

U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF SOILS—MILTON WHITNEY, Chief.

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SOIL SURVEY OF CRAIGHEAD COUNTY,  
ARKANSAS.

BY

E. B. DEETER, IN CHARGE, AND L. VINCENT DAVIS.

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HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

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[Advance Sheets—Field Operations of the Bureau of Soils, 1916.]



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1917.

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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF SOILS,  
*Washington, D. C., January 20, 1917.*

SIR: I have the honor to transmit herewith the manuscript report and map covering the survey of the Craighead County area, Arkansas, and to request that they be published as advance sheets of the field operations of the Bureau of Soils, 1916, as authorized by law.

The selection of this area was made after conference with the State officials cooperating with the bureau in the work of surveying and classifying the soils of Arkansas.

Respectfully,

MILTON WHITNEY,  
*Chief of Bureau.*

Hon. D. F. HOUSTON,  
*Secretary of Agriculture.*

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### MAP.

Soil map, Craighead County sheet, Arkansas



# SOIL SURVEY OF CRAIGHEAD COUNTY, ARKANSAS.

By E. B. DEETER, In Charge, and L. VINCENT DAVIS.—Area Inspected by HUGH H. BENNETT.

## DESCRIPTION OF THE AREA.

Craighead County is situated in northeastern Arkansas. It is bounded on the north by Lawrence and Greene Counties, Ark., and Dunklin County, Mo.; on the east by Mississippi County, Ark.; on the south by Poinsett County; and on the west by Jackson and Lawrence Counties. It is almost a rectangle in outline, with a length of 42 miles east and west and a width varying from 12 to 20 miles north and south. The total area is 708 square miles, or 453,120 acres.

With the exception of Crowleys Ridge, the surface consists of flat to gently rolling stream bottoms and second bottoms or terraces, these lowlands constituting about four-fifths of the total area. Crowleys Ridge extends through the central part of the county in a general north and south direction. On the north county line it has a width of about  $12\frac{1}{2}$  miles, but near Gilkerson it begins to narrow sharply toward the east and it is only slightly over a mile in width on the south county line. The topography of this "hill" section of the county varies from gently rolling to very hilly. Within the limits of the ridge there are numerous deep gullies and steep slopes. The slopes to the lowland on both east and west are usually rather gentle.

The lowlands covering the remainder of the county east of Crowleys Ridge, varying from 15 to 21 miles in width, lie 50 to 75 feet lower than the ridge. Their highest elevation is in a strip 3 to 6 miles wide adjacent to the ridge. The margin of this terrace is very distinct at Bowman. The entire eastern lowland is characterized by numerous low, flattish ridges or swells and broad, flat terraces which have a general north and south trend. They vary in length from a few rods to several miles and in width from very narrow strips to areas  $1\frac{1}{2}$  miles across. These elevations alternate with sloughs or



FIG. 1.—Sketch map showing location of the Craighead County area, Arkansas.

lower lying narrow areas that are usually more poorly drained. The difference in elevation between the adjoining higher and lower land varies from about 1 foot to 10 feet. The largest of the elevations occur just west and south of Lake City, at Claunch, between Black Oak and Monette, and at Poplar Ridge.

The part of the county lying west and south of Crowleys Ridge is also flat. Here, too, the lower bottoms are separated from the higher lying second bottoms by lines of surface relief ranging from very distinct to faint or imperceptible. There are many low elevations, usually bordered by very gentle slopes. The western strip of lowland is about 4 miles wide in the vicinity of Bono, but along the south county boundary it has a width of approximately 19 miles.

Crowleys Ridge is drained by a network of watercourses, separated generally by narrow divides. The larger streams in this "hill" section have well-defined channels, but there are numerous subsidiary drainage ways that are only gullies or depressions, and carry water for only short periods after rains. Much of the water issuing from Crowleys Ridge spreads out over the lowland, eventually reaching shallow sloughs. In the northern part of the county many small streams converge toward the middle of the ridge and eventually form Big Creek, which flows in a general southwest direction. In the southern part of the county this stream is known as Bayou De View. Greasy Slough and Black Fork are two of its tributaries.

The drainage of the eastern lowlands is very poor. After periods of heavy rainfall water stands on the nearly level surface over much of the area, the rainfall being augmented by the run-off from the "hill" section. The sluggish and shallow sloughs are inadequate to dispose of the excess water during the greater part of the year and large areas are flooded, flats and depressions being inundated for weeks and months at a time. Practically all the drainage eventually reaches the St. Francis River, which traverses the eastern part of the county from north to south.

A wide belt along the St. Francis River constitutes the so-called "sunk-lands," which locally are believed to be the result of the earthquake of 1811. These low areas along the streams really represent nothing more than first-bottom land, some of the areas lying so low as to be almost permanently overflowed by the waters of the river. In places the river channel is very shallow and can scarcely be located. Within the boundaries of the "sunk-lands" there are a number of islands consisting merely of isolated remnants of the elsewhere extensive second bottoms. The larger of these include Big, Cane, Rush, and Hatchie Coon Islands.

In the eastern part of the county, near the St. Francis River, the sloughs are better defined and larger than in the region adjacent to

Crowleys Ridge. They vary from several rods to three-fourths mile in width. Many of them carry overflow water from the river. A large percentage really constitute swamps, supporting a dense growth of cypress and tupelo gum. The largest sloughs are Cacklebur, Honey Cypress, Purcell, and Big Bay.

Some of the second-bottom remnants, or so-called "ridges," between the sloughs near the St. Francis River were formerly subject to overflow. Since the construction of levees along the Mississippi River no inundations occur except when the levees break, as they last did in 1913. Drainage work is progressing quite rapidly and a large area of land is being reclaimed. Some of the ditches indicated on the map were merely in process of construction at the time of the survey.

