to soybeans, sorghum, and corn. It is also suited to most of the pasture grasses and legumes commonly grown but not to winter grasses and legumes. Areas that have adequate natural drainage or adequate artificial drainage are suited to cotton and small grains. Winter cover crops and green-manure crops can be grown in some areas, but other areas are unsuited to these crops because of poor drainage and the risk of flooding.

Nitrogen is needed on all crops except legumes. Other fertilizers should be applied to meet the needs indicated by soil tests. Good tilth can be maintained and organic matter supplied by growing pasture plants and other sod crops in rotation with row crops and by plowing under crop residues. Excess surface water can be drained through properly designed crop rows to V- or W-shaped ditches and from those to larger ditches. Existing provisions for flood protection are inadequate and should be improved. This soil is in capability unit 7 (II-3).

**Ina silt loam** ( $\frac{1}{2}$  to 2 percent slopes) (Ia).—This soil is nearly level to sloping, but only a little of it is gently sloping or sloping. The surface soil, if left bare, will crust easily when wet.

*Present use and capability.*—Most of this soil is cultivated. A little of it is in pasture. On the sloping and gently sloping areas, runoff is medium. The risk of

erosion is slight to moderate. Moderate conservation practices are needed. This soil is in capability unit 7 (II<sub>s</sub>-3).

### **Pearson series**

The soils of the Pearson series are nearly level to gently sloping. They have formed on beds of medium-textured alluvium over sand. The subsoil is dark-brown, strong-brown, or yellowish-brown, friable silt loam. The native vegetation consists of a mixture of hardwood trees, vines, canes, and swamp grasses.

The Pearson series is one of the minor series in the county. It occurs on the Mississippi River flood plain, on old natural levees along small creeks that flow from the Loess Belt. The soils of this series are moderately well drained. Other soils that developed on similar materials are the well drained Lintonia soils, the poorly drained Colt soils, and the somewhat poorly drained Brittain soils. No Lintonia or Colt soils occur in this county; the Brittain soils occur only as small inclusions.

**Pearson silt loam, nearly level phase** ( $\frac{1}{2}$  to 2 percent slopes) (Pa).—The following profile was observed in a cultivated area 2.5 miles northeast of Greenwood and 1 mile north of the Columbus and Greenville Railway.

- A<sub>p</sub> 0 to 5 inches, dark-brown, friable silt loam; massive; contains many fine roots.
- B 5 to 31 inches, strong-brown, friable silt loam; color grades to yellowish brown in the lower part; moderate medium subangular blocky structure; contains many roots, many fine pores, and many dark-brown and black concretions.
- C 31 to 60 inches, light yellowish-brown, mottled, friable silt loam; massive; contains many small brown concretions and a few fine pores.

The surface soil is 5 to 10 inches thick. The depth to the C horizon ranges from 20 to 30 inches. The depth to the sandy material ranges from 3 to 5 feet. This mapping unit includes some small gently sloping areas and also some small areas of Brittain and Dexter soils, neither of which is mapped separately in this county.

This soil is low in natural fertility. It is very strongly acid to strongly acid. The supply of organic matter is small. Permeability is moderate to slow. The available moisture capacity is moderately low. Runoff is slow to medium. There is little or no risk of erosion. The root zone is moderately deep. Tilth is good. This soil is easy to work and needs few conservation practices.

*Present use and capability.*—Most of this soil is cultivated. A small part is in pasture, and an even smaller part is in forest. This soil is suited to cotton, corn, soybeans, small grains, and sorghum. It is well suited to most of the grasses and legumes commonly grown for pasture.

At present, yields of all crops are low, but if this soil is carefully managed it can be one of the most productive in the county. To increase the supply of organic matter and to improve structure and tilth, green-manure crops should be grown after all crops except legumes. Pasture plants and other sod crops should be used in the rotation. This soil needs a complete fertilizer and lime. Soil tests should be made to determine how much fertilizer is needed. This soil is in capability unit 1 (I-1).

### **Sandy alluvial land**

**Sandy alluvial land** (Sa).—This mapping unit consists of coarse-textured sandy sediments that have been re-

cently deposited near crevasses in the levees along Big Sand Creek, Palusha Creek, and Abiacha Creek. The deposits are 2 to 8 feet thick. Most of this infertile sand has been deposited over fertile soils. Either erosion or deposition may take place during floods. Water and air move rapidly through the sedimentary material; consequently, this land type is extremely droughty.

*Present use and capability.*—This mapping unit includes small areas of deep infertile sand that lack vegetation and areas of deep sand covered with thick to scattered stands of willow and cottonwood. Bermudagrass grows on some of the more shallow areas. This mapping unit is not suited to pasture, but it is suited to trees. Cottonwoods will grow well if properly managed. To prevent the destruction of more good cropland, these areas should be protected from floods. This mapping unit is in capability unit 20 (VII<sub>s</sub>-1).

### **Swamp**

**Swamp** (Sb).—This mapping unit occurs on low-lying areas that are covered with water most or all of the time. It occurs in shallow meanders, in old, shallow oxbow lakes, and in depressions. It is scattered over wide areas of the county. Locally this mapping unit is called swamps or brakes. Some of the larger areas are Mathis Brake, Ashland Brake (fig. 7), and Beckham Swamp.

The surface soil is 2 to 15 inches thick. It consists of gray clay, silty clay, silty clay loam, and silt loam. It is underlain by gray, highly mottled clay that is 3 feet to many feet thick. Originally the surface soil was covered with a thick layer of partially decomposed plant material. At one time this layer was probably as much as 18 inches thick. In places it has been entirely destroyed by fire during dry periods, but in other places as much as 1.5 inches remains.

*Present use and capability.*—Most of this mapping unit is covered with willow, tupelo-gum, and cypress trees and water lilies, button bushes, and swamp grasses. Mathis Brake consists of areas of open water and has little vegetation. None of this unit has been cleared. It is used for forest or for wildlife.

### **Waverly series**

The Waverly series consists of poorly drained soils formed on fine-textured to medium-textured local alluvium washed from Pearson, Hyman, Ina, Collins, and Falaya soils. These soils occur on nearly level concave slopes in depressed areas on the flood plains of Big Sand Creek and Palusha Creek. The native vegetation was cypress, tupelo-gum, and willow trees and swamp grasses. The total acreage is small.

These soils are associated with the better drained Pearson, Hyman, Ina, Collins, and Falaya soils.

**Waverly soils, local alluvium phases** ( $\frac{1}{2}$  to 2 percent slopes) (Wa).—The following profile was observed in a cultivated area 3 miles northeast of Greenwood.

- A<sub>pg</sub> 0 to 6 inches, gray, friable silt loam; massive.
- A<sub>lg</sub> 6 to 15 inches, light-gray, mottled, friable silt loam; massive; contains many small black concretions.
- D<sub>g</sub> 15 to 48 inches+, light-gray, mottled, very firm clay; massive; contains many black concretions.

In places the combined thickness of the A<sub>pg</sub> and A<sub>lg</sub> horizons is 6 to 20 inches. The texture of these horizons ranges from silty clay loam to silt loam. The subsoil is clay or silty clay.



Figure 7.—A young stand of tupelo-gum in Ashland Brake near Schlater.

These soils are low in natural fertility and contain little organic matter. They are more likely to accumulate soil material through deposition than to lose material through erosion. They are strongly acid to medium acid. Permeability is slow. The available moisture capacity is high. Runoff is slow to ponded. The root zone is shallow. Tilth is fairly good, but poor drainage delays preparation of seedbeds.

*Present use and capability.*—These soils are either idle or in pasture. Because of poor surface drainage, it is risky to plant most crops. Late-planted corn, sorghum, and temporary summer pasture have been grown, but results have been varied. Until drainage is improved, it is best to use these soils for forest. They are in capability unit 15 (U1w-13).

## Formation of Soils

Soil is the product of the forces of environment acting on soil materials deposited or accumulated by geologic processes. The characteristics of the soil at any given point are determined by the interaction of five major factors—climate, living organisms, parent material, topography, and time. The relative importance of the different factors differs from place to place. In Leflore County,

the parent material and the topography account for the principal differences among the soils.

Many of the processes of soil formation are unknown, but it is possible to acquire some understanding of how soils are formed by considering separately each of the formative factors and some of the processes that contribute to the development of soil profiles.

## Factors of Soil Formation

Climate and living organisms are the active factors of soil formation. Topography and time modify the effects of the active factors on the accumulated parent material.

### Climate

The climate of Leflore County is of the humid, warm-temperate, continental type characteristic of the southern part of the United States. Data on the average monthly, seasonal, and annual temperature and precipitation are given in table 4.

Climate has had only slight effect on the soils of Leflore County. Generally, soils in a humid, warm-temperate climate are strongly weathered, leached, acid, and infertile. In this county, however, the soils are more like those in cooler, drier climates because the flood plain of the Mississippi is geologically young and the sediments from

TABLE 4.—*Temperature and precipitation at Greenwood, Leflore County, Mississippi*

[Elevation, 128 feet]

Month	Temperature <sup>1</sup>			Precipitation <sup>2</sup>			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1952)	Wettest year (1932)	Average snowfall
December	46.7	83	5	6.50	4.51	12.84	0.5
January	46.3	83	0	5.09	3.80	11.80	.4
February	48.6	87	-6	4.77	3.00	7.60	.6
Winter	47.2	87	-6	16.36	11.31	32.24	1.5
March	57.1	92	20	5.82	5.12	3.29	.1
April	64.4	97	28	5.70	3.61	5.20	( <sup>3</sup> )
May	72.3	103	37	4.79	4.93	2.09	0
Spring	64.6	103	20	16.31	13.66	10.58	.1
June	79.5	106	49	3.76	.04	6.30	0
July	82.1	111	51	4.34	1.34	5.62	0
August	81.6	108	51	3.36	4.18	3.79	0
Summer	81.1	111	49	11.46	5.56	15.71	0
September	76.7	108	38	2.58	1.06	5.12	0
October	65.1	98	26	2.88	( <sup>3</sup> )	6.83	0
November	54.1	86	16	4.09	3.80	3.70	.1
Fall	65.3	108	16	9.55	4.86	15.65	.1
Year	64.5	111	-6	53.68	35.39	74.18	1.7

<sup>1</sup> Average temperature based on a 56-year record, through 1955; highest and lowest temperatures, on a 32-year record, through 1930.

<sup>2</sup> Average precipitation based on a 57-year record, through 1955; wettest and driest years based on a 50-year record, in the period 1898-1955; snowfall based on a 32-year record, through 1930.

<sup>3</sup> Trace.

which the soils formed have not been in place long enough to be strongly weathered. Most of the sediments were washed from areas where weathering is not intense.

### Living organisms

Plants and animals have two important functions in soil formation. They supply organic matter to the soil and bring plant nutrients from the lower layers to the upper ones. Trees, grasses, and other plants are the primary sources of organic matter. Trees and deep-rooted grasses absorb water and plant nutrients from deep strata in the soils. As the plants die and decay, these nutrients are returned to the soil.

Before settlement of Leflore County, vegetation was the more important of the living organisms that affect soil formation. The activities of animals were apparently of minor importance. The early explorers and early settlers found a cover of dense forest broken by a few canebrakes. On most of the better drained soils there were thick stands of mixed hardwoods. Heavy stands of cypress or tupelo-gum filled the swampy areas. The trees on the better drained areas were hickory, pecan, post oak, blackgum, winged elm, and some cottonwood. In low flat areas that were wet but not swampy, the principal trees were willow oak, overcup oak, green ash, hackberry,

sweetgum, soft elm, and tupelo-gum. Many canebrakes were found along the swampy areas. The differences in native vegetation seem to have been associated with differences in surface drainage. Only the major differences in the original vegetation are reflected to any extent in the soils, probably because of the general youthfulness of the land surface.

With the development of agriculture in Leflore County, the activities of man began to affect the development of the soils. By clearing off the trees, cultivating the soils, introducing new species of plants, building levees and dams for flood protection, and artificially improving natural drainage, man will influence the direction and rate of soil formation in the future. Few results of these changes can yet be seen, and some may not be evident for many centuries.

### Parent material

Alluvium, much of it only slightly weathered, was the parent material of the soils of Leflore County. The alluvial deposit is about 150 feet thick. The upper part of it is sand, silt, and clay, and the lower part is sand and gravel (2).

The alluvium was derived from a multitude of rocks, soils, and unconsolidated sediments in some 20 states. Most of it originated in the upper part of the Mississippi River basin and was transported by the Mississippi River. The upper basin extends from Montana to Pennsylvania. Most of the rock in this region is sedimentary, but immense areas are mantled with glacial drift and loess.

The Loess Belt—also called the Loess Hills—is an area in which a thick mantle of loess has been deposited over sandy material of the East Coast Coastal Plain (3). Alluvium that originated in the Loess Belt was deposited along the eastern edge of the county and in small areas along the major streams. This material was transported by Big Sand Creek, Palusha Creek, Abiacha Creek, the Yalobusha River, and the Tallahatchie River. The total acreage of the soils that developed from these sediments is small.

The alluvium has a wide range of texture. Normally, when a stream overflows, the coarser textured sediments are deposited nearest the channel and the finer textured material toward the outer edges of the flood plains. The sands that are deposited nearest the streams form the low ridges that are called natural levees. Silt is carried farther from the stream and is deposited when the floodwaters are moving more slowly. Clay is carried to the outer edges of the flood plain and settles when the water becomes still. Actually, this simple pattern of deposits is rare. In Leflore County the streams have changed their courses many times; sometimes they have washed out natural levees, and sometimes they have deposited sand over slack-water clay. Consequently, there are many combinations of material in the layer of sediments. Only the largest areas of slack-water clays, which lie farthest from the channels, have remained stable.

Differences in texture are accompanied by some differences in chemical and mineralogical composition. The coarser textured sediments are usually higher in quartz than the medium- or fine-textured sediments, but they are lower in feldspars and ferromagnesian minerals. Characteristically they are more siliceous, lower in bases, and lower in carbonates.

Many of the differences among the soils of Leflore

County result from the differences in texture and composition of the parent material.

### **Topography**

The topography of Leflore County ranges from flat, in the slack-water areas, to gently sloping, in the ridges and depressions along old stream channels. Most of the county is nearly level. Local differences in elevation are slight. The slope gradient is generally less than 3 percent, but along streambanks and on some natural levees it is as much as 15 percent. Along the west side of the county, the maximum difference in elevation is less than 5 feet in 5 miles.

The highest point in the county is 144 feet above sea level. It is in the northeastern corner, near Minter City. The lowest points, which are along the west and south borders, are only 105 feet above sea level. The maximum difference in elevation is only 39 feet.

Most of the county drains southwestward toward the Yazoo River through tributary streams and river lakes. An area north of Ellison Lake and west of the Tallahatchie River and Bear Creek drains westward toward the Quiver River. Water moves slowly into the drainage channels, especially from the first bottoms and the areas of slack-water clay.

The topography has had a modifying effect on the action of the other factors of soil formation. The soils that formed on low terraces reflect the action of climate and living organisms more than the soils on the low, flat areas that have been flooded more frequently.

### **Time**

Geologically, the soils of Leflore County are young. Probably most of them have formed from sediments that have been exposed about 11,000 years. Some have formed from sediments of more recent origin. Until recently there were frequent floods that deposited fresh sediments. It was not until 1928 that floods on the Mississippi River were effectively controlled. Between 1900 and 1950 there was a major flood in the basin of the Yazoo River on an average of every two years. Even now, some parts of the county are flooded at short intervals.

### **Genetic Processes**

None of the soils of Leflore County have well differentiated horizons within the solum. There may, however, be marked differences between the solum and the C horizon. In some profiles there is an underlying D horizon.

In most of the soils, the differentiation of horizons is the result of two or more of the following processes: (1) accumulation of organic matter; (2) leaching of carbonates more soluble than calcium carbonate; (3) translocation of silicate clay minerals; and (4) reduction and transfer of iron. All four processes have been active to some extent in the development of the horizons in the Dundee, Dubbs, Bosket, and Pearson soils. The first two processes are reflected in the faint horizons in Collins silt loam; the first and last were the principal processes in the formation of Alligator clay. All of the soils in the county had accumulated enough organic matter in their uppermost layers to form an A<sub>1</sub> horizon. As a consequence of cultivation, however, the A<sub>1</sub> and A<sub>2</sub> horizons

have been mixed together and can no longer be distinguished. In most of the soils, this mixed layer is now identified as an A<sub>p</sub> horizon.

Leaching of carbonates and salts has taken place in all the soils of the county, but it has had only a limited and indirect effect on horizon differentiation. In some soils, apparently, the removal of these materials from the upper part of the profile is a necessary preliminary to the translocation of silicate clay minerals. Some of the well-drained soils have been completely leached of carbonates and salts. Leaching of the wet soils has been slow because water moves through them slowly, but even the wettest soils in the county show, by their acid reaction and the absence of carbonates, some evidence of leaching. The soils formed from sediments washed from the Loess Belt have not been in place long enough for leaching to have had much effect, but most of the sediments washed from soils that were already leached.

Only in a few soils has the translocation of silicate clay minerals contributed to the development of horizons. In the B horizon of the Dundee, Dubbs, and Bosket soils, there are dark-colored coatings on the ped faces and clay films in the old root channels, which show that some clay has moved down from the A horizon. The amount, however, is small.

The reduction and transfer of iron, a process known as gleying, has been important to horizon differentiation in all of the wet soils in the county. It has taken place in all of the poorly drained and somewhat poorly drained soils and to some extent in the lower horizons of moderately well drained soils.

The reduction of iron oxides in the deeper horizons of the wet soils is indicated by the gray colors. Usually the reduction is accompanied by some transfer of iron, which may be local or general. After it has been reduced, iron may move completely out of the profile, it may move from one horizon into another, or it may move only a short distance and stop within the horizon of its origin. In Leflore County it seems to have moved only a short distance and stopped either in the horizon of its origin or in a nearby horizon. Iron has been segregated into concretions in the deeper horizons of some soils. It has also been segregated to form yellowish-red, strong-brown, and yellowish-brown mottles in the deeper horizons of many soils.

In Leflore County, horizon differences result in part from the accumulation of organic matter in the uppermost layer. In the poorly drained soils, horizon differentiation is caused in part by the reduction and transfer of iron. The effects of the reduction and transfer of iron are evident but not prominent, probably because the soils are young. The sediments have been subjected to the processes of horizon differentiation for too short a time to permit the formation of prominent horizons.

Some of the comparative effects of the several processes of horizon differentiation are illustrated by the detailed profile descriptions in the pages that follow.

## **Classification of Soils in Higher Categories**

Soils are placed in narrow classes for the purpose of discussing their suitability for agriculture and their management requirements. They are placed in broader

classes for study and comparison of large areas. The comprehensive system of soil classification followed in the United States consists of six categories. Beginning with the broadest category, these are the order, suborder, great soil group, family, series, and type. The order, the great soil group, and the series are the categories most commonly used.

There are three orders of soils—the zonal, the intrazonal, and the azonal. Zonal soils have evident, genetically related horizons that reflect the influence of the active factors of soil formation—climate and living organisms. Intrazonal soils have evident, genetically related horizons that reflect the dominating influence of some local factor of relief, parent material, or age over the normal effect of climate and vegetation. Azonal soils lack distinct, genetically related horizons because of their youth or because they developed from resistant parent material or on steep topography.

The next category commonly used is the great soil group, which consists of soils that have common internal characteristics. Leflore County is within the region in which soils of the Red-Yellow Podzolic great soil group are dominant, but no soils of that group were mapped in

the county. In table 5, the soil series in Leflore County are shown by order and great soil group, and some of the factors in the formation of the soils of each series are described.

In the following pages, the soil series of Leflore County are classified into orders and great soil groups. At least one profile actually observed at a specific location in the county is described for each series. Samples for laboratory analysis were taken from some of the profiles described, and the results of the analysis are shown in a table that follows the detailed description of the profile sampled. (For Dubbs silt loam, samples were taken in Tunica County, Miss., and for Alligator clay, one sample was taken from Bolivar County, Miss.)

Following the profile description, a discussion of the processes that have been active in horizon differentiation is given. A comparison of the different series within the great soil group is made, and reasons for placing each series within that particular great soil group are given.

The classification of soil series into great soil groups is based principally on those characteristics observed in the field. The supplementary laboratory data are limited.

TABLE 5.—*Classification of the soils by higher categories and some of the factors that have contributed to differences in soil morphology*

[The factors of climate and living organisms are relatively uniform in their effect on the soils throughout the county and do not account for the broad differences among soils]

ZONAL SOILS

Great soil group and series	Dominant relief	Drainage	Parent material
Gray-Brown Podzolic soils:			
Bosket.....	Gently sloping.....	Good to somewhat excessive..	Stratified beds of moderately fine textured to moderately coarse textured alluvial sediments on natural levees or terraces.
Dubbs.....	Nearly level to sloping....	Moderately good to good....	Same.
Dundee.....	Nearly level to sloping....	Somewhat poor to moderately good.	Stratified beds of fine-textured to medium-textured alluvial sediments on natural levees or terraces.
Pearson.....	Nearly level.....	Moderately good.....	Medium-textured alluvium on terraces.

INTRAZONAL SOILS

Low-Humic Gley soils:			
Alligator.....	Nearly level.....	Poor.....	Thick beds of fine-textured (slack-water) alluvium.
Dowling.....	Nearly level (concave)....	Poor.....	Thick beds of fine-textured alluvium.
Falaya.....	Nearly level.....	Somewhat poor.....	Moderately fine textured to medium textured recently deposited alluvial sediments.
Forestdale.....	Gently sloping.....	Somewhat poor to poor....	Stratified beds of fine-textured and medium-textured alluvium on low elevations of natural levees or terraces.
Ina.....	Nearly level.....	Somewhat poor.....	Medium-textured recently deposited alluvial sediments.
Waverly.....	Nearly level (concave)....	Poor.....	Fine-textured to medium-textured recently deposited alluvium.

AZONAL SOILS

Alluvial soils:			
Collins.....	Nearly level.....	Moderately good.....	Medium-textured recently deposited alluvium.
Hymon.....	Nearly level.....	Moderately good.....	Medium-textured recently deposited alluvium.
Regosols:			
Beulah.....	Nearly level.....	Somewhat excessive to excessive.	Thick beds of medium textured to moderately coarse textured alluvium on natural levees or terraces.

Further study may prove the classification to be incorrect in some instances.

### Zonal soils

The zonal soils in Leflore County are the Dubbs, Dundee, Bosket, and Pearson. These soils are barely within the zonal order and are considered to be intergrades to the azonal order. The horizons in these soils are evident but more nearly faint than distinct. They are genetically related and seem to reflect the influence of climate and living organisms. The effect of time is also important.

#### GRAY-BROWN PODZOLIC SOILS

Gray-Brown Podzolic soils are generally found in humid, cool-temperate climates. They are formed under a cover of deciduous forest. As a group they have a thin, dark-colored A<sub>1</sub> horizon over a light brownish-gray A<sub>2</sub> horizon. The A<sub>2</sub> horizon is underlain by a brown to yellowish-brown, finer textured B horizon that grades into a lighter colored and coarser textured C horizon.

The Dubbs, Dundee, Bosket, and Pearson soils are classified as Gray-Brown Podzolic soils, although they have some of the characteristics of Prairie soils. In the lower horizons of the Dundee, Dubbs, and Pearson soils there is some evidence of gleying; consequently, these soils might be considered to be intergrades to the Low-Humic Gley great soil group.

The soils of these four series were formed by the same processes and are much alike in profile characteristics. Collectively, they comprise about 22 percent of the total area of Leflore County. They include some of the most productive soils in the county.

**Dubbs soils.**—The moderately well drained to well drained Dubbs soils are intermediate in drainage in the Dundee-Dubbs-Bosket group. They have the same range in drainage as the Pearson soils.

These soils lack the distinct A<sub>1</sub> and A<sub>2</sub> horizons characteristic of Gray-Brown Podzolic soils. It seems highly probable that the original profiles contained A<sub>1</sub> and A<sub>2</sub> horizons, but as a consequence of cultivation these layers have been mixed together and are now identified as an A<sub>p</sub> horizon.

The following profile of Dubbs silt loam was observed in the SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec. 13, T. 6 S., R. 12 W., Tunica County, Miss. (Sample D 44 Mi 004-1 to 6).

- |                 |   |
|-----------------|---|
| A <sub>p</sub>  | 0 to 5 inches, grayish-brown to dark yellowish-brown silt loam; moderate fine granular structure; very friable (furrow slice); abrupt boundary.   |
| B <sub>21</sub> | 5 to 11 inches, dark yellowish-brown clay loam; strong medium subangular blocky structure; crushes readily to mixture of moderate fine subangular blocks and moderate medium granules; hard when dry, friable when moist, slightly plastic when wet; few pinholes; crushed mass is yellowish brown; gradual boundary. |
| B <sub>22</sub> | 11 to 14 inches, yellowish-brown heavy loam; weak to moderate coarse irregular blocky structure; peds have partial coatings of dark yellowish brown, and interiors have network of pinholes with very dark brown linings; hard when dry, friable when moist, slightly plastic when wet.                               |
| B <sub>3</sub>  | 14 to 21 inches, light yellowish-brown very fine sandy loam; many fine, faint mottles of reddish yellow; weak coarse irregular blocky structure; pinholes and very dark brown streaks common; gradual boundary.   |
| C <sub>1x</sub> | 21 to 33 inches, mottled pale-yellow and reddish-yellow very fine sandy loam; many fine, faint mottles; crushed mass appears light yellowish-brown; structureless; soft, very friable; pinholes few to common; black and  |

very dark brown, very fine, soft concretions common (2 per square inch); gradual boundary.

- |                 |   |
|-----------------|---|
| C <sub>2x</sub> | 33 to 60 inches +, mottled pale-yellow, reddish-yellow, and light-gray very fine sandy loam; many, fine, faint or distinct mottles; structureless; soft, very friable; few black and very dark brown very fine concretions. |
|-----------------|---|

Table 6 gives data obtained by laboratory analysis of samples taken from this profile.

The following profile of Dubbs very fine sandy loam was observed in a cultivated area in the SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 29, T. 18 N., R. 2 W.

- |                  |  |
|------------------|--|
| A <sub>p</sub>   | 0 to 5 inches, brown (10YR 5/3) very fine sandy loam; single grain; very friable when moist; many fine roots; strongly acid; abrupt, smooth boundary.  |
| B <sub>21</sub>  | 5 to 9 inches, dark yellowish-brown (10YR 4/4) silty clay loam; yellowish-brown (10YR 5/4) when crushed; massive; firm to weakly cemented (plow-sole); many fine roots; many fine pores; strongly acid; clear, smooth boundary.  |
| B <sub>22</sub>  | 9 to 16 inches, dark yellowish-brown (10YR 4/4) silty clay loam; yellowish-brown (10YR 5/6) when crushed; moderate medium subangular blocky structure; peds are coated with dark brown (10YR 4/3); interior of peds has network of pinholes coated with darker brown linings; firm when moist; many fine roots; strongly acid; clear, smooth boundary. |
| B <sub>3</sub>   | 16 to 27 inches, yellowish-brown (10YR 5/4) silty clay loam; weak fine and medium subangular blocky structure; some peds have partial dark-brown coatings; firm when moist; a few fine roots; a few fine pores; very strongly acid; abrupt, smooth boundary.   |
| C <sub>1</sub>   | 27 to 40 inches, yellowish-brown (10YR 5/4) silt loam; texture grades with depth to very fine sandy loam; massive; friable when moist; contains pockets of gray sand; a few fine roots; a few fine pores; strongly acid; gradual, smooth boundary.   |
| C <sub>12x</sub> | 40 to 60 inches+, yellowish-brown (10YR 5/4) very fine sandy loam mottled with shades of gray and brown; mottles are common, fine, and faint; a few small, dark-brown to black concretions; a very few fine roots; a few fine pores; medium acid.  |

In the Dubbs soils, the horizons are differentiated by color, texture, structure, and consistence. The A horizon is somewhat darker colored than the B or C horizon but not much darker colored than the upper part of the B horizon. The B horizon has a finer texture, a more distinct structure, and a less friable consistence than the A or C horizon. Despite these differences, the horizons are not yet distinct.

The B<sub>2</sub> horizon of the Dubbs soils is much higher in clay than the A or C horizons. The relative proportion of fine sand, very fine sand, and silt varies from one horizon to another within the profile. This is probably more a result of stratification of the parent material than of horizon differentiation. There has, however, been some downward movement of clay minerals from the A horizon, as evidenced by clay films on ped faces and in pores in the B<sub>2</sub> horizon.

The Dubbs soils lack distinct horizons, principally because the soils are young. Leaching has replaced some of the exchangeable bases with hydrogen, carbonates have been completely removed from the solum, and some translocation of clay minerals has taken place. These processes, however, are in their very early stages. Organic matter has accumulated in the upper horizons.

**Dundee soils.**—The Dundee soils are somewhat poorly drained to moderately well drained. They are the most poorly drained soils in the Dundee-Pearson-Dubbs-Bosket group. The Bosket soils are well drained to somewhat excessively drained, and the Pearson and Dubbs soils are moderately well drained to well drained.

TABLE 6.—Laboratory data for Dubbs silt loam

[Sample number D 44 Mi 004-1 to 6, located in the SE¼NE¼ sec. 13, T. 6 S., R. 12 W., Tunica County, Miss. Analysis by Soil Survey Laboratory, Soil Conservation Service, Beltsville, Md.]

Laboratory number	Horizon	Depth	Mechanical separates						Organic matter <sup>2</sup>	Exchangeable cations				Sum of cations	Base saturation	pH
			Very coarse sand and coarse sand <sup>1</sup>	Medium sand	Fine sand	Very fine sand	Silt	Clay		H	Ca	Mg	K			
		<i>Inches</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Me./100 gm.</i>	<i>Me./100 gm.</i>	<i>Me./100 gm.</i>	<i>Me./100 gm.</i>	<i>Me./100 gm.</i>	<i>Percent</i>	
D4373-----	A <sub>1p</sub>	0-5	0.4	0.6	3.2	25.2	55.5	15.1	1.0	4.2	8.0	1.8	.78	14.8	72	6.2
D4374-----	B <sub>21</sub>	5-11	.1	.1	.7	28.6	42.6	28.5	.7	10.7	8.2	3.2	.53	22.6	53	4.6
D4375-----	B <sub>22</sub>	11-14	.1	.1	1.0	36.0	38.4	24.4	.6	9.4	7.7	3.0	.40	20.5	54	4.7
D4376-----	B <sub>3</sub>	14-21	.1	.1	1.6	49.5	31.9	16.8	.2	9.1	6.1	2.9	.35	18.4	50	4.8
D4377-----	C <sub>1R</sub>	21-33	.2	.2	1.1	42.4	39.6	16.5	.2	4.9	7.3	2.9	.43	15.5	68	5.0
D4378-----	C <sub>2R</sub>	33-60	.2	.2	.1	45.4	40.4	12.9	.0	3.2	7.8	2.6	.35	14.0	77	5.4

<sup>1</sup> Very coarse sand and coarse sand are combined here because of the very small amounts of each.