The drainage system of the lowlands lying west and south of Crowleys Ridge is also inadequate, the surface water here likewise being carried away in shallow, slow-moving sloughs. Certain slight depressions are filled with water during the greater part of the year; some of these are locally termed "lakes." The principal stream here is the Cache River, which crosses the county from northeast to southwest through a very winding, tortuous channel. Numerous sloughs occur throughout the bottom land, which varies in width from  $1\frac{1}{2}$  to 4 miles, and it includes a number of elevations or "islands" which are surrounded by water only during overflows. The terrace or second bottom along the Cache River commonly gives way by an abrupt fall of 10 or 15 feet to the first bottom, but in a few places the transition is through a very gentle slope. Although several surveys for contemplated drainage work have been made, there are no ditches in the western part of the county.

Craighead County was organized February 19, 1859. The first settlers came into this region as early as 1830. Many of the pioneer settlers and traders traveled over the national highway which extended southwest from St. Louis. In 1860 the population of the county was 3,066. Settlers from Kentucky and Tennessee formed a considerable part of the population at that period. Recently many settlers have come in from northern States, particularly Illinois. The first settlements were made on Crowleys Ridge, which is now rather thickly populated. With the extension of lumbering, farms quickly occupied the cut-over lowlands, and settlement is now well scattered through the county.

The 1910 census gives the population of the county as 27,627. Jonesboro, the principal town and one of the county seats, has a population of 7,123. This city is an important railroad and trading center and has a number of commercial industries. Lake City, on the St. Francis River, with a population of about 500, is also a county seat. Nettleton has a population of over 1,000. Monette is a thriv-

ing town of about 600 inhabitants east of the St. Francis River. Bay, Brookland, and Lunsford are trading centers in the eastern lowlands, Bono and Cash are the principal towns west of Crowleys Ridge.

Transportation facilities are very good. The trunk lines of the St. Louis & San Francisco Railroad and the St. Louis Southwestern Railway pass through Jonesboro, which is a division point. Jonesboro is 420 miles southeast of Kansas City, 64 miles northwest of Memphis, and about 250 miles south of St. Louis. The St. Louis, Iron Mountain & Southern Railway passes through Brookland and Nettleton. The Jonesboro, Lake City & Eastern Railroad connects Jonesboro with points in Craighead and Mississippi Counties. The Bono & Southern, a branch of the St. Louis & San Francisco, extends from Bono to Algoa in Jackson County. Another short branch, the Manila & Southwestern, leaves the main line at Herman and extends to Lunsford. A third branch known as the Blytheville, Leachville & Arkansas Southern extends from Leachville, in Mississippi County, into the southeastern corner of Craighead County.

The public highways on Crowleys Ridge are in general good gravel roads. An effort is being made to improve the roads in the lowlands, and some of them have received considerable attention in recent years. Levees have been built and many sloughs have been bridged. At Lake City a substantial iron bridge, almost three-fourths mile in length, crosses the St. Francis River.

Rural mail-delivery service operates throughout the greater part of the county. Telephone lines radiate from Jonesboro to all the outlying towns. Educational facilities are fairly good, particularly in the towns. In addition to the graded and high schools, the First District Agricultural School is situated at Jonesboro.

Jonesboro, Lake City, and Monette are the principal local markets for the various farm products. Shipments are also made to Memphis and St. Louis, and some as far as New York City.

#### CLIMATE.

Although Craighead County is near the northern boundary of Arkansas, the climate is such as to permit the growing of the staple crops common to the State. Two crops of certain kinds can be grown, such as two plantings of Irish potatoes, corn and velvet beans, corn and peas, corn and soy beans, or corn and peanuts.

The average date of the last killing frost in the spring is March 30, and that of the first in the fall October 30. Late frosts, causing injury to early crops, are of rare occurrence. The latest killing frost in the spring on record occurred April 17, and the earliest in the fall on October 11. The average growing season is 214 days in length, and ample for a second planting in case of damage to the first

crop by wet weather. Good pasturage is available as early as March.

Temperatures of 116° F. in summer and -14° F. in winter have been recorded, but such extremes are of rare occurrence and short duration. Heavy snowfalls are uncommon, but there is usually some ice and sleet and one or more light snowfalls in the course of the winter. July and August are the hottest months, while February is the coldest.

The mean annual rainfall of 49.31 inches is in general favorably distributed throughout the year for growing crops. This distribution is particularly desirable for the sandy areas in the lowlands and on Crowleys Ridge. January is usually the wettest and October the driest month.

The following table is compiled from records of the Weather Bureau station at Jonesboro:

*Normal monthly, seasonal, and annual temperature and precipitation at Jonesboro.*

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December.....	41.0	79	10	4.56	6.03	7.30
January.....	40.4	82	- 1	6.16	1.80	7.24
February.....	38.7	82	-14	4.21	3.43	2.30
Winter.....	40.0	82	-14	14.93	11.26	16.84
March.....	52.1	93	1	5.02	4.72	6.36
April.....	62.0	96	27	3.96	3.20	4.24
May.....	71.1	100	33	4.33	1.66	4.74
Spring.....	61.7	100	1	13.31	9.58	15.34
June.....	77.9	106	41	4.17	1.27	3.80
July.....	80.8	116	51	3.23	2.95	2.61
August.....	79.6	109	52	3.76	3.20	5.16
Summer.....	79.4	116	41	11.16	7.42	11.57
September.....	74.2	102	37	3.76	2.00	12.27
October.....	63.0	98	28	2.66	1.06	2.52
November.....	51.1	84	13	3.49	1.98	6.72
Fall.....	62.8	102	13	9.91	5.04	1.512
Year.....	61.0	116	-14	49.31	33.30	65.26

#### AGRICULTURE.

The first settlements in Craighead County were made on Crowleys Ridge, where some of the land has been in cultivation for over

three-quarters of a century. In recent years the timber has been cleared from the more productive areas of the lowlands, while some of the old "hill" farms have been abandoned, principally because of excessive erosion. The crops first grown were chiefly wheat, corn, and oats. Cotton was a minor crop, generally grown to be traded for various family necessities. With the development of better market facilities, cotton and corn have become the chief crops.