<sup>2</sup> The content of organic matter was estimated by the hydrogen peroxide method (8).

The soils of the Dundee series have a thin  $A_p$  horizon, which probably consists of a former  $A_1$  horizon and  $A_2$  horizon that have been mixed by plowing. These soils formed under a hardwood forest.

The following profile of Dundee very fine sandy loam was observed in a cultivated area in the NW $\frac{1}{4}$ NW $\frac{1}{4}$  sec. 10, T. 19 N., R. 1 W.,  $\frac{3}{4}$  mile northeast of Quito.

- $A_p$  0 to 5 inches, dark yellowish-brown (10YR 4/4) very fine sandy loam; single grain; very friable when moist; many fine roots; slightly acid (soil limed in spring of 1956); abrupt, smooth boundary.
- $B_{21}$  5 to 14 inches, light yellowish-brown (10YR 6/4) silty clay loam; moderate medium subangular blocky structure; ped faces coated with dark brown (10YR 4/3); interiors of peds have network of pinholes lined with dark brown; firm when moist; many roots; very strongly acid; clear, smooth boundary.
- $B_{22}$  14 to 21 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; ped faces partly coated with dark brown; a few roots; a few pores; very strongly acid; clear, smooth boundary.
- $B_3$  21 to 30 inches, light yellowish-brown (10YR 6/4) silty clay loam; weak fine and medium subangular blocky structure that grades to massive in the lower part; common, fine, distinct mottles of strong brown (7.5YR 5/6); a few roots; many fine pores; very strongly acid; clear, smooth boundary.
- $C_{11k}$  30 to 44 inches, pale-brown (10YR 6/3) silt loam that contains pockets of light brownish-gray (10YR 6/2) sand; massive; very friable when moist; common, fine, faint mottles of dark yellowish brown (10YR 4/4) a few roots; many fine pores; strongly acid; gradual, smooth boundary.
- $C_{12k}$  44 to 60 inches+, pale-brown (10YR 6/3) very fine sandy loam; massive; very friable when moist; many, fine and medium, distinct mottles of strong brown (7.5YR 5/6); a few small, dark-brown and black concretions; many fine pores; strongly acid.

The solum is 26 to 32 inches deep. The texture of the A horizon ranges from very fine sandy loam to silty clay loam, and that of the B horizon from silty clay loam to silty clay. The structure in the  $B_2$  horizon is uniform.

In the Dundee soils, the horizons are differentiated by color, texture, structure, and consistence. The A horizon is darker colored than the B or C horizon. The B horizon has finer texture, more distinct structure, and firmer consistence than the A or C horizon. Clay films cover the faces of the peds and line the pores in the  $B_2$  horizon but not in the other horizons. Despite these differences, the horizons are not distinct.

The content of organic matter is greatest in the A horizon and decreases with depth. The silty clay loams contain more organic matter than the sandier soils of this series. The amount of organic matter in the A horizon has diminished as a result of cultivation.

Like the Dubbs soils, the Dundee soils are young and lack distinct horizons. However, there has been some movement of clay from the A horizon to the B horizon. As a result of leaching, some of the exchangeable bases have been replaced with hydrogen. Carbonates and salts have been leached from the solum.

In general, the solum of the Dundee soils resembles that of the Dubbs soils in color, texture, consistence, and structure. The  $B_2$  horizon of the Dundee soils is somewhat finer textured than that of the Dubbs soils, but less than one texture grade finer. The Dundee soils are less well drained than the Dubbs.

**Bosket soils.**—The Bosket soils are well drained to excessively drained. They are the best drained soils in the Dundee-Pearson-Dubbs-Bosket group. Originally

they had  $A_1$  and  $A_2$  horizons, but as a consequence of cultivation these layers have been mixed together and are now identified as an  $A_p$  horizon.

The following profile of Bosket very fine sandy loam was observed in a cultivated area in the NE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 24, T. 18 N., R. 2 W.,  $4\frac{1}{2}$  miles southwest of Itta Bena.

- $A_p$  0 to 6 inches, dark-brown (10YR 4/3, moist) to brown (10YR 5/3, dry) very fine sandy loam; single grain; very friable when moist; many fine roots; strongly acid; abrupt, smooth boundary.
- $B_2$  6 to 15 inches, very dark grayish-brown (10YR 3/2, moist) to light brownish-gray (10YR 6/2, dry) light silty clay loam; weak medium subangular blocky structure; friable when moist; very few roots; a few fine pores; medium acid; clear, smooth boundary.
- $B_3$  15 to 21 inches, very dark grayish-brown (10YR 3/2) light silty clay loam; massive with a few weak medium subangular blocky peds; friable when moist; few roots; many fine pores; medium acid; abrupt, smooth boundary.
- C 21 to 35 inches, dark yellowish-brown (10YR 4/4) very fine sandy loam; massive; very friable when moist; a few fine pores; strongly acid; abrupt, smooth boundary.
- $D_1$  35 to 40 inches, brown (10YR 5/3) silty clay loam; massive; firm when moist; layer contains some black globules that seem to be decaying plant material; few pores; very strongly acid; clear, smooth boundary.
- $D_2$  40 to 60 inches+, yellowish-brown (10YR 5/4) very fine sandy loam; massive; friable when moist; many fine pores; very strongly acid.

The solum is 15 to 21 inches deep. The texture of the A horizon is uniform. The texture of the  $B_2$  horizon ranges from silty clay loam to sandy clay loam. Some profiles lack the  $B_3$  horizon. The D horizon, though not uncommon, is missing in many places.

The horizons are differentiated by color, texture, structure, and consistence. The A horizon is darker colored than the B and C horizons. The color of the B horizon appears to be influenced by organic stains, which make it grayish brown. The B horizon has a finer texture and a more distinct structure than the A or C horizon and is less friable. Clay films cover the ped faces in the  $B_2$  horizon but not in the other horizons. The D horizon is typical of the thin clay layers found in many soils formed on stratified alluvial sediments. It is more clearly differentiated than the other horizons in the profile.

The content of organic matter is greatest in the A horizon and decreases with depth. The  $B_2$  horizon is much higher in clay than the A or C horizon.

Like the Dubbs and Dundee soils, the Bosket soils lack distinct horizons. However, there has been some downward movement of clay minerals, as evidenced by the clay films on the ped faces in the B horizon. Leaching has replaced some of the exchangeable bases with hydrogen, and carbonates have been removed from the solum. Some organic matter has accumulated in the upper horizons.

The Bosket soils differ from the Dundee and Dubbs soils in color, texture, structure, and thickness of the B horizon. The Dundee and Dubbs soils have no D horizon.

**Pearson soils.**—The Pearson soils formed from material washed from the Loess Belt of Mississippi; the other Gray-Brown Podzolic soils in the county formed from material washed from the upper reaches of the Mississippi River basin.

It seems highly probable that the soils of the Pearson

series originally had a thin A<sub>1</sub> horizon and a thin A<sub>2</sub> horizon. As a consequence of cultivation, these layers have been mixed together and are now identified as the A<sub>p</sub> horizon.

The following profile of Pearson silt loam was observed in a cultivated area in the NE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 8, T. 19 N., R. 2 E., 3 $\frac{1}{2}$  miles east of Greenwood.

- A<sub>p</sub> 0 to 5 inches, dark-brown (7.5YR 4/4) silt loam; moderate fine to medium granular structure; very friable when moist; many fine roots; very strongly acid; abrupt, smooth boundary.
- B<sub>21</sub> 5 to 12 inches, brown (7.5YR 5/4) silt loam; moderate medium subangular blocky structure; friable when moist; a few roots; many fine pores; very strongly acid; clear, smooth boundary.
- B<sub>22</sub> 12 to 20 inches, strong-brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; ped faces coated with darker brown; friable when moist; a few roots; many fine pores; very strongly acid; abrupt, smooth boundary.
- B<sub>3</sub> 20 to 31 inches, light-brown (7.5YR 6/4) silt loam; weak to moderate fine and medium subangular blocky structure; firm when moist; common, fine, faint mottles of strong brown (7.5YR 5/6); peds are coated with white (10YR 8/2); a few dark-brown concretions; many fine pores; very strongly acid; clear, smooth boundary.
- C<sub>11</sub> 31 to 42 inches, light yellowish-brown (10YR 6/4) silt loam; massive; friable when moist; few, fine, distinct, mottles of strong brown (7.5YR 5/8); many small, dark reddish-brown concretions; streaks of white (10YR 8/2) silt are common; a few pores; strongly acid; clear, smooth boundary.
- C<sub>12</sub> 42 to 48 inches, light yellowish-brown (10YR 6/4) silt loam; massive; friable when moist; few, fine, faint mottles of strong brown (7.5YR 5/8); many fine, dark reddish-brown concretions; streaks of white (10YR 8/2) silt; a few pores; very strongly acid; clear, smooth boundary.
- C<sub>13</sub> 48 to 60 inches +, yellowish-brown (10YR 5/4) silt loam; massive; common, medium, distinct mottles of dark brown (7.5YR 4/2); many pores; very strongly acid; below 60 inches, breaks gradually into sandy material.

Table 7 gives data obtained by laboratory analysis of samples taken from this profile.

The content of organic matter is low in all horizons. It is higher in the A horizon than in the B or C horizon but not much higher than in the B<sub>21</sub> horizon. The amount of organic matter in the A horizon has been decreased by cultivation.

All horizons are high in silt. In the B<sub>2</sub> horizon there is some increase of clay but also some increase of sand. The relative proportions of sand, silt, and clay vary from one horizon to another. This is more the result of stratification of the parent material than of horizon differentiation.

The horizons are differentiated by color, texture, and structure. The A horizon is somewhat darker colored than the B horizon or C horizon but not much darker colored than the B<sub>2</sub> horizon. The B horizon contains more clay and has a more distinct structure than the A horizon or C horizon; it contains very little more clay than the C horizon. Clay films are found on ped faces in the B<sub>2</sub> horizon, but they are not very distinct. Despite these differences, the horizons are not yet distinct.

The Pearson soils lack distinct horizons, mostly because of their youthfulness. Leaching has replaced some of the exchangeable bases with hydrogen, carbonates have been removed from the solum, and some translocation of clay minerals has taken place. However, these developments are in their very early stages. There is some evidence of gleying in the lower horizons.

The Pearson soils differ from the Dundee, Dubbs, and Bosket soils in color, texture, and consistence. They are somewhat darker colored, differing one unit in hue and one or two units in value and chroma. The Pearson soils contain more silt and less sand and clay than the others. The B horizon in the Pearson soils is friable, and that in the Dundee, Dubbs, and Bosket soils is firm.

#### Intrazonal soils

The intrazonal soils in Leflore County are the Alligator, Dowling, Falaya, Forestdale, Waverly, and Ina. All are somewhat poorly drained to poorly drained. They have genetically related horizons that reflect the influence of parent material and relief. Some of these soils are members of the hydromorphic suborder; the rest have many of the characteristics of hydromorphic soils.

#### LOW-HUMIC GLEY SOILS

The Low-Humic Gley group consists of imperfectly drained to poorly drained soils. They have very thin surface horizons, which are moderately high in organic matter, and mottled gray and brown gleylike mineral

TABLE 7.—Laboratory data for Pearson silt loam

[Sample taken in NE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 8, T. 19 N., R. 2 E., Leflore County. Analysis made at Mississippi Agricultural Experiment Station]

Horizon	Depth	Mechanical separates						Organic matter <sup>1</sup>	pH
		Sand				Silt	Clay		
		Coarse sand	Medium sand	Fine sand	Total				
	Inches	Percent	Percent	Percent	Percent	Percent	Percent		
A <sub>p</sub> -----	0-5	0.38	1.14	1.06	5	85	10	.95	5.4
B <sub>21</sub> -----	5-12	1.26	4.47	1.16	14	62	24	.86	4.5
B <sub>22</sub> -----	12-20	.84	4.70	1.59	14	60	26	.46	4.3
B <sub>3</sub> -----	20-31	1.35	4.91	1.68	16	66	18	.46	4.9
C <sub>11</sub> -----	31-42	.77	3.77	1.59	12	68	20	.18	5.3
C <sub>12</sub> -----	42-48	.12	.89	1.43	5	78	17	.18	5.4
C <sub>13</sub> -----	48-60	.14	.91	1.43	5	80	15	.15	5.3

<sup>1</sup> Content of organic matter estimated by the hydrogen peroxide method (8).

horizons with a low degree of textural differentiation (11). They are strongly acid to medium acid. In texture they range from sand to clay. The parent materials vary widely in physical and chemical properties. The native vegetation is a swamp forest.

All of the intrazonal soils in this county are Low-Humic Gleys. They are typical of the great soil group, except that the organic-matter content of the surface layer is moderate to moderately low. The Alligator and the Dowling soils have some of the characteristics of Grumusols; they shrink and crack readily. However, they lack thick, dark-colored, organic-mineral horizons, and there is little or no evidence of churning (?). Collectively, the Low-Humic Gley soils comprise about 68 percent of the area of the county.

**Alligator soils.**—The Alligator soils are poorly drained. They have formed on broad, flat areas of slack-water clay. They are associated with the Dowling and Forestdale soils. The Dowling soils are more poorly drained than the Alligator soils, but the Forestdale soils are better drained.

Three types of Alligator soils were mapped in Leflore County—clay, silty clay loam, and silt loam. The silt loam type is an overwash phase.

Profile No. 1 of Alligator clay was observed in a virgin area in the NW¼SW¼ sec. 30, T. 19 N., R. 2 W., 7 miles west of Itta Bena and 1 mile north of United States Highway No. 82.

- A 0 to 5 inches, gray (10YR 5/1) clay; moderate to strong medium coarse subangular blocky structure; hard when dry, firm when moist, and plastic when wet; many fine to medium roots; abrupt, smooth boundary.
- AC<sub>g</sub> 5 to 11 inches, gray (10YR 6/1) clay; weak to moderate coarse and medium subangular blocky structure; hard when dry, firm when moist, and plastic when wet; many, medium, distinct and prominent mottles of yellow and brown; a few fine pores and medium-sized roots; clear, smooth boundary.
- C<sub>11g</sub> 11 to 19 inches, gray (10YR 6/1) clay; massive; hard when dry, firm when moist, and plastic when wet; many, medium and fine, distinct and prominent mottles of yellow and brown; a few fine pores and a few roots; gradual, smooth boundary.

- C<sub>12g</sub> 19 to 52 inches, gray (10YR 6/1) clay; massive; very hard when dry, firm when moist, and very plastic when wet; many, medium, distinct and prominent mottles of yellow and brown; a few fine pores; clear, smooth boundary.
- C<sub>2g</sub> 52 inches +, grayish-brown (10YR 5/2) clay; massive; very hard when dry, firm when moist, and very plastic when wet; common, fine, distinct mottles of yellow and brown.

Profile No. 2 of Alligator clay was observed in a virgin area in Bolivar County, Miss., 2 miles northeast of Merigold and 3 miles east of United States Highway No. 61.

- A 0 to 5 inches, dark-gray (10YR 4/1) clay; moderate coarse subangular blocky structure; hard when dry, firm when moist, and plastic when wet; many fine pores and many fine and medium roots; clear, smooth boundary.
- AC<sub>g</sub> 5 to 11 inches, grayish-brown (2.5Y 5/2) clay; moderate coarse subangular blocky structure; hard when dry, firm when moist, and plastic when wet; many, distinct, medium and fine mottles of yellow and brown; many fine pores; many fine and medium roots; clear, smooth boundary.
- C<sub>11g</sub> 11 to 16 inches, grayish-brown (2.5Y 5/2) clay; moderate medium subangular blocky structure; hard when dry, firm when moist, and plastic when wet; a moderate number of fine pores and a few medium roots; gradual, smooth boundary.
- C<sub>12g</sub> 16 to 26 inches, grayish-brown (2.5Y 5/2) clay; massive; hard when dry, firm when moist, and plastic when wet; many, medium, prominent mottles of yellow and brown; a moderate number of pores and a few medium roots; gradual, smooth boundary.
- C<sub>13g</sub> 26 to 52 inches, olive-gray (5Y 4/2) clay; massive; hard when dry, firm when moist, and plastic when wet; common, fine and medium, distinct and prominent mottles of yellow and brown; a few fine roots and pores; clear, smooth boundary.
- C<sub>2g</sub> 52 inches +, olive-gray (5Y 4/2) clay; massive; hard when dry, firm when moist, and plastic when wet; common, medium, prominent mottles of yellow and brown; a few fine pores.

Table 8 gives data obtained by laboratory analysis of samples from the preceding two profiles of Alligator clay.

Profile No. 3 of Alligator clay, observed in a cultivated field in the NE¼ sec. 11, T. 20 N., R. 1 E., ¼ miles south

TABLE 8.—Laboratory data for Alligator clay

[Analysis made at Soil Laboratory, Mississippi Agricultural Experiment Station by L. E. DeMumbrum and R. R. Bruce]

Profile and location	Horizon	Depth	Bulk density	Mechanical separates			Total pore space	Readily extractable elements		Cation exchange capacity	pH
				Sand <sup>1</sup>	Silt	Clay		P	K		
		Inches		Percent	Percent	Percent		P.p.m.	Lb./acre	Me./100 gm.	
No. 1 (Sample taken in NW¼SW¼ sec. 30, T. 19 N., R. 2 W., 7 mi. W. of Itta Bena and 1 mi. N. of U. S. 82.)	A	0 to 5	1.96	1	20	79	26	3.25	536	41.8	5.5
	AC <sub>g</sub>	5 to 11	1.97	1	14	85	26	(?)	553	43.7	5.1
	C <sub>11g</sub>	11 to 19	1.99	1	12	87	25	(?)	514	47.1	4.4
	C <sub>12g</sub>	19 to 52	2.14	1	15	84	19	(?)	514	49.9	4.7
	C <sub>2g</sub>	52+	2.07	2	21	77	22			45.0	6.6
No. 2 (Sample taken in Bolivar County, Miss., 2 mi. NE. of Merigold and 3 mi. E. of U. S. 61.)	A	0 to 5	1.83	1	20	79	31	3.5	579	51.4	5.9
	AC <sub>g</sub>	5 to 11	1.95	1	16	83	30	(?)	481	49.6	5.1
	C <sub>11g</sub>	11 to 16	1.94	1	15	84	27	(?)	497	51.8	5.0
	C <sub>12g</sub>	16 to 26	1.92	1	13	87	28	(?)	465	48.9	5.0
	C <sub>13g</sub>	26 to 52	2.07	1	14	85	22	(?)	478		5.0
	C <sub>2g</sub>	52+	2.04	1	12	87	23	17.16	403	49.9	7.0

<sup>1</sup> The very coarse, coarse, fine, and very fine sands are combined here because of the very small amounts of each.

<sup>2</sup> Trace.

of Little Tippe Bayou and 1¼ miles southwest of Goose Pond.

- A<sub>p</sub> 0 to 4 inches, dark grayish-brown (10YR 4/2) clay; moderate fine to medium granular structure; many fine roots; strongly acid; abrupt, smooth boundary.
- AC<sub>k</sub> 4 to 10 inches, gray (5Y 5/1) clay; moderate fine and medium subangular blocky structure; hard when dry, firm when moist, and plastic when wet; many, medium, distinct and prominent mottles of yellow and brown; many fine pores; a few roots; a few cores of dark grayish-brown (10YR 4/2) clay extending down from the A<sub>p</sub> layer; strongly acid; gradual, smooth boundary.
- C<sub>11k</sub> 10 to 27 inches, gray (5Y 5/1) clay; weak fine and medium subangular blocky structure; hard when dry, firm when moist, and plastic when wet; many, medium, distinct and prominent mottles of yellow and brown; many fine pores; a very few roots; a few cores of dark grayish-brown (10YR 4/2) clay that extend from the A<sub>p</sub> horizon into, but not through, the C<sub>11k</sub> horizon; strongly acid; gradual, smooth boundary.
- C<sub>12k</sub> 27 to 47 inches, gray (10YR 5/1) clay; massive; hard when dry, firm when moist, and plastic when wet; many, medium, distinct and prominent mottles of yellow and brown; a few fine pores; strongly acid; clear, smooth boundary.
- C<sub>2k</sub> 47 inches +, dark-gray (10YR 4/1 or 5Y 4/1) clay; massive; hard when dry, firm when moist, and plastic when wet; common, fine, distinct mottles of yellow and brown; a few fine pores; neutral.

Alligator soils do not have distinct horizons, because the soils are young and the fine sediments are resistant to change. The horizons are differentiated principally by color, particularly by differences in hue and degree of mottling. All horizons except the A have been affected by gleying.

The organic-matter content is greater in the A horizon and decreases with depth. On the average, the A horizon in a virgin area is 3.96 percent organic matter, and the A horizon in a cultivated area is 2.55 percent organic matter.

Mineralogical data obtained by Dr. I. E. DeMumbrum and Dr. R. R. Bruce of the Mississippi Agricultural Experiment Station show that quartz is the dominant mineral and illite is the dominant clay mineral in the silt fraction of the Alligator clays. In the fine silt fraction (2 to 5 microns), there may be more illite than quartz. The fine silt fraction also includes significant amounts of feldspar and traces of vermiculite and kaolinite. The coarse clay fraction (0.2 to 2 microns) contains about equal amounts of montmorillonite; montmorillonite interstratified with vermiculite; illite; and kaolinite. It also contains significant amounts of quartz.

The fine clay fraction (less than 0.08 micron) is pure montmorillonite. The medium clay fraction (0.08 to 0.2 micron) is predominantly montmorillonite, but contains some illite, a little kaolinite, and traces of quartz.

Alligator clay is over 70 percent clay. Half of the clay is fine and medium, and the properties of montmorillonite clay predominate. Because of this the soils shrink and crack greatly when dry. Cracks form that are 1 to 4 inches wide at the surface and 3 to 5 feet deep. In cultivation, topsoil is dragged into the cracks. This is evident in the AC<sub>k</sub> horizon and the C<sub>11k</sub> horizon in the No. 3 profile. This process produces some of the same effects as the churning that takes place in Grumusols (?).

**Dowling soils.**—These are poorly drained soils that have developed in depressions in areas of slack-water clay. In some places local alluvium has been deposited over the clay. The Dowling soils are associated with the poorly

drained Alligator soils and the somewhat poorly drained to poorly drained Forestdale soils. Dundee, Dubbs, and Bosket soils also occur nearby.

The following profile of Dowling clay was observed in a cultivated area in the center of sec. 31, T. 19 N., R. 2 W., half a mile east of the Sunflower County line and half a mile north of United States Highway No. 82.

- A<sub>pk</sub> 0 to 4 inches, dark grayish-brown (2.5Y 4/2) clay; weak fine granular structure; firm when moist; many fine and a few medium-sized roots; medium acid; abrupt, smooth boundary.
- C<sub>11k</sub> 4 to 10 inches, grayish-brown (2.5Y 5/2) clay; massive; very firm when moist; common, fine, distinct mottles of dark brown (7.5YR 4/4); many fine and a few medium-sized roots; a few fine pores; strongly acid; clear, smooth boundary.
- C<sub>12k</sub> 10 to 22 inches, olive-gray (5Y 5/2) clay; massive; very firm when moist; many, medium, distinct mottles of dark brown (7.5YR 4/4); a few fine roots and some decaying plant material; strongly acid; clear, smooth boundary.
- C<sub>13k</sub> 22 to 40 inches, olive-gray (5Y 5/2) clay; massive; firm when moist; many, medium, distinct mottles of strong brown (7.5YR 5/6); a few fine pores; strongly acid; clear, smooth boundary.
- C<sub>14k</sub> 40 to 60 inches+, gray (N6) clay; massive; firm when moist; many, fine, prominent mottles of dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6); slightly acid.

The Dowling soils have very indistinct horizons. The horizons differ slightly in structure, but little or not at all in other characteristics. The A horizon is between 3.5 and 4 percent organic matter. The organic matter content decreases with depth. Gleying is evident throughout the profile, even in the A horizon.

Dowling clay is very much like Alligator clay in color, structure, texture, and consistence. It contains a little more organic matter than Alligator clay. It has a higher water table and poorer surface drainage, and consequently it has more evidence of gleying in the A horizon.

**Falaya soils.**—These are somewhat poorly drained soils that have formed on stratified silty sediments washed from the Loess Belt. Generally, the relief is nearly level and the water table is high. The Falaya soils are associated with the Ina soils, which are also somewhat poorly drained, and with the Collins soils, which are better drained.

The following profile of Falaya silt loam was observed in a cultivated area in the NW¼NE¼ sec. 11, T. 16 N., R. 2 W., 100 yards west of the Yazoo River.

- A<sub>p</sub> 0 to 5 inches, brown (10YR 5/3) silt loam; massive; very friable when moist; many fine roots; very strongly acid; abrupt, smooth boundary.
- C<sub>11k</sub> 5 to 24 inches, light brownish-gray (2.5Y 6/2) silt loam; massive; friable when moist; many, fine, distinct mottles of dark brown (10YR 4/3); a few fine roots; many pores; medium acid; clear, smooth boundary.
- C<sub>12k</sub> 24 to 48 inches, light brownish-gray (2.5Y 6/2) silt loam; massive; friable when moist; many, fine, distinct mottles of dark brown (10YR 4/3) and very dark grayish-brown (10YR 3/2); many pores; medium acid; clear, smooth boundary.
- C<sub>13k</sub> 48 to 60 inches+, light olive-gray (5Y 6/2) silt loam; massive; friable when moist; many, fine and medium, prominent mottles of dark brown (7.5YR 4/2) and strong brown (7.5YR 5/6); a few fine pores; very strongly acid.

Parent material and relief were the dominant influences in the development of this soil. The horizons are genetically related but weakly differentiated. The soil is so young that the clay minerals have not been removed from

the A horizon, and there is no B horizon. The A horizon is darker colored than the C horizon, but other characteristics are uniform throughout the profile. The A horizon is only moderately high in organic matter when uncultivated, and cultivation reduces the supply. The color of the A horizon is derived from the parent material, but the color of the C horizon results from the reduction of iron oxides. In many places the A horizon consists of brown silt deposited over older sediments and has not been in place long enough to become gleyed.

Because of the very low degree of horizon differentiation and the youthfulness of the sediments from which they formed, the Falaya soils are considered to be intergrades between the Low-Humic Gley soils and the Alluvial soils.

**Forestdale soils.**—The Forestdale soils are poorly drained to somewhat poorly drained. They occur on the lowest parts of the natural levees. They are considered transitional between the soils of the natural levees and the soils of the slack-water areas. Generally, but not always, they occur between the two groups. Four types—silty clay, silty clay loam, silt loam, and very fine sandy loam—were mapped in Leflore County. The silty clay loam and silt loam are the most extensive.

The following profile of Forestdale silty clay loam was observed in a cultivated area in the NE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 7, T. 19 N., R. 1 W., 1 mile north of the Mississippi Vocational College campus.

- A<sub>p</sub> 0 to 4 inches, brown (10YR 5/3) silty clay loam; weak fine granular structure; friable when moist; numerous roots; very strongly acid; abrupt, smooth boundary.
- B<sub>1</sub> 4 to 9 inches, pale-brown (10YR 6/3) silty clay loam; weak fine granular structure; friable when moist; many fine roots; a few fine pores; a few fine dark-colored concretions; very strongly acid; abrupt, smooth boundary.
- B<sub>21g</sub> 9 to 16 inches, light brownish-gray (10YR 6/2) silty clay; moderate medium subangular blocky structure; firm when moist; many, fine, distinct mottles of yellowish brown; a few fine pores; many dark-brown to nearly black concretions; extremely acid; gradual, smooth boundary.
- B<sub>22g</sub> 16 to 27 inches, light-gray (10YR 7/2) silty clay loam; moderate coarse subangular blocky structure; firm when moist; many, medium, distinct mottles of yellowish brown; few fine pores; many dark-brown to nearly black concretions; medium acid; clear, smooth boundary.
- C<sub>11g</sub> 27 to 46 inches, light-gray (10YR 7/2) silty clay loam; massive; friable when moist; many, medium, distinct mottles of yellowish brown; many small, dark-brown to nearly black concretions; medium acid; gradual, smooth boundary.
- C<sub>12g</sub> 46 to 60 inches +, light-gray (10YR 7/2) silty clay loam; massive; friable when moist; many, medium, distinct mottles of yellowish brown; many dark concretions; medium acid.

The horizons in the Forestdale profile are set apart by one or more of these properties: Color, texture, structure, and consistence. The A horizon is darker colored than the B horizon or the C horizon but not much darker colored than the upper part of the B horizon. The B<sub>2</sub> horizon has a finer texture, is less friable, and has a more distinct structure than the other horizons. Despite these differences, the horizons are not distinct. There is no evidence of translocation of silicate clay minerals downward from the A horizon. The finer texture of the B<sub>2</sub> horizon is a result of stratification of the alluvium rather than of horizon development.

The content of organic matter is moderately low. It is highest in the A horizon and decreases with depth. The

amount of organic matter in the A horizon has been decreased by cultivation.

The gray, mottled color patterns and the presence of concretions are evidence of gleying. Leaching has replaced some of the exchangeable bases with hydrogen. Some of the carbonates and salts have been removed from the profile.

The Forestdale soils lack distinct horizons, largely because of their youthfulness and the resistance of the fine-textured sediments to change. The fine texture, especially in the B<sub>2</sub> horizon, slows down the processes of horizon differentiation.

The Forestdale soils have browner, coarser textured, more friable upper horizons than the Alligator and Dowling soils, and coarser textured, more friable lower horizons. Also, they are less intensely gleyed. They have a weak textural B<sub>2</sub> horizon, which is lacking in the Alligator and Dowling soils.

**Waverly soils.**—The poorly drained Waverly soils occur in small depressions. They have formed from local alluvium washed from acid, silty soils.

These soils resemble the Dowling soils in drainage and color. They are associated with the somewhat poorly drained Ina and Falaya soils and with the moderately well drained Collins soils.

The following profile of Waverly silt loam was observed in a cultivated area in sec. 17, T. 19 N., R. 2 E., 4 miles east of Greenwood.