Recently much interest has been taken in increased crop diversification. In the last year or two the acreage of wheat has increased somewhat, and corn occupies a larger area, but cotton continues to be the main money crop of the county. In 1910 there were 20,624 acres devoted to this crop, and 40,499 acres to corn. The average yield of cotton for the entire county was 0.55 bales per acre and of corn 20 bushels per acre. The corn produced is used mainly on the farm, but occasionally the yield is large enough to produce a surplus for sale locally. Part of the wheat crop is ground at small mills for home use; the remainder is sold to local buyers.

A large number of farms have a small acreage in oats. Some farmers thrash the crop, while others feed in the sheaf to stock. In the western part of the county rice is becoming an important market crop.

Hay and forage crops are extensively grown, mainly for local use. The principal hay grasses are timothy, red clover, alsike clover, bur clover, redtop, lespedeza, Bermuda grass, and prairie grasses. Cowpeas are frequently grown for hay. The acreage of alfalfa is small, but is being extended. Velvet beans, soy beans, and Sudan grass are recently introduced crops that can be grown successfully. The cutting of corn for silage is fairly common and is on the increase.

While small fruits and vegetables, including sweet potatoes and Irish potatoes, can be grown on many of the soils, only small gardens are maintained to supply home demands and a small surplus for sale in Jonesboro. In 1915 about 15 carloads of strawberries were shipped to outside markets. About 20 carloads of Spanish peanuts were also shipped, chiefly to St. Louis. Peanut growing is well developed in the vicinity of Pleasant Grove School.

Orchard fruit is not grown on a commercial scale, although peaches and apples of good color and flavor are grown on Crowleys Ridge. The principal varieties of apples grown are the Winesap, Ben Davis, and Jonathan. Cherries and plums do well. Grapes of excellent quality are grown, but there are no large vineyards.

Cattle raising has been developed only in a small way and on a few farms. Recently about 60 Shorthorn bulls were brought into the county, and the raising and feeding of beef cattle are on the increase. The principal market for dairy products is Jonesboro, the demand being supplied by a few dairies and by milk and butter

brought in by farmers. Cows are commonly kept on pasturage supplemented by dry feed. During the winter they are frequently put on a ration of corn silage and grain. The dairy cattle kept are generally grades, many of them unprofitable. A few small flocks of sheep are raised in the county.

Almost every farmer produces some pork. On some farms more than a hundred head of hogs are kept, but in many cases not enough meat is produced for the use of the family.

There is a good demand for poultry and eggs in Jonesboro. In addition, a poultry-marketing association ships a carload of poultry products each week to St. Louis, New York, and other cities. Little attention is given to poultry raising on a large scale.

Although cotton and corn are grown to some extent on poorly drained soils, such as the Calhoun silt loam, the relatively high second bottoms along the St. Francis and Cache Rivers are recognized as the best land in the county for these crops and command the highest cash rental.

Probably the best example of recognition of soil adaptation is the growing of rice, in the southwestern part of the county, on the Crowley silt loam. The impervious clay subsoil of this type is equivalent to a hardpan and aids in retaining water on the field during the growing season. The soil used for lowland pastures is usually the Calhoun silt loam. The areas of Waverly and Sharkey soils are used as a free range for cattle, the frequency of overflow and the present inadequate drainage making the growing of field crops almost impossible.

In some of the upland fields, including those on Crowleys Ridge, where the slopes are steep enough to cause washing during rains, contour cultivation is practiced. In a few fields, strips of sod several feet wide are left along the slopes at intervals of 15 to 20 yards. Deep plowing is not done very extensively, but the use of heavier plows and work stock is becoming more common.

The big-boll varieties of cotton, such as the Trice, Sproul, Cleveland, Rowden, Lone Star, and Express, are most commonly grown. The Mebane Triumph, adapted to both hill and bottom lands, has given good results and is increasing in favor. A large part of the cotton crop is sold as seed cotton. Practically all the cotton grown is planted on low ridges. The use of two-horse cultivators is becoming common for both cotton and corn. Crabgrass is a very troublesome weed in this section on account of the difficulty of keeping it under control in fields devoted to cultivated crops.

In the "bottoms" corn is usually grown on freshly cleared land for a year or two, owing to the fact that cotton generally makes a rank vegetative growth at the expense of fruit. Varieties of corn commonly grown on the lowlands are Reids Yellow Dent, Johnson

County White, Boone County White, Batts Prolific, Iowa Silver Mine, and Mosby. Valentines Yellow is a good variety for ensilage. The first four varieties have also given good results on the soils of Crowleys Ridge. Only a small percentage of the farmers plant cowpeas between the rows of corn at the last cultivation.

In growing peanuts the plants are pulled by hand and stacked about poles to a height of 5 or 6 feet. (Pl. I, fig. 2.) Two cross-pieces at the base of the pole prevent injury from moisture. After curing for about six weeks the peanuts are thrashed, placed in bags, and shipped to market. The hay is generally baled and is highly esteemed.