- A<sub>pg</sub> 0 to 6 inches, very pale brown (10YR 7/3) silt loam; massive; friable when moist; common, fine mottles of yellow and brown; small, dark-brown concretions are common; medium acid; abrupt, smooth boundary.
- C<sub>11g</sub> 6 to 24 inches, light-gray (2.5Y 7/2) silt loam; massive; friable when moist; many, fine and medium, distinct mottles of yellow and brown; many small, dark-brown to nearly black concretions; a few pores; strongly acid; gradual, smooth boundary.
- C<sub>12g</sub> 24 to 54 inches, light-gray (2.5Y 7/2) silt loam; massive; many medium and large mottles of yellow and brown; many dark-brown concretions; a few pores; strongly acid; clear, smooth boundary.
- D<sub>g</sub> 54 to 60 inches +, olive-gray (5Y 5/2) silty clay; massive; firm when moist; many medium mottles of yellow and brown; dark-brown and nearly black concretions are common; strongly acid.

The horizons are differentiated principally by color and mottling. Distinct horizons have not developed because the frequent floods deposit fresh sediments and the high water table slows down the process of horizon differentiation. The content of organic matter is highest in the A horizon and decreases with depth. Evidence of gleying is found throughout the profile, in the colors (2.5Y and 5Y), the mottling, and the concretions.

The Waverly soils differ from the Alligator, Dowling, and Forestdale soils in texture because the parent materials were of different textures. They are more friable and have less distinct structure than the other soils. They do not shrink and crack when dry.

**Ina soils.**—These soils have formed on stratified beds of silt and sand washed from the Loess Belt of Mississippi. Streams have cut through the loess and into the sandy Gulf Coastal Plain formations beneath. Consequently, the silty and sandy sediments are mixed and stratified.

The Ina soils are predominantly nearly level. They are somewhat poorly drained and have a high water table. They are associated with the moderately well drained Collins soils and the somewhat poorly drained Falaya soils.

These soils have no B horizon. They have some of the characteristics of Alluvial soils.

The following profile of Ina very fine sandy loam was observed in a cultivated area in the NW $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 6, T. 22 N., R. 1 E., 100 yards south of an old river run and  $\frac{1}{4}$  mile northwest of Whole Truth Church.

- A<sub>p</sub> 0 to 6 inches, pale-brown (10YR 6/3) very fine sandy loam; massive; very friable when moist; many fine roots; medium acid; abrupt, smooth boundary.
- C<sub>11g</sub> 6 to 16 inches, grayish-brown (2.5Y 5/2) very fine sandy loam; massive; very friable when moist; many, fine and medium, prominent mottles of dark grayish brown (10YR 4/2) and dark brown (7.5YR 4/2); many fine roots; many fine pores; medium acid; clear, smooth boundary.
- C<sub>12g</sub> 16 to 36 inches, grayish-brown (2.5Y 5/2) very fine sandy loam; massive; very friable when moist; many, fine and medium, prominent mottles of dark brown (7.5YR 4/4); few pores; slightly acid; abrupt, smooth boundary.
- C<sub>13g</sub> 36 to 48 inches, dark grayish-brown (2.5Y 4/2) silt loam; massive; friable when moist; common, fine, faint mottles of yellow and brown; a few pores; medium acid; clear, smooth boundary.
- C<sub>14g</sub> 48 to 60 inches +, light brownish-gray (2.5Y 6/2) very fine sandy loam; massive; very friable when moist; many, medium, prominent mottles of dark brown (7.5YR 4/4); a few pores; slightly acid.

The horizons are genetically related. They reflect the dominant influence of parent material and relief. The sediments have not been in place long enough to have weathered to any great extent.

Color and texture differentiate the horizons. The A horizon is browner than the C horizon. The C<sub>13g</sub> horizon is darker colored than the other C horizons and contains more silt than the A horizon or the other C horizons. The C<sub>14g</sub> horizon is lighter gray than the other C horizons. Structure and consistence are nearly uniform. Despite the differences in color and texture, the horizons are not distinct.

These soils are leached. Some of the bases have been replaced with hydrogen, and carbonates and salts have been removed. The supply of organic matter is moderate in the A horizon and decreases with depth. The supply has decreased under cultivation, but even in forested areas it was never large.

The color of the A horizon may be derived from the parent material. Some of the sediments that form the C horizon may have been washed from gray soils but the color of the C horizon results mostly from the reduction of iron oxides. The segregation of iron and the consequent formation of grayish-brown and dark-brown mottles is evidence of gleization of the sediments in place.

### Azonal soils

The Beulah, Collins, and Hymon soils are in the azonal order. The Beulah soils have many characteristics of zonal soils, and the Collins and Hymon soils have characteristics of intrazonal soils. The Collins and Hymon soils lack distinct, genetically related horizons because of their youthfulness; the Beulah soils lack distinct, genetically related horizons because their parent materials are resistant to change.

Regosols and Alluvial soils are the two great soil groups of azonal soils in Leflore County.

### REGOSOLS

Regosols consist of deep, unconsolidated rock (soft mineral deposits) in which few or no clearly expressed soil characteristics have developed. They consist mostly of

recent sand dunes and of loess and glacial drift on steep slopes (11).

The Beulah soils are the only Regosols mapped in this county. They comprise less than 0.1 percent of the total area of the county.

**Beulah soils.**—The somewhat excessively drained to excessively drained Beulah soils have formed on deep, unconsolidated, sandy alluvial sediments. They occur on the highest elevations of the old natural levees and are associated with the Dundee, Dubbs, and Bosket soils. Although the horizons are indistinct, these soils have some of the characteristics of Gray-Brown Podzolic soils.

The following profile of Beulah very fine sandy loam was observed in a nearly level cultivated area in the SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 18, T. 18 N., R. 1 W., 3 miles southwest of Quito.

- A<sub>p</sub> 0 to 6 inches, yellowish-brown (10YR 5/4) very fine sandy loam; massive; very friable when moist; many fine roots; strongly acid; abrupt, smooth boundary.
- B 6 to 22 inches, dark-brown (10YR 2/2) very fine sandy loam; pockets of very dark brown (10YR 3/3) sand; single grain; very friable when moist; many fine roots in the upper part; many pores; strongly acid; gradual, smooth boundary.
- C<sub>11</sub> 22 to 40 inches, yellowish-brown (10YR 5/4) very fine sandy loam; single grain; very friable when moist; many pores; a few fine roots; very strongly acid; gradual, smooth boundary.
- C<sub>12</sub> 40 to 60 inches +, light yellowish-brown (10YR 6/4) very fine sandy loam; single grain; very friable when moist; many pores; strongly acid.

The horizons differ principally in color. The B horizon is darker colored than the A or C horizon; the C horizon becomes lighter colored with depth. Structure, texture, and consistence are uniform.

There is little organic matter in any of the horizons, but there is a little more in the A than in the lower part of the profile. The amount has decreased under cultivation, but even in forested areas it was never more than moderately large.

The horizons are not distinct, apparently because the sandy parent material is resistant to change. The sediments have been in place and free from flooding longer than the parent material of better developed associated soils. The brown color of the subsoil is evidence of excessive drainage, good aeration, and oxidation of iron.

These soils are leached. Bases have been replaced with hydrogen, and carbonates and salts have been removed.

### ALLUVIAL SOILS

Alluvial soils consist of transported and recently deposited sediments that have been modified little or not at all by soil-forming processes. The Collins and Hymon soils are Alluvial soils. They comprise only about 0.8 percent of the area of the county.

**Collins soils.**—The Collins soils occur on recently deposited silty material washed from the Loess Belt of Mississippi. The sediments are young; some have been in place for less than fifty years. These soils reflect the influence of parent material and time over other factors of soil formation. There has been little modification of the original parent material by soil-forming processes.

Profile No. 1 of Collins silt loam was observed in a cultivated area in the NE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 8, T. 17 N., R. 1 E.,  $\frac{1}{2}$  mile east of United States Highway No. 49E and  $\frac{1}{4}$  mile north of Abiacha Creek Diversion Canal. (Laboratory No. 56579-56582.)

- A<sub>p</sub> 0 to 6 inches, yellowish-brown (10YR 5/4, moist) to very pale brown (10YR 7/3, dry) silt loam; weak fine granular structure; very friable; medium acid; abrupt, smooth boundary.
- C<sub>1</sub> 6 to 30 inches, yellowish-brown (10YR 5/4, moist) to pale-yellow (2.5Y 7/4, dry) silt loam; massive; very friable when moist; common, medium, distinct mottles of gray and brown; many fine roots; many decaying tree limbs and roots; slightly acid; clear, smooth boundary.
- C<sub>2</sub> 30 to 54 inches, yellowish-brown (10YR 5/4, moist) to pale-yellow (2.5Y 7/4, dry) silt loam; massive; friable when moist; few, medium, distinct mottles of yellowish-brown and brown; a few fine roots; much decaying plant material; neutral reaction; clear, wavy boundary.
- D<sub>g</sub> 54 inches+, brown (10YR 5/3, moist) and grayish-brown (10YR 5/2, moist) to white (2.5Y 8/2, dry) and pale-yellow (2.5Y 7/4, dry) silty clay loam; massive; firm when moist; many, medium, distinct mottles of brown; water table at depth of about 50 inches; slightly acid. (No observation of the horizon could be made in place. The sample from this horizon was collected with a post-hole auger.)

Profile No. 2 of Collins silt loam was observed in a cultivated area in sec. 7, T. 19 N., R. 2 E., ¼ mile northwest of Browning School and ¼ mile north of the Columbus and Greenville Railway. (Laboratory No. 56583-56585.)

- A<sub>p</sub> 0 to 6 inches, yellowish-brown (10YR 5/4, moist) to pale-yellow (2.5Y 7/4, dry) silt loam; weak fine granular structure; very friable when moist; very strongly acid; abrupt, smooth boundary.
- C<sub>11</sub> 6 to 18 inches, light yellowish-brown (10YR 6/4, moist) to light yellowish-brown (2.5Y 6/4, dry) silt loam; massive; very friable when moist; the lower part contains thin alternating layers of very pale brown and white silt or silt loam; strongly acid; clear, smooth boundary.
- C<sub>12</sub> 18 to 40 inches+, yellowish-brown (10YR 5/4, moist) to light yellowish-brown (2.5Y 6/4, dry) silt loam; massive; very friable when moist; mottled or spotted with gray and yellow; a few small, dark-brown concretions in the lower part; very strongly acid. (The water table was at a depth of about 50 inches and no observation could be made below that mark. Silty clay loam was encountered at a depth of about 65 inches with a soil auger.)

Data obtained by laboratory analysis of samples from these two profiles are given in table 9.

The Collins soils lack distinct horizons because the sediments in which they are developing are young. The horizons differ little in texture, color, consistence, and structure.

The A<sub>p</sub> horizon contains little organic matter but slightly more than the C horizon.

The color of all horizons seems to have derived from the parent material. The mottling in the lower horizons results from a high water table and is evidence of slight gleying. Some leaching may have taken place, but the parent material was washed from acid soils and may have been low in bases when deposited. Some of the parent material, however, was derived from lower strata and is high in bases. Consequently, some profiles are only slightly acid to medium acid.

**Hymon soils.**—The Hymon soils occur on recently deposited silty and sandy materials washed from the Loess Belt and from the Coastal Plain formation. These soils reflect the influence of parent material and time over other factors of soil formation. There has been little or no modification of the original parent material.

The following profile of Hymon very fine sandy loam was observed in the SE¼SE¼ sec. 5, T. 17 N., R. 1 W., 100 yards south of the Yazoo River.

- A<sub>p</sub> 0 to 6 inches, brown (10YR 5/3) very fine sandy loam; single grain; many fine roots; slightly acid; abrupt, smooth boundary.
- C<sub>11</sub> 6 to 23 inches, yellowish-brown (10YR 5/4) very fine sandy loam; massive; friable when moist; pockets of light brownish-gray (10YR 6/2) sand; few, fine, faint mottles of yellowish brown (10YR 5/6); few roots; few fine pores; slightly acid; clear, smooth boundary.
- C<sub>12</sub> 23 to 36 inches, pale-brown (10YR 6/3) and light-gray (10YR 7/2) very fine sandy loam; massive; friable when moist; few, medium, faint mottles of yellow and brown; many pores; slightly acid; abrupt, smooth boundary.
- C<sub>13</sub> 36 to 48 inches, grayish-brown (10YR 5/2) heavy silt loam; massive; friable when moist; few, fine, faint

TABLE 9.—Laboratory data for Collins silt loam<sup>1</sup>

[Analysis by Soil Survey Laboratory, Soil Conservation Service, Beltsville, Md.]

Profile, laboratory number, and location	Horizon	Depth	Mechanical separates			Exchangeable cations					Sum of cations	Base saturation	pH
			Fine and very fine sand <sup>2</sup>	Silt	Clay	Ca	Mg	H	Na	K			
No. 1 (56579-56582)----- (Sample taken in NE¼-SW¼ sec. 8, T. 17 N., R. 1 E., ½ mi. E. of U. S. 49E and ¾ mi. N. of Abiacha Creek Diversion Canal.)	A <sub>p</sub>	0 to 6	0.3	92.0	7.7	3.6	1.1	4.0	0.2	0.2	9.1	56	5.4
	C <sub>1</sub>	6 to 30	.8	92.2	7.0	3.4	2.3	2.0	.3	.1	8.1	75	6.7
	C <sub>2</sub>	30 to 54	.1	90.1	9.8	5.4	3.7	1.6	.4	.2	11.3	86	7.2
	D <sub>g</sub>	54+	.5	75.6	23.9	7.7	5.2	5.1	.5	.4	18.9	73	6.0
No. 2 (56583-56585)----- (Sample taken in sec. 7, T. 19 N., R. 2 E., ¼ m. NW. of Browning School and ¼ mi. N. of the Columbus and Greenville Railway.)	A <sub>p</sub>	0 to 6	.4	88.8	10.8	4.8	2.1	4.8	.2	.4	12.3	61	5.0
	C <sub>11</sub>	6 to 18	.2	84.8	15.0	4.6	2.6	4.8	.3	.2	12.5	62	5.4
	C <sub>12</sub>	18 to 40+	.2	85.0	14.8	4.0	2.9	5.0	.1	.2	12.2	59	5.1

<sup>1</sup> No effort has been made to separate silt loam and silt textures in the field; therefore, the silts and silt loams are referred to as silt loam.

<sup>2</sup> No very coarse, coarse, or medium sand occurs in these two profiles. Fine and very fine sand are combined because the amounts are very small.

mottles of yellowish brown (10YR 5/6); a few black concretions; many fine pores; medium acid.

The horizons are set apart by texture and faint mottling in the lower horizons. They differ somewhat in color, but the differences are not prominent. The differences in texture are caused by stratification of the parent materials, and the silty and sandy horizons may alternate positions within the profile. The mottling in the lower horizons is the result of a high water table and the reduction of iron when the soil is moist.

Hymon soils contain very little organic matter. There is a little more in the A<sub>p</sub> horizon than in the lower horizons. Leaching has progressed to some extent, but it is difficult to determine to what extent because the parent materials were washed from soils that were already depleted of carbonates and bases.

## Engineering Properties of Soils

To make the best use of the soil maps, engineers need to know the physical properties of the soil materials and the in-place condition of the soils. After testing soil materials and observing the behavior of soils when used in engineering structures and foundations, engineers can recommend designs for structures on specific soils.