The principal varieties of rice grown are the Japan, Blue Rose, and Honduras. The land is cleared by sawing the trees close to the ground in order to allow the use of harvesting machinery. The fields are surveyed and 3-inch contour lines are run, along which small dikes are thrown up. Rice is seeded in the latter part of April or early in May. Water is pumped into the fields when the plants are 3 to 4 inches high, and the land is kept flooded until within a few weeks of harvesting. The crop is cut late in August or early in September and is shocked like wheat. Thrashing is done in the field. The average yield of rice is 40 to 50 bushels per acre. The quality is said to be very good. Rice growing has been developed in the vicinity of Cash, Dryden, Gilkerson, and Otwell. Water is generally pumped from a 10-inch well, varying from 100 to 125 feet in depth. Rice is seldom grown in the same field for more than 3 to 5 years, as the quality of the product is likely to be injured by the coming in of "volunteer" or "red" rice. The field is then sown to cowpeas or a similar crop. As developed in Craighead County, rice growing requires considerable capital, the principal factors being the initial cost of the land, the expense of a well and machinery, and of the special preparation of the land for irrigation.

Little attention is given in the county to the rotation of crops. Cotton and corn have generally been alternated yearly or at intervals of a few years. Where peanuts are grown, winter wheat is frequently sown while the peanuts are still stacked in the field.

Only a few farmers use barnyard manure. Commercial fertilizers are not used on the lowlands and only to a limited extent on the uplands, where a small aggregate area of cotton is fertilized with applications of 150 to 200 pounds per acre.

The average farmhouse is not very substantial, although there are some notable exceptions. There are a number of large barns, and many that have very little storage capacity and are of cheap construction. In many instances farm implements are unsheltered throughout the winter. There is an increasing tendency to use riding disks and shovel cultivators and heavier plows. Mules and horses of good quality are used as work stock.

In 1909 one-third of all the farms in the county made an expenditure for labor, the outlay averaging \$121 for each of the 1,035 farms reporting. Farm labor can be had at \$1 to \$1.25 a day, while in the lumbering industry day wages range from \$1.50 to \$5, depending upon the skill required. Farm hands hired by the month receive from \$18 to \$25 and board. Very little negro labor is employed.

The 1910 census reports 3,106 farms in the county, occupying 43.7 per cent of its area. The average size of farms was 61.8 acres,<sup>1</sup> of which 35 acres were improved. One holding comprises 12,000 acres, of which 2,000 acres are in cultivation. Of the total number of farms, 42 per cent are operated by owners and 58 per cent by tenants. A large number of the most desirable lowland farms are operated by tenants who pay a cash rental ranging from \$6 to \$10 an acre. The share system is also common, the owner receiving one-third of the corn and one-fourth of the cotton, while the tenant furnishes the farm equipment.

The 1910 census reports an average farm value of \$2,443, 62.3 per cent of which was in land, 14.9 per cent in buildings, 4 per cent in implements, and 18.8 per cent in domestic animals.

Land varies greatly in price from place to place. On Crowleys Ridge the price ranges from \$15 to \$40 an acre, depending upon the improvements, freedom from erosion, and nearness to towns. Unimproved "white land" of the lowlands sells for \$15 to \$25 an acre. Lands in the St. Francis Basin and the Cache River Valley command from \$25 to \$100 an acre.

#### SOILS.

The upland soils of Craighead County, or those of Crowleys Ridge, are derived from what is believed to be wind-blown or loessial material, while the lowland soils are derived from first-bottom and second-bottom alluvial material, that is, recent and relatively old alluvium, respectively.

The basal material underlying Crowleys Ridge consists of unconsolidated sands, clay, and intermixed gravel, representing marine sediments, or Coastal Plain material, which were probably laid down during the Tertiary period. These materials have influenced the present soils only on the slopes and ridges, where locally the overlying loessial material has been removed by erosion. The superficial loess deposit consists of a mixture of silt and clay containing very little sand and no gravel, except where added by local wash from the exposed basal beds. This loess contributes the bulk of the material in the upland or Crowleys Ridge soils.

Crowleys Ridge constitutes about one-fifth of the area of the county. The principal ridge soils have been classified with the

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<sup>1</sup>The census tabulated each tenancy as a "farm."

Memphis series. A much less extensive area occurring on lower slopes, where drainage and aeration have not been so good, is mapped as a soil of the Grenada series. The silt loams are largely in the predominance. The silty clay loam occurs on slopes where the superficial silty layer has been washed off.

The Memphis series includes types having brown, mellow surface soils and reddish-brown to buff moderately friable silty clay loam to silty clay subsoils. The subsoil usually extends to a depth of 3 feet or more without important change. The soils are derived from a deposit which is believed to consist of wind-blown material. The drainage is generally good. The surface varies from rolling to rough, near the Mississippi River and some of the other large streams, to undulating or nearly level over the broader divides, where the streams have not dissected the land so thoroughly and deeply. Both soil and subsoil give an acid reaction with litmus paper. In this series two types are mapped, the silt loam and silty clay loam.

The Grenada soils are derived from the same material as the Memphis soils and superficially resemble them. They differ from the Memphis in that gray and bluish-gray mottlings are conspicuous in the lower subsoil, which characteristically is a compact to hardpan-like, highly mottled stratum containing varying quantities of rusty-brown and black concretions or concretionary materials, or both. This layer apparently is somewhat impervious to moisture and air. The Grenada soils occupy level, depressed, and gently sloping areas. In this county but one type is mapped, the silt loam.

The soils of the lowlands vary considerably in color, texture, and drainage. The parent material consists of deposits laid down over the present and former flood plains of the streams by overflow water. That in the lower or first bottoms is being added to by each overflow; that of the higher areas or second bottoms was laid down when the overflows reached higher levels than they now do. This material has been brought down by flowing water from the various upland soils occurring in the drainage basins of the streams. The greater part consists of a mixture of silt and clay, but many areas are quite sandy. The first-bottom soils have been classified in the Collins, Sharkey, and Waverly series.

The surface soil of the types included in the Collins series are brown and silty, and the subsoils gray. The series is developed in the first bottoms of streams, is subject to overflow and is poorly drained. The material is of alluvial origin and consists of wash from the loessial soils of Arkansas and Louisiana. Only one type, the silt loam, is mapped in Craighead County.

The Sharkey series includes types with yellowish-brown to drab surface soils and mottled rusty-brown, bluish, drab, and yellowish,

plastic subsoils. In the slight depressions where water stands for a large part of the year organic-matter accumulations impart a nearly black color to the soil. The soils of this series so far encountered contain a high percentage of clay in both soil and subsoil. They occur in first bottoms subject to annual overflow and are poorly drained. On drying the soil cracks, forming small aggregates, and this condition gives rise to the local name "buckshot land." In Craighead County the Sharkey series is represented by one type, the clay.

The surface soils of the types included in the Waverly series are light gray in color and overlie gray or mottled yellowish and grayish subsoils. This series is typically developed in the more poorly drained portions of the first bottoms of streams passing through and issuing from the loessial region of the Central Prairie States. The soils are subject to overflow but are extensively farmed. One type, the clay, is mapped.

The soils of the second bottoms have been placed in the Calhoun, Olivier, Lintonia, and Crowley series.

The Calhoun series includes alluvial types with gray surface soils and a gray or drab tenacious, waxy clay subsoil. Iron concretions are common. These soils occupy poorly drained, flat stream terraces, on which water stands for long periods after rains. They are not subject to overflow. The Calhoun series is represented in this county by one type, the silt loam, of which a shallow phase also is shown.

The Olivier series includes types having grayish-brown soils and mottled yellowish and drab subsoils. Yellow is the most pronounced color, especially in the upper subsoil, but drab, bright yellow, and various shades of brown and yellow usually occur in the subsoil. These soils are derived from old alluvium, and are no longer subject to overflow, at least in their typical development. They occupy low terraces and natural levees. The surface is nearly flat to slightly undulating, but the surface drainage is fairly well established. Internal drainage is less complete. Two types of this series are mapped in the present survey—the fine sandy loam and silt loam.

The surface soils of the types included in the Lintonia series are light brown or yellowish brown, and the subsoils are slightly lighter in color and somewhat more compact in structure. The soils of this series occupy stream terraces and flat alluvial lands along streams, through which the channels are so deeply cut that overflows are of rare occurrence. The material is mainly alluvial and is derived largely from the Memphis, Richland, and Knox soils. Drainage is well established. In this series three types are mapped—the fine sandy loam, loamy sand, and silt loam.

The Crowley series includes types with ashy-gray to light-brown soils and mottled brown, yellow, and red to almost uniformly yel-

low clay subsoils. Lime concretions and iron concretions are present in the subsoil, which is quite impervious to water. The topography is flat. The silt loam is the only type of this series mapped in Craighead County.

In the eastern part of the county large areas are covered with mounds or "sand blows," made up of material varying from fine sand to medium loamy sand in texture and from grayish to yellowish brown in color. Usually the sandy material is loose to a depth of about 3 feet or more and becomes lighter in color with depth. In places mottled sandy clay is encountered within the 3-foot section. These mounds are of relatively low productiveness, and where very numerous they lessen the agricultural value of the land. They are shown on the map by "sand-spot" symbols.

In the following table the names and the actual and relative extent of the various soil types mapped are given :

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Calhoun silt loam.....	29,888	33.0	Collins silt loam.....	20,224	4.5
Shallow phase.....	119,808		Olivier fine sandy loam.....	19,200	4.2
Sharkey clay.....	64,000	14.1	Crowley silt loam.....	11,456	2.5
Lintonia fine sandy loam.....	41,792	9.2	Grenada silt loam.....	5,760	1.3
Memphis silt loam.....	41,088	9.1	Lintonia loamy sand.....	4,544	1.0
Olivier silt loam.....	40,384	8.9	Lintonia silt loam.....	2,240	.5
Waverly clay.....	32,000	7.1			
Memphis silty clay loam.....	20,736	4.6	Total.....	453,120	.....

MEMPHIS SILT LOAM.

The Memphis silt loam consists of a pale yellowish brown floury silt loam, underlain at about 6 to 8 inches by a yellow silt loam, which passes within 2 or 3 inches into a buff or reddish-yellow to dull-red compact silty clay. Frequently the subsoil becomes more yellow with depth and gray mottling is encountered in the lower part. On the gentle slopes the silt loam frequently passes into yellowish or reddish-yellow silty clay loam at about 10 to 15 inches and this into yellowish or reddish-yellow silty clay, which is usually not so compact as in areas in which the clay lies nearer the surface. On the steeper slopes the soil usually is shallower, and there are included patches, too small to map, of Memphis silty clay loam.

There are a number of small gravelly areas in the type. These are mostly encountered on slopes and are due to admixture of material from older deposits. There are also a few included patches of Ruston sandy loam, that is, a grayish-brown sandy loam overlying dull-red compact sandy clay. The gravel consists of rounded chert. The Ruston material is derived from exposures of the basal strata of Crowleys Ridge.