This report contains information that can be used by engineers to—

1. Make studies that will aid in the selection and development of industrial, commercial, residential, and recreational sites.
2. Make preliminary estimates of runoff and erosion for use in designing drainage structures, planning dams, planning land leveling for irrigation, and planning other structures for water and soil conservation.
3. Make preliminary evaluations of soil and ground conditions that will aid in the selection of highway and airport locations and in planning detailed soil surveys for the intended locations.
4. Locate sand and gravel for use in structures.
5. Correlate performance of engineering structures with soil mapping units, and thus develop information that will be useful in designing and maintaining the structures.
6. Determine the suitability of soil units for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps, reports, and aerial photographs for the purpose of making soil maps and reports that can be readily used by engineers.

*The mapping and the descriptive reports are somewhat generalized and should be used only in planning more detailed field surveys to determine the in-place condition of the soil at the site of the proposed engineering construction.*

Some of the terms used by the soil scientist may be unfamiliar to the engineer, and some words—for example, soil, clay, silt, sand, and aggregate—have special meanings in soil science. Most of these terms are defined in the glossary at the back of this report.

Other parts of this report may also be of use to engineers, particularly the sections, Soil Descriptions and Formation of Soils.

## Engineering Classification Systems

Two systems for classifying soils are in general use among engineers.

Most highway engineers use the system approved by the American Association of State Highway Officials (1). In this system, classification is based on the identification of soils according to their texture and plasticity and on their performance in highways. All soil materials are classified in seven principal groups. The groups range from A-1 (gravelly soils of high bearing capacity, the best soils for subgrades) to A-7 (clay soils having low strength when wet, the poorest soils for subgrades). Within each group, the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest. The group index number is in parentheses after the soil group symbol. For example, the surface layer of Forestdale silty clay loam has a group classification of A-6 and a group index number of 8. Thus, the complete class symbol is written as A-6(8). The classification of the principal soils of Leflore County according to the A. A. S. H. O. system is shown in table 10.

Some engineers prefer to use the Unified system of soil classification established by the Waterways Experiment Station, Corps of Engineers (12). This system is based on identification of soils according to their texture and plasticity and their performance as engineering construction materials. Soil materials are identified as coarse grained (8 classes), fine grained (6 classes), or highly organic. The classification of the principal soils of the county according to the Unified system is given in table 10.

## Engineering Interpretations

Table 10 lists the map symbols and names of the principal soils in the county and gives brief descriptions of characteristics that affect the suitability of the soils as sites for highways or for soil and water conservation projects. The figures and information given in this table are estimates and are based partly upon data obtained by testing typical soil material from Leflore County and other counties in the Mississippi River flood plain.

Few soils in Leflore County are good or excellent sources of foundation material for subgrades, and none contain material suitable for subbase materials to be used immediately below the pavement.

The ratings for suitability of soils as sources of topsoil—for embankments, cut slopes, and ditches—are for Leflore County. Topsoil material should be fertile and should also be easy to smooth and grade and should not be impervious.

In places where the water table is high, seepage in the back slopes of cuts may result in slumping or sliding of the overlying material. A high water table may also reduce the bearing capacity of the foundation soil and cause deterioration of the pavement. Underdrains or interceptor ditches can be used to carry away subsurface water before it causes damage.

The Alligator and Dowling soils and some of the other soils in the county are frequently flooded, and some are under water for several months during the year. On these soils, highway grade lines should be several feet above the annual high-water level. On-site surveys

should be made to determine the necessary height of the grade line.

Generally, no difficulty is encountered with foundations for one-story frame, brick, and stone buildings on the Dundee, Dubbs, Bosket, and Beulah, and other sandy soils. Alligator and Dowling soils, and other similar soils are not good foundation material for the support of any buildings. These soils swell and shrink; consequently, brick or stone structures may crack unless special precautions are taken in constructing foundations. Foundations for buildings more than one story high need some special support. Samples from deep borings should be tested to determine what kind of foundation structure is needed to support larger buildings.

Because the materials for foundations and subbases and for surfaces of secondary roads must be transported, the cost of building and maintaining roads in Leflore County is high.

At many construction sites, major variations in the soil occur within the depth of the proposed excavations, and several soil units may occur within a short distance. The soil map, the detailed descriptions of the soils, and the engineering data and recommendations given in this section should be used in planning detailed surveys of soils at construction sites.

### Soil Data Related to Engineering

Samples from two of the principal soil series of Leflore County were tested by standard procedures to help evaluate the soils for engineering purposes. The results of these tests and the classification of each sample according to both the A. A. S. H. O. and the Unified systems are given in table 11.

## General Nature of the County

### Settlement and Development

The area that is now Leflore County was inhabited by the Choctaw Indians before white settlers arrived. The first settlers moved into the area about 1820. They got along peaceably with the Indians and lived by subsistence farming.

In 1830 the Choctaws, by the Treaty of Dancing Rabbit Creek, ceded to the Federal Government all of their land east of the Mississippi River. After this treaty, many of the settlers obtained title to the land on which they lived. Between 1830 and 1840, new settlers arrived from Tennessee and Kentucky, from other southern and seaboard states, and from other parts of Mississippi; a few came from the northern states.

Leflore County was formed in 1871 from parts of Sunflower County and Carroll County. It was named for Greenwood Lefluer (9), the Choctaw Indian chief with whom the Treaty of Dancing Rabbit Creek was negotiated.

*Population.*—From 1871 to 1930 the population increased steadily, but since 1930 it has decreased, especially between 1940 and 1950. In 1940, the population of Greenwood, the county seat, was 14,767, and in 1950 it was 18,061. In 1940, the towns of Itta Bena and Sidon had populations of 1,795 and 418, respectively; and in 1950, populations of 1,725 and 361, respectively.

*Transportation.*—Leflore County has good bus, railway, and truck transportation. Air transportation for passengers and mail to and from Greenwood is also good. The Columbus and Greenville Railway crosses the county from east to west and serves Greenwood and Itta Bena. It provides facilities for shipping to eastern markets and connects with water transportation facilities at Greenville, Mississippi. A branch line of the Illinois Central Railroad crosses the county from north to south. This line serves Sidon, Greenwood, and Money and connects with shipping and marketing facilities in Memphis, Tennessee, and New Orleans, Louisiana.

The county has good highways. United States Highway No. 82 crosses the county from east to west, and United States Highway No. 49E crosses the central part from north to south. Regular bus, truck, and mail service is maintained over both of these highways. State Highway No. 7 crosses the county from northeast to southwest by way of Greenwood, Itta Bena, Morgan City, and Swiftown. State Highway No. 442 crosses the west central part of the county, and State Highway No. 8 crosses the northwestern part of the county from Minter City westward. All-weather county roads serve the several communities and connect with the State and Federal highways.

*Industries.*—Leflore County has no industries that employ large numbers of people. Some local industries process and ship farm products. Three compress and storage companies in Greenwood and one in Itta Bena process, store, and ship raw cotton. Two oil mills in Greenwood and one in Minter City process cottonseed and soybeans. Several storage companies store soybeans and small grains. Two small sawmills in Greenwood process part of the timber produced in the county. Five companies manufacture chemical and allied products. One electrical equipment company, one company that manufactures tractor and truck trailers, and one that manufactures farm equipment are located in Greenwood. Nine companies process food and kindred products. Three companies deal in stone, two deal in clay and glass products, and four are engaged in printing and publishing.

*Community, farm, and home facilities.*—Dwellings in the rural areas range from large, fairly well built houses on the larger plantations to small, poorly constructed tenant houses. Generally, the smaller farms have medium-sized, fairly well constructed dwellings.

Electricity is available in all parts of the county. According to the 1954 census, 4,372 farms out of a total of 4,858 had electrical service. The towns, the large plantations, and some of the smaller farms have telephone service. All parts of the county have rural mail service.

Churches are located in towns, villages, and rural communities. In Greenwood there are churches of many faiths.

The public schools in the county were recently reorganized. When the reorganization and building program is completed, there will be 4 large high schools and 15 elementary schools. A vocational college is located at Itta Bena.

### Climate

The climate of Leflore County is humid, warm-temperate, and continental. Table 4 shows the monthly,

TABLE 10.—*Soil characteristics*

[Estimates are based partly on tests of typical soil material from

Symbols on map	Soils	Brief description of soils	Depth to seasonally high water table	Depth from surface (typical profile)	Engineering classification	
					Unified	A. A. S. H. O.
Aa, Ac.....	Alligator clay, level and nearly level phases (0 to 2 percent slopes).	Poorly drained plastic clay.	<i>Feet</i> 0-½	<i>Inches</i> 0-5 5-28 28-40	MH or CH... CH..... CH.....	A-7..... A-7..... A-7.....
Ab, Ad.....	Alligator clay, level and nearly level overflow phases (0 to 2 percent slopes).	Poorly drained plastic clay.	0	0-5 5-28 28-40	MH or CH... CH..... CH.....	A-7..... A-7..... A-7.....
Ae.....	Alligator clay, gently sloping phase (2 to 5 percent slopes).	Poorly drained plastic clay.	0-1	0-5 5-28 28-40	CH..... CH..... CH.....	A-7..... A-7..... A-7.....
Ag, Ah.....	Alligator silty clay loam, nearly level and gently sloping phases (½ to 5 percent slopes).	Poorly drained silty clay loam and clay.	1-2	0-4 4-24 24-60	CL or CH... CH..... CH.....	A-6 or A-7... A-7..... A-7.....
Ba.....	Beulah very fine sandy loam (½ to 5 percent slopes).	Well to somewhat excessively drained sandy loam and silty clay loam.	6+	0-7 7-24 24-48	SM or SC... SM or SC... SM.....	A-2 or A-4... A-2 or A-4... A-2.....
Bb, Bc.....	Bosket very fine sandy loam, nearly level and gently sloping phases (½ to 5 percent slopes).	Well to somewhat excessively drained sandy loam and silty clay loam.	4+	0-7 7-21 21-48	SM or SC... CL..... SM or SC...	A-2 or A-4... A-6..... A-2 or A-4...
Ca.....	Collins silt loam (½ to 5 percent slopes).	Moderately well drained silt loam.	½-2	0-7 7-20 20-60	ML or CL... ML or CL... ML or CL...	A-4 or A-6... A-4 or A-6... A-4 or A-6...
Da, Db.....	Dowling clay and Dowling soils, on depressed concave slopes.	Poorly drained plastic clay, silt loam, and silty clay loam.	0	0-6 6-22 22-48	MH or CH... CH..... CH.....	A-6 or A-7... A-7..... A-7.....
Df, Dg, Dh, Dc, Dd, De.	Dubbs very fine sandy loam and silt loam, nearly level, gently sloping, and sloping phases (½ to 8 percent slopes).	Moderately well to well drained sandy loam, silty clay loam, and silt loam.	4+	0-7 7-30 30-60	SM, ML, or CL. SC or CL... SM or SC...	A-4 or A-6... A-6..... A-2 or A-4...
Dk, Dm, Dn, Dr, Ds, Dt.	Dundee silt loam and very fine sandy loam, nearly level, gently sloping, and sloping phases (½ to 5 percent slopes).	Somewhat poorly to moderately well drained sandy loam, silt loam, and silty clay.	2-4	0-6 6-30 30-60	ML or CL... CL or CH... ML or CL...	A-4 or A-6... A-6 or A-7... A-4 or A-6...
Do, Dp.....	Dundee silty clay loam, nearly level and gently sloping phases (½ to 5 percent slopes).	Somewhat poorly to moderately well drained silty clay loam, silty clay, and silt loam.	2-4	0-6 6-30 30-60	ML or CL... MH, CL, or CH. ML or CL...	A-6..... A-7..... A-4 or A-6...
Fa.....	Falaya silt loam (½ to 5 percent slopes).	Somewhat poorly drained silt.	½-1	0-7 7-24 24-60	ML or CL... ML or CL... ML or CL... CL.....	A-4 or A-6... A-4 or A-6... A-4 or A-6... A-6.....
Fb, Fc.....	Falaya silty clay loam (½ to 5 percent slopes).	Somewhat poorly drained silt and silty clay loam.	½-1	0-6 6-24 24-60	CL..... CL or CH... CH.....	A-6..... A-6 or A-7... A-7.....
Fe, Ff, Fo.....	Forestdale silt loam and very fine sandy loam, nearly level and gently sloping phases (½ to 5 percent slopes).	Somewhat poorly drained to poorly drained sandy loam, silt loam, and clay.	½-2	0-5 5-30 30-60	ML or CL... CL or CH... CL or CH...	A-4 or A-6... A-7..... A-6.....
Fh, Fn.....	Forestdale silty clay loam, nearly level and gently sloping phases (½ to 5 percent slopes).	Somewhat poorly drained to poorly drained silty clay loam and clay.	½-2	0-5 5-30 30-60	CL..... CL or CH... CL or CH...	A-6..... A-7..... A-6.....

significant in engineering

Leflore County and other counties in the Mississippi River flood basin]

Permeability	Structure	Available moisture capacity	Reaction	Shrink-swell potential	Suitability as source of—	
					Topsoil	Foundation material
<i>Inches per hour</i>		<i>Inches per foot of depth</i>	<i>pH</i>			
Less than 0.05	Granular	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
Less than 0.05	Subangular blocky	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
Less than 0.05	Massive	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
Less than 0.05	Granular	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
Less than 0.05	Subangular blocky	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
Less than 0.05	Massive	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
Less than 0.05	Granular	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
Less than 0.05	Subangular blocky	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
Less than 0.05	Massive	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
0.2 to 0.8	Massive	2.0	5.1 to 6.0	Moderate to high	Poor	Fair to poor.
Less than 0.05	Subangular blocky	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
Less than 0.05	Massive	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
2.5 to 5.0	Massive	1.2	4.5 to 6.0	Low	Good	Fair to good.
2.5 to 5.0	Massive	1.2	4.5 to 6.0	Low	Good	Fair to good.
2.5 to 5.0	Massive	1.0	4.5 to 6.0	Low	Good	Fair to good.
2.5 to 5.0	Massive	1.2	5.1 to 6.5	Low	Good	Fair to good.
0.8 to 2.5	Subangular blocky	1.6	5.1 to 6.5	Moderate	Fair to good	Fair to poor.
2.5 to 5.0	Massive	1.4	5.1 to 6.5	Low	Good	Fair to good.
2.5 to 5.0	Massive	2.2	5.5 to 6.5	Low	Fair to good	Poor.
2.5 to 5.0	Massive	2.2	5.1 to 6.5	Low	Fair to good	Poor.
2.5 to 5.0	Massive	2.2	5.1 to 7.3	Low	Fair to good	Poor.
0.05 to 0.8	Granular to massive	1.8	5.1 to 6.5	Moderate to very high	Not suitable	Very poor.
Less than 0.05	Massive	3.0	5.1 to 6.5	Very high	Not suitable	Very poor.
Less than 0.05	Massive	3.0	5.1 to 6.5	Very high	Not suitable	Very poor.
0.8 to 2.5	Granular	1.8	4.5 to 6.0	Low	Fair to good	Fair to poor.
0.2 to 0.8	Subangular blocky	1.8	4.5 to 6.0	Moderate	Poor to fair	Poor.
0.8 to 2.5	Massive	1.5	4.5 to 6.0	Low	Fair to good	Fair to poor.
0.8 to 2.5	Granular to massive	1.8	4.5 to 6.0	Low	Fair to good	Fair to poor.
0.2 to 0.8	Subangular blocky	1.8	4.5 to 6.0	Moderate to high	Poor	Poor.
0.8 to 2.5	Massive	1.5	4.5 to 6.0	Low	Poor to fair	Fair to poor.
0.8 to 2.5	Granular	2.0	4.5 to 6.0	Moderate to high	Poor to fair	Fair to poor.
0.2 to 0.8	Subangular blocky	2.2	4.5 to 6.0	High	Poor	Poor.
0.8 to 2.5	Massive	2.0	4.5 to 6.0	Low	Poor to fair	Fair to poor.
0.8 to 2.5	Massive	2.0	5.1 to 6.0	Low	Poor to fair	Poor.
0.8 to 2.5	Massive	2.2	5.1 to 6.0	Low	Poor to fair	Poor.
0.8 to 2.5	Massive	2.2	5.1 to 6.0	Low	Poor to fair	Poor.
0.2 to 0.8	Granular	2.5	5.1 to 6.0	Low to moderate	Poor	Poor.
0.2 to 0.8	Massive	2.5	5.1 to 6.0	Low to moderate	Poor	Poor.
0.2 to 0.8	Massive	2.5	5.1 to 6.0	High	Poor	Poor.
0.8 to 2.5	Granular-massive	1.8	5.1 to 6.0	Low	Fair to good	Fair to good.
0.05 to 0.2	Subangular blocky	2.2	5.1 to 6.0	High	Not suitable	Poor.
0.8 to 2.5	Massive	2.2	5.1 to 6.0	Moderate to high	Poor	Fair to poor.
0.2 to 0.8	Granular	2.5	5.1 to 6.0	Moderate to high	Poor	Poor.
0.05 to 0.2	Subangular blocky	2.5	5.1 to 6.0	High	Not suitable	Poor.
0.2 to 0.8	Massive	2.5	5.1 to 6.0	Moderate to high	Poor	Poor.