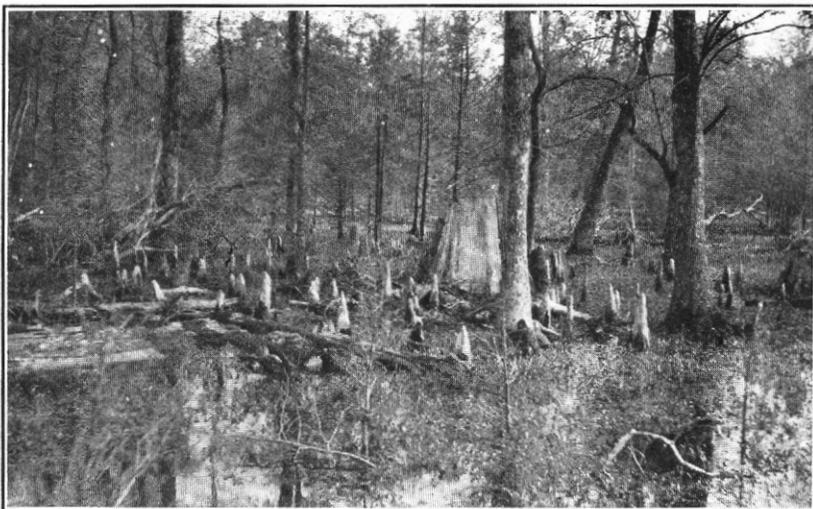


FIG. 1.—CHARACTERISTIC TIMBER GROWTH ON SHARKEY CLAY.



FIG. 2.—METHOD OF STACKING PEANUTS.

The soil is the Olivier silt loam.



The Memphis silt loam is the principal soil type of Crowleys Ridge. It commonly occurs on gentle slopes and in somewhat rolling positions where erosion has not advanced so far as elsewhere on the Ridge. There are many small streams, which quickly carry away the surface water. The underdrainage is good. Both soil and subsoil are acid to litmus.

The principal forest growth consists mainly of post oak and blackjack oak, with some scattered shortleaf pine, hickory, and dogwood. There is a considerable undergrowth of sparkleberry, persimmon, and sedge grass in old fields.

This type is an important farming soil, about 70 per cent of it being in cultivation. Corn and cotton are the principal crops, the larger area being in corn. At the present time the area devoted to wheat is being extended. There are many small apple and peach orchards which produce fruit of good quality, but no important commercial orchards. These fruits are said to be superior in flavor to those grown on the lowlands. Plums and cherries also do well, but are not grown in an important way. Garden vegetables, including radishes, onions, lettuce, spinach, cauliflower, cantaloupes, tomatoes, beans, peas, cucumbers, strawberries, and Irish and sweet potatoes do well. Spanish peanuts are grown successfully and in some instances are an important source of income. This industry is developed near Pleasant Grove School. Dairying and the production of small quantities of milk and butter by farmers having only a few cows is carried on sufficiently to supply local demands. Some farmers are beginning to raise beef cattle.

Cotton yields ordinarily about two-fifths to one-half bale; corn, 20 to 30 bushels; wheat, 8 to 12 bushels; and peanuts, 30 bushels per acre.

Little care is now taken to maintain the productiveness of the soil. Cotton and corn are grown without interplanted crops. Fields are left without a cover crop during the winter and allowed to become eroded. There is very little production of barnyard manure, and rotations seldom include a leguminous crop. Deep plowing is not practiced extensively, the one-horse plow being still commonly used. In general, modern farm implements are not used so extensively as in more highly developed agricultural sections of the county. A few farmers buy a medium grade of fertilizer, which is applied to cotton at the time of planting at the rate of about 200 pounds to the acre. In many instances this practice seems to be justified by the increased yields obtained.

Land of this type sells for \$15 to \$50 an acre, depending upon nearness to towns and the extent to which erosion has occurred.

For the improvement of this type the principal need is a greater diversification of crops. Rotations should be more generally intro-

duced, especially those which include legumes. Bur clover is a satisfactory legume for the section. It not only adds organic matter and nitrogen to the soil, but serves as a winter cover crop, preventing the washing of the surface soil. It also affords some pasturage. The following rotation is used by some farmers on this soil with good results: First year, cotton with bur clover sown between the rows about September 1; second year, corn, soy beans, or velvet beans, followed by bur clover; third year, cotton.

Winter oats are grown by some farmers. This is a good cover crop as it furnishes winter and early spring pasturage, and produces a very desirable feed for work stock when it is most needed. Varieties that succeed are Winter Turf, Appler, and Bancroft. Besides bur clover other legumes that can be grown here are lespedeza and red, crimson, and white clover. Bermuda and orchard grass should be sown on steep hillsides. A proper rotation, together with deep plowing and shallow cultivation, would maintain the soil in good condition, conserving the supply of moisture, preventing erosion, and increasing the yields of crops. Applications of lime in other sections have given good results on this soil. This is such a good grass and forage-crop soil that the raising of beef cattle and hogs could unquestionably be carried on profitably, as on the same land in other sections, notably in parts of Mississippi.

The mellow, floury silt loam also makes an excellent truck and fruit soil. With the large markets near at hand trucking and fruit growing should be more extensively developed.

#### MEMPHIS SILTY CLAY LOAM.

The Memphis silty clay loam consists of reddish-brown silty clay loam passing abruptly into reddish-brown or buff silty clay or yellowish-brown to light-brown silt loam, underlain at about 3 to 5 inches by buff to dull-red or reddish-brown compact silty clay, which is more compact in the lower part and often shows grayish mottlings at about 20 inches. There are many gullies and eroded areas in which reddish clay is exposed at the surface.

There are a number of small gravelly areas, some of which are shown with gravel symbol. These usually occur on slopes. Associated with some of these gravelly spots are areas of Ruston sandy loam, that is, a grayish-brown sandy loam overlying dull-red, compact sandy clay. The gravel consists almost entirely of rounded chert, ranging from the size of a pea to 5 or 6 inches in diameter. The boundary between this type and the associated Memphis silt loam is rather indefinite and patches of the latter are included.