TABLE 10.—*Soil characteristics*

Symbols on map	Soils	Brief description of soils	Depth to seasonally high water table	Depth from surface (typical profile)	Engineering classification	
					Unified	A. A. S. H. O.
Fk.....	Forestdale silty clay loam, nearly level moderately shallow phase.	Poorly drained silty clay loam and clay.	<i>Feet</i> ½-1.	<i>Inches</i> 0-4 4-27 27-60	CL..... CL or CH..... CH.....	A-6 or A-7... A-7... A-6... A-7... A-7... A-6... A-6...
Fg.....	Forestdale silty clay, nearly level phase (½ to 5 percent slopes).	Poorly drained silty clay and clay.	½-1	0-4 4-32 32-60	MH or CH..... CH..... CH.....	A-7... A-7... A-6...
Ha.....	Hymon very fine sandy loam (½ to 5 percent slopes).	Moderately well drained sandy loam and silt loam.	2-4	0-8 8-26 26-60	SM or SC..... ML or CL..... ML or CL.....	A-2 or A-4... A-4... A-4 or A-6...
lb, la.....	Ina very fine sandy loam and silt loam (½ to 5 percent slopes).	Somewhat poorly drained sandy loam and silt loam.	½	0-8 8-26 26-60	SM, ML, or CL..... SM, ML, or CL..... SM, ML, or CL.....	A-4 or A-6... A-4 or A-6... A-4 or A-6...
Pa.....	Pearson silt loam, nearly level phase (½ to 5 percent slopes).	Well drained silt loam.....	2-4	0-7 7-30 30-60	ML or CL..... ML or CL..... ML or CL.....	A-4 or A-6... A-6... A-4 or A-6...
Sa.....	Sandy alluvial land (½ to 5 percent slopes).	Excessively drained sand...	1-2	0-72	SP or SM.....	A-2 or A-3...
Wa.....	Waverly soils (depressed concave slopes).	Poorly drained silt loam and clay.	0-½	0-6 6-20 20-60	ML or CL..... CL or CH..... CH.....	A-4, A-6, or A-7. A-7... A-7...

TABLE 11.—*Engineering test data*<sup>1</sup>

Soil name and location of sample	Parent material	Bureau of Public Roads report number	Depth	Horizon	Mechanical analyses <sup>2</sup>	
					Percentage passing sieve—	
					No. 60 (0.25 mm.)	No. 200 (0.074 mm.)
Forestdale silty clay loam..... (Samples taken in the NE¼SW¼ sec. 7, T. 19 N., R. 1 W., 1 mile N. of Mississippi Vocational College.)	Old alluvium.....	92900	<i>Inches</i> 0 to 9.....	A <sub>p</sub> and B <sub>1</sub> .....	100	93
		92901	9 to 27.....	B <sub>21g</sub> and B <sub>22g</sub> .....	100	98
		92902	27 to 59.....	C <sub>11g</sub> and C <sub>12g</sub> .....	100	97
Dundee silty clay loam..... (Samples taken in SW¼ sec. 3, T. 20 N., R. 1 W., 1.25 miles NW. of Shellmound.)	Old alluvium.....	92903	0 to 5.....	A <sub>p</sub> .....	100	97
		92904	5 to 18.....	B <sub>21</sub> and B <sub>22</sub> .....	100	98
		92905	18 to 48.....	B <sub>3</sub> and C.....	100	97

<sup>1</sup> Tests performed by Bureau of Public Roads in accordance with standard procedures of the American Association of State Highway Officials (1).

significant in engineering—Continued

Permeability	Structure	Available moisture capacity	Reaction	Shrink-swell potential	Suitability as source of—	
					Topsoil	Foundation material
<i>Inches per hour</i>		<i>Inches per foot of depth</i>	<i>pH</i>			
0.05 to 0.2	Granular	2.5	5.1 to 6.0	Moderate to high	Not suitable	Poor.
0.05 to 0.2	Subangular blocky	3.0	5.1 to 6.0	High to very high	Not suitable	Poor.
Less than 0.05	Massive	3.0	5.1 to 6.0	High	Not suitable	Poor to very poor.
0.05 to 0.2	Granular	3.0	5.1 to 6.0	High	Not suitable	Poor to very poor.
0.05 to 0.2	Subangular blocky	3.0	5.1 to 6.0	Very high	Not suitable	Poor to very poor.
0.05 to 0.2	Massive	3.0	5.1 to 6.0	High	Not suitable	Poor to very poor.
0.8 to 2.5	Single grain	2.0	5.6 to 6.5	Low	Fair to good	Fair.
0.8 to 2.5	Massive	2.0	5.6 to 6.5	Low	Fair to good	Fair.
0.8 to 2.5	Massive	2.0	5.6 to 6.5	Low	Fair to good	Fair.
0.8 to 2.5	Massive	2.2	5.1 to 6.0	Low	Fair to good	Poor.
0.8 to 2.5	Massive	2.2	5.1 to 6.0	Low	Fair to good	Poor.
0.8 to 2.5	Massive	2.2	5.1 to 6.0	Low	Fair to good	Poor.
0.8 to 2.5	Granular to massive	2.0	4.5 to 5.5	Low	Poor	Poor.
0.8 to 2.5	Subangular blocky	2.2	4.5 to 5.5	Low	Poor	Poor.
0.8 to 2.5	Massive	2.0	4.5 to 5.5	Low	Poor	Poor.
More than 10	Single grain	<1.0	4.5 to 5.5	Low	Good	Fair to good.
0.2 to 0.8	Massive	1.8	4.5 to 5.5	Low to high	Poor	Fair to poor.
0.2 to 0.8	Massive	1.8	4.5 to 5.5	Moderate to high	Poor	Fair to poor.
Less than 0.05	Massive	3.0	4.5 to 5.5	High	Not suitable	Fair to poor.

for samples taken from two soil profiles

Mechanical analyses <sup>2</sup> —Continued					Liquid limit	Plasticity index	Moisture-density		Engineering classification	
Percentage smaller than—							Maximum dry density	Optimum moisture	A. A. S. H. O.	Unified
0.050 mm.	0.020 mm.	0.005 mm.	0.002 mm.	0.001 mm.						
77	50	29	24	21	31	11	<i>Lb./cu. ft.</i> 108	<i>Percent</i> 17	A-6 (8)	CL.
85	60	39	35	33	50	25	99	21	A-7-6 (16)	CL.
80	52	30	25	22	39	17	108	17	A-6 (11)	CL.
85	60	29	21	18	34	11	104	17	A-6 (8)	ML or CL.
83	57	37	32	31	48	24	103	19	A-7-6 (15)	CL.
80	48	24	20	19	35	13	108	17	A-6 (9)	ML or CL.

<sup>2</sup> Mechanical analyses of soils according to standard methods of the American Association of State Highway Officials, Designation: T 88-54. Results by this procedure frequently differ somewhat from results that would have been obtained by the procedures of the Soil Conservation Service. In the A. A. S. H. O. procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material in the soil sample, including that coarser than 2 mm. in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 mm. in diameter is excluded from calculations of grain-sized fractions. The mechanical analyses used in this table are not suitable for use in naming texture classes for soils.

seasonal, and annual temperature and precipitation recorded at the United States Weather Bureau at Greenwood.

The average length of the growing season at Greenwood is 219 days. The average date of the last frost in spring is March 25. The latest killing frost recorded was on April 26. The average date of the first frost in fall is October 30. The earliest frost recorded was on October 13.

The annual precipitation is fairly well distributed throughout the year. The summers are hot and long.

### Water Supply

Water for livestock is obtained from lakes, streams, and deep or shallow wells. The larger streams maintain a steady flow throughout the year. During droughts, smaller streams may go dry or separate into disconnected lakes or ponds. Small lakes may also go dry. Shallow wells or artesian wells supply water for industrial use, and deep wells supply water for domestic use in cities and towns and on many farms.

There are at least 200 artesian wells scattered throughout the county. Artesian water is obtained from the Winona and Meridian sand members and the Kosciusko sandstone member of the Lisbon formation and from Basic City shale (4). The depth of the wells depends on the depth to these layers. The depth to the Kosciusko sandstone member is 200 to 500 feet, and the depth to the Meridian sand member, 700 to 1,000 feet (2). The first artesian well in the Mississippi River flood plain was drilled in Winona sand at Greenwood in 1836.

The water in shallow wells is derived from recent deposits of river sediment. The upper layers of sediment consist of sand, silt, and clay, and the lower layers, from which the water is obtained, of sand and gravel. Shallow wells are a cheap source of water for some industrial uses and for irrigation. The water is harder than that obtained from deep wells.

In the past the water supply has been adequate, but recently the pressure in the artesian wells has declined because of the steady increase in the amount of water used. The increased demand is accounted for by the introduction of rice as a crop, the irrigation of other crops, and increased industrial use. A State Board of Water Commissioners has been established to regulate the use of surface water and to protect those who have developed and are using the natural bodies of water in the State.

### Forests and Wildlife

Timber is one of the principal resources of Leflore County. In poorly drained areas, the principal trees are cypress and tupelo-gum. Other areas are covered with willow oak, post oak, some species of white oak, pecan, ash, elm, blackgum, sweetgum, hackberry, and other hardwoods. Good woodland management is not generally practiced.

Most of the timber stands could be improved. Better cutting practices, marketing methods, and fire prevention methods are needed.

In 1954, there were about 81,942 acres of woodland, much of it cut over. The acreages lie in several large and many smaller areas throughout the county and are mostly poorly drained or flooded. In 1954, 1,414,000 board feet of saw logs and veneer logs and 372 cords of

pulpwood were cut. Much of the timber is shipped out of the county to be processed.

In 1955, a program for preventing fires and improving timber management was started by the county in cooperation with the State Forest Service. This program should help to increase the income from these valuable woodlands.

The lakes and rivers are well stocked with commercial and game fish. The commercial species are catfish and buffalo fish, and the principal game fish are bream, crappie, and black bass.

There are many squirrels, rabbits, and other small fur-bearing animals. Quail and mourning dove are plentiful, and in most years ducks are also plentiful. Deer and wild turkeys are found in some of the larger wooded areas. State laws provide protection for the fish and game.

The Leflore County Fishing and Hunting Association and several private clubs have cooperated with the State Game and Fish Commission to improve some of the recreational sites. Hunting and fishing regulations are imposed by the Commission.

### Flood Control

The history of civilization in the Mississippi River flood plain has centered around efforts to restrain and control floods that would ravage rather than enrich settled land. The fight still goes on. Floods are still potentially destructive, although flood-control measures are now being practiced (10).

In 1873 the Federal Government created the Mississippi River Commission, but no effective flood control program was organized until 1928, following the great flood of 1927. Since 1928 the Mississippi River levee system has been effective in keeping floodwaters off the land.

For nearly a century, the control of floods on the Yazoo River was left to local efforts. Between 1900 and 1950 there was a major flood in the Yazoo basin on an average of every two years (10). The first coordinated effort to control these floods was the creation of levee boards. These were organized by law as governmental subdivisions with full taxing authority, but not until recently were they successful in controlling floods. Local drainage districts with full taxing authority were organized to coordinate local efforts. Most drainage districts have now been liquidated. The few that are still in existence cooperate with the Soil Conservation Service and the Corps of Engineers, United States Army.

In 1931 a flood-control survey of the Yazoo River system was completed by the Corps of Engineers, United States Army (10). A tentative flood-control program was outlined in a report, but the program, the report concluded, was not economically justifiable. In 1932, after a major flood, a new survey was made, but this produced the same unfavorable recommendations. However, a report made in 1933 favored a flood-control program, and one was authorized by Congress in 1936.

Four reservoirs were built as part of the Yazoo project—one on the Tallahatchie River, one on the Coldwater River, one on the Yocona River, and one on the Yalobusha River. Also part of the project were channel improvement, cutoffs and auxiliary channels, and levees in limited areas where the danger of floods still exists. Much of the chan-

nel work has been completed. The four reservoirs impound the water from 2,832,000 acres. The flood-control pools have a capacity of 3,528,100 acre-feet of water.

This project has already alleviated the flood hazard on the main streams. When it is completed, about 110,000 acres of land in the county will be completely protected from ordinary flood hazards. Of this area, 45,000 acres is now cleared and cultivated and 65,000 acres is in forest.

The hill creeks—Big Sand, Palusha, and Abiacha—that flow through Leflore County produce floods that move down very rapidly from the Loess Belt. Destructive erosion and bank cutting at the headwaters of these creeks are progressing rapidly. Although the floods last only a short time, they can destroy a year's crop of cotton or deposit detrimental amounts of sand and silt over fertile soil. Many acres of farmland, some of which is in Leflore County, have been covered with sediment and will yield nothing for many years. Levees have been built and channels have been cleared through the efforts of the drainage districts, but floods still occur occasionally. Sediment fills up the stream channels or, if the levees break, settles on the fields. Big Sand Creek, which drains the central part of Carroll County, carries 1,100,000 cubic yards of sediment onto the flood plain each year (12).

An experimental program of watershed conservation has been set up on one tributary of Big Sand Creek. If this program results in effective control of floods, it is hoped that similar programs can be initiated on all tributaries. The United States Department of Agriculture and the Corps of Engineers, United States Army, are now making a joint study of the area to determine needs for flood control on these smaller streams.

## Agriculture

The Choctaw Indians who once inhabited this area were primarily hunters, not farmers, but they practiced a primitive type of agriculture. Corn was the main crop. A few melons, pumpkins, and beans were also grown.

The squatters who moved into the county about 1820 grew most of their own food. They also hunted and fished for food. The plantation system started about 1840. Corn, oats, cowpeas, sweetpotatoes, sugarcane for sirup, and hay were grown on the plantations for food and for feed for work animals. Cotton was grown for export to England and for shipment to markets in the North; some cotton was spun and woven for use on the plantations.

The high price of cotton after World War I caused a sharp increase in the acreage planted to cotton. From World War I to 1934, practically all the cropland in the county was planted to cotton, but after 1934 the cotton acreage was restricted. Although it has been replaced to a great extent by other crops and by pasture plants, cotton is still the principal cash crop.