The Memphis silty clay loam occupies about half as large an area as the silt loam. It occurs on the steeper slopes of Crowleys Ridge, usually between the smoother ridge crests and the stream bottoms, and has resulted through the washing away of the surface layer

of mellow silt loam and the exposure of the heavier underlying material. The largest areas occur south of Jonesboro, but smaller areas are found throughout Crowleys Ridge.

The soil is not very important agriculturally, because of its badly eroded condition. Some fields have been washed to such an extent that they have been abandoned. Probably not more than 20 per cent of the type is now in cultivation, the remainder being in forest and pasture land. Where the type is in cultivation it is usually part of a field the greater part of which is Memphis silt loam.

Yields are much lower than on the associated silt loam, cotton averaging not more than one-third bale and corn about 15 bushels to the acre.

Land of this type can be bought for \$10 to \$15 an acre.

In a number of instances contour cultivation and terracing are practiced, in order to prevent erosion. Protection from erosion is the most serious factor in connection with the tillage of this soil. The methods used for the control of erosion consist in some cases merely of contour cultivation, that is, running the furrows along the slope at about the same level; in others terracing, a more satisfactory method, is employed. The construction of brush dams to prevent the encroachment of gullies upon the tilled land is also practiced. Some of the steeper areas should remain in forest. The best means of utilizing the rougher parts of the type would be in the raising of live stock. Bermuda grass or lespedeza can be established on such areas, and these grasses provide good pasturage and some hay. Two-horse teams and fairly heavy plows are necessary for efficiently handling land of this type. The soil should be kept well supplied with organic matter by growing and occasionally turning under the legumes. Applications of lime or ground limestone probably would give good results, as both soil and subsoil are acid to litmus.

#### GRENADA SILT LOAM.

The surface soil of the Grenada silt loam is a grayish-brown to pale yellowish brown silt loam, mottled with gray, the mottling increasing with depth. The subsoil, beginning at depths between 15 and 24 inches, consists of a compact, plastic, drab or grayish silty clay, mottled with yellow or brown, or a mottled yellow and gray or drab silty clay loam, passing into silty clay. Iron concretions are common in the subsoil. The surface soil often has a grayish appearance when dry. In places it consists of colluvial material from the Memphis soils.

The Grenada silt loam occupies level to very gently sloping areas on Crowleys Ridge. It commonly occurs in low areas or strips along streams or along the edge of the lowlands, merging gradually into the Memphis soils lying farther back. Surface drainage is fair, but

underdrainage is poor. This type is inextensive, but owing to its almost level topography and consequent freedom from erosion it is a desirable farming soil, and at least 90 per cent of it is in cultivation.

The principal crops grown on the Grenada silt loam are cotton, corn, peanuts, and various forage crops. Because of the variation in conditions of drainage, there is also a fairly wide range in yields. Cotton yields two-fifths to three-fifths bale and corn 20 to 35 bushels per acre. Definite prices for land of this type can not well be given, as it usually is included in farms with other types. A fair average would probably be \$30 to \$50 an acre depending upon nearness to markets.

The prevailing need of this type is drainage. The soil is valuable enough to warrant the use of tile, although ditching would aid materially. A gradual increase in the depth of plowing is advisable. Legumes, such as peanuts, lespedeza, cowpeas, and the clovers should be grown to maintain the productiveness of the soil. The practice of growing peanuts, followed by wheat, is a good one.

Applications of lime undoubtedly would be helpful as the soil is acid to litmus.

#### COLLINS SILT LOAM.

The surface soil of the Collins silt loam consists of a brown mellow silt loam, passing at an average depth of about 10 inches into a mottled grayish and rusty-brown silt loam. This is underlain at about 20 inches by a gray or drab silt loam or silty clay loam, mottled with shades of brown and containing small brown and black concretions, which passes into an almost white to mottled white and yellowish or brownish compact clay, containing black and brownish concretions and concretionary material. Frequently this lower compact stratum has the characteristics of a hardpan. In places the lower subsoil is not heavier than a silt loam or silty clay loam, the brown silt loam extending to a depth of 15 to 18 inches. The type is well supplied with organic matter.

The Collins silt loam is a first-bottom soil, occurring in relatively broad strips along the streams of Crowleys Ridge, with its greatest development along Big Creek, where it attains a width of over a mile. The streams within the limits of the ridge are not very large, but the strips of alluvium along these streams are relatively wide. As the upland streams enter the lowlands the typical Collins silt loam disappears. In places the boundary between the Collins silt loam and its terrace equivalent, the Olivier silt loam, is necessarily rather arbitrary.

This type has been formed from material derived from the loess of the adjoining Memphis soils. Some of the outer edges of these first bottoms have received some colluvial material and are rarely

overflowed. In places there are strips of land bordering streams which have the appearance of a natural levee and are above overflow. The greater part of the type is overflowed, but only for a few hours at a time. The topography is prevailingly nearly level. In the larger stream bottoms there are a few scattered sloughs and old stream channels. Surface and underdrainage are poor to fair, except along some of the smaller streams, the bottoms of which are well drained.

The Collins silt loam is considered the best farming soil within the limits of Crowleys Ridge. About 65 per cent of it is in cultivation. The forest growth consists mainly of willow oak, maple, sweet gum, black gum, elm, hickory, and ironwood. Along some of the smaller streams there is a growth of cane and willow.

The principal crops are cotton, corn, and grasses for hay and pasturage. Timothy, redtop, Bermuda grass, alsike clover, red clover, and lespedeza are commonly grown. The acreage of cotton is considerably less than that of corn. Cotton yields ordinarily one-half to three-fifths bale and corn 30 to 40 bushels per acre. Land of this type sells for \$35 to \$60 an acre.