## Crops

The acreages of the principal crops grown in Leflore County for stated years are given in table 12.

Cotton has always been the major cash crop in the county. Developing better varieties, planting only on soil suitable for cotton, and improving management methods have resulted in increased yields per acre in recent

years. In 1949, 85,887 bales of cotton were harvested, and in 1954, 72,688 bales.

Until the dry years of 1950 to 1956, corn led the grain crops in acreage. Fertilizing, irrigating, planting suitable hybrids, and generally improving management methods has resulted in increased yields. In 1954, however, yields were low because of the drought; 222,761 bushels of corn were harvested for grain, as compared to 584,737 bushels in 1949.

Oats do well on most soils of the county. In 1949, 181,578 bushels of oats were harvested, and in 1954, 790,229 bushels. Wheat and barley also do well, but they are not grown to any extent.

TABLE 12.—Acreages of principal crops for stated years

Crop	1929	1939	1949	1954
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Corn harvested for grain.....	36,797	60,057	30,587	15,672
Cotton.....	172,006	94,059	114,525	86,254
Oats threshed or combined..	20	11,682	5,989	20,696
Soybeans harvested for beans.....	3,247	1,385	29,175	55,558
All hay except sorghum.....	5,519	12,858	11,888	12,347
Rice threshed or combined..	(1)	(1)	(1)	5,666

<sup>1</sup> Not reported.

Soybeans are grown principally for oil. Yields depend on moisture and temperatures late in summer and in fall, when the beans start to fruit. In 1949, 490,664 bushels of soybeans were harvested, and in 1954, 418,001 bushels.

Other crops include nuts, alfalfa and lespedeza for hay, and a few fruits and vegetables.

## Livestock

After acreage allotments for cotton were established, some farmers began raising livestock on land formerly planted to cotton. Since 1930, the number of livestock has continuously increased.

The number of cattle and calves increased from 8,583 in 1930 to 20,491 in 1954. Most of these are beef cattle. The principal breeds are Aberdeen Angus and Hereford. There are also some Shorthorns and one herd of Santa Gertrudis. On some farms, dry-lot feeding has been successful. The feeder steers are either raised on the farm or purchased locally.

The number of sheep and lambs increased from 292 in 1930 to 3,807 in 1954. This probably does not include the large number of feeder lambs bought outside the county. The principal breeds are Southdown, Shropshire, and Hampshire. The number of swine fluctuates from year to year. It has averaged around 18,000 since 1930.

In 1954 there were only 7 dairy farms in the county. The products from these are sold locally. Poultry accounts for only a small amount of income in the county although there are several fairly large poultry farms.

Many of the work animals have been replaced by tractors. In 1930 there were 12,823 mules and horses in the county, but by 1954 this number had dropped to 1,785. Only a few farms depend wholly on mules for power, and many farms are completely mechanized.

## Size and Tenure of Farms

According to the 1954 census, there were 4,938 farms in Leflore County. The average farm was 69.7 acres in size. About 24 percent of the farms in the county were under 10 acres in size.

Tenants operated 88.5 percent of the farms, owners and part owners 10.7 percent, and managers 0.8 percent. Of the 4,372 tenants that reported, 3,780 were croppers.

Croppers operate under the supervision of the owner, manager, or operator, who furnishes all of the equipment, credit, or any other capital needed. Profits are divided on a 50-50 or 40-60 basis. Some tenants furnish their own equipment and rent the land for one-fourth of the cotton and one-third of the corn produced. Other tenants pay a cash rent.

## Glossary

**Alluvium.** Sand, mud, or other sediments deposited on land by streams.

**Clay.** Mineral particles less than 0.002 mm. in diameter. As a textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Claypan.** A compact, slowly permeable layer rich in clay and separated more or less abruptly from the layer above. Claypans are commonly hard when dry and plastic or stiff when wet.

**Colluvium.** Mixtures of soil material and rock fragments, moved by gravity and deposited near the base of strong slopes.

**Complex.** A soil association in which areas of different soil series, types, or phases are so intricately mixed that they cannot be shown separately on maps of the scale used and are, therefore, mapped as one unit.

**Consistence, soil.** The attributes of soil material that are expressed by the degree and kind of cohesion and adhesion or by the resistance to deformation or rupture. Terms commonly used to describe consistence are *brittle*, *compact*, *firm*, *friable*, *impervious*, *sticky*, *plastic*, and *cemented*. Several terms may be used to describe the consistence of a soil at different degrees of moisture content. For example, "very plastic, very firm, very hard" means very plastic when wet, very firm when moist, and hard when dry.

*Brittle.* When dry, will break with a sharp, clean fracture, or, if struck a sharp blow, will shatter into cleanly broken hard fragments.

*Compact.* Dense and firm but not cemented.

*Firm.* Crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

*Friable.* Crushes easily under gentle to moderate pressure between thumb and forefinger, and coheres when pressed together.

*Impervious.* Very resistant to penetration by water, air, and roots.

*Sticky.* Tends to adhere to other materials and objects when wet.

*Plastic.* Wire formable; moderate pressure required for deformation of the soil mass.

*Cemented.* Brittle and hard because of the presence of some cementing substance other than clay minerals, such as calcium carbonates, silica, or oxides or salts of iron and aluminum.

**Contour tillage.** Furrows plowed at right angles to the direction of slope, at the same level throughout, and ordinarily close together.

**Cropland.** Land regularly used for crops, except forest crops. It includes rotation pasture, cultivated summer fallow, or other land ordinarily used for crops but temporarily idle.

**Drainage, soil.** The rapidity and extent of the removal of water from the soil by flow over the surface (runoff) and by flow through the soil to underground spaces (internal drainage).

**Environment, soil.** The aggregate of all the factors that affect the formation of a soil.

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

**Fertility, soil.** The quality of a soil that enables it to provide, in adequate amounts and in proper balance, the compounds necessary for the growth of specified plants, when other growth factors such as light, temperature, moisture, and the physical condition of the soil are favorable.

**Forest.** Land that bears a stand of trees of any age or stature, including seedlings, of a species that attains a minimum of 6 feet average height at maturity.

**Formation, soil.** The action of pedogenic factors upon loose geologic materials; the process that gives soils their distinguishing characteristics and makes it possible to classify them scientifically.

**First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.

**Genesis, soil.** Mode of origin of a soil, referring particularly to the processes responsible for the development of the solum from the unconsolidated parent material.

**Gley.** The process that leads to the development, under the influence of excessive moisture, of a gley horizon in the solum.

**Great soil group.** Any one of several broad groups of soils with fundamental characteristics in common.

**Green-manure crop.** Any crop grown and plowed under to improve the soil, especially by the addition of organic matter.

**Horizon, soil.** A layer of soil approximately parallel to the surface and having more or less well-defined characteristics that have been produced through the operation of soil-forming processes. Several different kinds of horizons may develop in each profile. The ones commonly used are described below:

A<sub>1</sub> A surface mineral soil horizon that is relatively high in organic matter and usually darker colored than lower horizons. It may or may not be a horizon of eluviation.

A<sub>2</sub> A surface or subsurface horizon, usually lighter colored than the underlying horizon; has lost clay minerals, iron, or aluminum, or all three, with the resultant concentration of the more resistant minerals. It is a horizon of eluviation, that is, one from which materials have been leached in solution and suspension.

A<sub>p</sub> A plowed or otherwise mixed surface horizon that includes more than the original A<sub>1</sub> horizon.

B<sub>2</sub> A subhorizon of (1) maximum accumulation of silicate clay minerals or of iron and organic material, or (2) maximum development of blocky structure; it may have characteristics of both (1) and (2).

C A layer of unconsolidated material, relatively little affected by the influence of organisms and presumed to be similar in chemical, physical, and mineralogical composition to the material from which the solum has developed.

D Any stratum underlying the C horizon, or the B horizon if no C is present, which is unlike the C horizon or unlike the material from which the solum has been formed.

mn In this report, refers to a plowpan, or manmade pan.

g A gleyed horizon, as B<sub>2g</sub>.

**Irrigation.** In this report, refers to supplemental irrigation.

**Leaching.** The removal of materials in solution by the passage of water through soil.

**Loess Belt.** A mantle of wind-transported material (loess), 30 to 100 feet thick, overlying Gulf Coastal Plain formations, east of and parallel to the Mississippi River flood plain.

**Morphology, soil.** The physical constitution of a soil, including the texture, structure, porosity, consistence, color, and other physical, chemical, and biological properties of the various horizons that make up the soil profile.

**Mottles.** Irregular spots of different colors. Mottling is indicated by descriptive words in a definite sequence; for example, "common, fine, distinct, yellowish-brown mottles." The word "common" indicates number of mottles; the word "fine," the size of the mottles; and the word "distinct," the degree to which the mottles contrast with the base color of the soil.

**Normal soil.** A soil having a profile in near equilibrium with the two principal forces of the environment—native vegetation and climate.

**Nutrients, plant.** The elements taken in by the plant, essential to its growth, and used by it in the elaboration of its food and tissue. Plant nutrients obtained from the soil include nitrogen, phosphorus, calcium, potassium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps others; plant nutrients obtained largely from the air and water are carbon, hydrogen, and oxygen.

**Parent material.** The unconsolidated mass from which the soil profile develops.

**Permeability, soil.** That quality of the soil that enables it to transmit water or air.

**Plowsole.** A dense compacted layer underneath the plow layer. It restricts the movement of water and air and the depth of the root zone; It limits fertility and the supply of available moisture.

**Porosity, soil.** The degree to which the soil mass is permeated with pores or cavities.

**Pore space.** The fraction of the bulk volume or total space within soils that is not occupied by solid particles.

**Productivity, soil.** The ability of a soil to produce a specified plant or sequence of plants under a specified system of management.

**Relief.** The elevations or inequalities of the land surface, considered collectively.

**Sand.** Small fragments of rock or mineral, between 0.5 mm. and 2.0 mm. in diameter; coarse sand, 1.0 mm. to 0.5 mm.; sand, 0.5 mm. to 0.25 mm.; fine sand, 0.25 mm. to 0.1 mm.; very fine sand, 0.1 mm. to 0.05 mm. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

**Silt.** Small grains of mineral soil, 0.05 mm. to 0.002 mm. in diameter. As a textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Slack-water soil.** A soil formed on sediments that have settled from still stream water.

**Soil.** The natural medium for the growth of land plants on the surface of the earth; composed of organic and mineral materials.

**Solum.** The upper part of the soil profile, above the parent material, in which the processes of soil formation are taking place. In mature soils the solum includes the A and B horizons, and the character of the material may be, and usually is, unlike that of the parent material.

**Structure, soil.** The morphological aggregates in which the individual soil particles are arranged. The most common types of structure are the following:

*Subangular blocky.* Having mixed rounded and plane faces, with vertices mostly rounded.

*Granular.* Hard or soft but firm small aggregates, angular or rounded, as in the A horizon of many Chernozems.

*Crumb.* Generally soft, small, porous aggregates, irregular in shape, as in the A<sub>1</sub> horizons of many soils.

To indicate a lack of definite structure, the following terms are normally used:

*Single grain* (structureless). Each grain by itself, as in dune sand.

*Massive* (structureless). Large uniform masses of cohesive soil, sometimes with irregular cleavage, as in the C horizons of many heavy clay soils.

**Subsoil.** Roughly, that part of the solum below plow depth.

**Surface soil.** That part of the upper soil of arable soils commonly stirred by tillage implements, or an equivalent depth in nonarable soils.

**Texture, soil.** The relative proportion of the various size groups of individual soil grains. See clay, sand, and silt.

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## MAJOR CHARACTERISTICS

SOILS ON

Series	Dominant relief	Drainage	Surface	
			Color	Consistence
Beulah.....	Nearly level.....	Somewhat excessive to excessive.	Grayish brown and yellowish brown.	Friable and very friable..
Bosket.....	Gently sloping.....	Good to somewhat excessive.	Grayish brown to dark brown..	Very friable.....
Dubbs.....	Nearly level.....	Moderately good to good..	Brown or yellowish brown.....	Very friable and friable..
Dundee.....	Nearly level.....	Somewhat poor to moderately good.	Grayish brown to yellowish brown.	Firm to very friable.....
Forestdale.....	Nearly level.....	Somewhat poor to poor.....	Grayish brown, brown, or pale brown.	Firm to friable.....
Pearson.....	Nearly level.....	Moderately good.....	Dark brown to yellowish brown.	Friable to very friable....

SOILS ON

Alligator.....	Nearly level.....	Poor.....	Dark gray, dark grayish brown, or grayish brown.	Firm.....
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SOILS ON

Collins.....	Nearly level.....	Moderately good.....	Yellowish brown.....	Friable.....
Hymon.....	Nearly level.....	Moderately good.....	Brown to yellowish brown.....	Very friable.....
Ina.....	Nearly level.....	Somewhat poor.....	Grayish brown to yellowish brown.	Very friable.....
Falaya.....	Nearly level.....	Somewhat poor.....	Dark grayish brown to brown..	Friable.....

SOILS IN

Dowling.....	Nearly level (concave)..	Poor.....	Very dark grayish brown to gray.	Firm to friable.....
Waverly.....	Nearly level (concave)..	Poor.....	Gray.....	Friable.....

## OF THE SOIL SERIES

## LOW TERRACES

soil	Subsoil			pH
	Texture	Color	Consistence	
Very fine sandy loam and sandy loam.	Dark brown and yellowish brown.....	Very friable.....	Very fine sandy loam to fine sandy loam.	5.1 to 6.0.
Very fine sandy loam.....	Grayish brown to yellowish brown.....	Friable.....	Silty clay loam or sandy clay loam.	5.1 to 6.5.
Silt loam and very fine sandy loam.	Dark brown to yellowish brown.....	Firm to friable.....	Silty clay loam or sandy clay loam.	4.5 to 6.0.
Silty clay loam to very fine sandy loam.	Light yellowish brown.....	Firm.....	Silty clay or silty clay loam.	4.5 to 6.0.
Silty clay to very fine sandy loam.	Gray or grayish brown.....	Firm.....	Clay to silty clay loam.....	5.1 to 6.0.
Silt loam.....	Dark brown, strong brown, or yellowish brown.	Friable.....	Silt loam.....	4.5 to 5.5.

## SLACKWATER AREAS

Clay, silty clay loam, and silt loam.	Gray or light gray.....	Firm.....	Clay.....	5.1 to 6.0.
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## FIRST BOTTOMS

Silt loam.....	Light yellowish brown and yellowish brown.	Very friable.....	Silt loam.....	5.1 to 6.0.
Very fine sandy loam.....	Yellowish brown.....	Very friable.....	Silt loam and very fine sandy loam.	5.6 to 6.5.
Silt loam and very fine sandy loam.	Grayish brown to yellowish brown.....	Friable to very friable.	Silt loam, very fine sandy loam, and sandy loam.	5.1 to 6.0.
Silt loam and silty clay loam.	Light brownish gray to grayish brown..	Firm to friable.....	Silt loam to silty clay loam.	5.1 to 6.0.

## DEPRESSIONS

Clay, silty clay loam, and silt loam..	Very dark gray, very dark grayish brown, or light gray.	Very firm.....	Clay.....	5.1 to 6.0.
Silty clay loam to silt loam..	Light gray.....	Very firm.....	Clay or silty clay.....	5.1 to 6.0.



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program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

**Supplemental Nutrition Assistance Program**

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (<http://directives.sc.egov.usda.gov/33085.wba>).

**All Other Inquiries**

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