Yields on this type would be increased by installing tile drains. This would improve the physical condition of the soil by making it more porous and friable. The lowering of the water table would also give a greater feeding depth for the roots of plants. The removal of excess water would be hastened and in this way the planting season would be from one to two weeks earlier. The land should be plowed deeper, increasing the depth gradually, and be given a thorough disking before planting. Both soil and subsoil are acid to litmus, and applications of lime or ground limestone should prove beneficial.

#### SHARKEY CLAY.

The Sharkey clay consists of a mottled brown, rusty-brown, and dark-drab clay, passing into a mottled lighter drab and rusty-brown clay. In places the lower subsoil consists of blue clay with only slight mottlings of brown or rusty brown. In a few places, as in the area  $1\frac{1}{4}$  miles southwest of Monette, the surface soil to a depth of a few inches is almost black, owing to the accumulation of organic matter. This type is locally referred to as "gumbo."

The greater part of the type is covered with mounds (sand blows) of grayish or mottled sand or fine sand, which are shown on the map by sand-spot symbols. In a few of the higher and better drained situations along the outer margins of areas of Sharkey clay there are included areas of Sharkey fine sandy loam, consisting of a mottled brown, rusty-brown, and drab fine sandy loam which passes at a depth of 15 to 30 inches into a yellowish fine sandy loam mottled with drab and rusty brown, or into blue clay mottled with rusty brown.

The Sharkey clay has an extensive development in the eastern part of the lowlands lying east of Crowleys Ridge. Its principal occurrence is in the wide belt along the St. Francis River commonly known as the "sunk lands" and in the network of large sloughs in the eastern part of the county. Many of these sloughs, such as Purcell, Big, and Little, serve as outlets for excess water of the St. Francis River, the water returning to the river at some point farther down its channel. The sloughs range from a quarter of a mile to a mile wide. Long strips of Sharkey clay ranging from 200 yards to a quarter of a mile in width also occur along several of the smaller sloughs which serve as drainage ways for the "flats" west of the river. Along the eastern county line there is a large area which represents an extension of the bottom along Buffalo Creek, in Mississippi County.

The type is generally level where it occurs in sloughs, but in the area along the St. Francis River there are some marked differences in elevation. There are depressions, known locally as "openings" or "lakes," where the water is quite deep. There are also several small slightly elevated areas which are somewhat better drained than the greater part of the type. Between Lake City and the Greene County line there are a number of small islands ranging in size from 60 to 200 acres, and consisting mainly of Olivier fine sandy loam which could not be mapped because of high water in the St. Francis bottoms.

Small areas of the Sharkey clay have been reclaimed by means of large ditches. Some of the ditches shown on the map are not yet completed, but the work is being pushed rapidly. Most of the type was covered with a foot or more of water throughout the progress of the soil survey.

The greater part of the type supports a stand of cypress and tupelo gum. (Pl. I, fig. 1.) Along the St. Francis River there are open stretches covered with a dense growth of smartweed, vines, and water-loving plants. Some small areas along the Big Bay Drainage Ditch and in a few other localities are being cultivated. Average yields of 1 bale of cotton and 50 bushels of corn per acre have been obtained.

The ordinary selling prices of cut-over land of this type range from \$25 to \$50 and of uncleared land from \$60 to \$90 an acre.

After the completion of the present drainage work a large part of the Sharkey clay occupying the sloughs will be suitable for cultivation. The channel of the St. Francis River must be deepened and straightened before the land adjacent thereto can be farmed. When this type is reclaimed it will be the strongest and most productive soil in the county. Unlike most clay soils it can be safely plowed either when very wet or almost dry, as the clods crumble when dry. This tendency to crumble giving rise to the designation, "buckshot

land." In Mississippi County alfalfa is grown successfully on the Sharkey clay, and there is no reason why it should not succeed in this county when drainage is well established.

#### WAVERLY CLAY.

The Waverly clay consists of a gray or drab silty clay, mottled with rusty brown, underlain at 6 to 12 inches by a drab plastic clay, mottled with rusty brown or yellowish brown, or both. The lower subsoil is either a drab to bluish-drab plastic clay or a drab clay mottled with brown or yellowish brown. Along the banks of the Cache River and in a few small elevated areas the material consists of a light-gray fine sandy loam, slightly mottled with yellow, underlain at about 12 inches by a bluish-gray sandy clay which passes into a drab plastic clay at about 24 inches. In some places the surface few inches is a silty clay loam. Concretions and concretionary material sometimes occur throughout the soil section.

The Waverly clay is confined to the region west of Crowleys Ridge. Its main development is along the wide first bottom of the Cache River and a few of its tributaries, where it varies from  $1\frac{1}{2}$  to 4 miles in width. Another area occurs along the Bayou De View. Here the type grades very gradually into the shallow phase of the Calhoun silt loam on the west, and the boundary line between the two types is only approximate.

The topography of the Waverly clay is almost level, but within its boundaries along the Cache River there are included numerous higher lying islands of a different soil, the largest and most important of which have been correlated with soil series other than the Waverly.

In its present condition the Waverly clay is very poorly drained, a large part of it being overflowed during the winter, and in some years for short periods during the summer. Sloughs occur throughout its extent and there are areas of swamp, some of which are known locally as "lakes."

The area of this type now in cultivation is almost negligible, practically all the type being forested with elm, hickory, willow oak, red oak, white oak, overcup oak, spotted oak, ironwood, sweet gum, maple, cypress, and tupelo gum. The chief value of the type at present is for timber and pasture. Succulent grasses grow luxuriantly and afford excellent grazing for cattle. Land of this type can be bought for \$20 to \$40 an acre.

Before any considerable area of the Waverly clay can be utilized for farming a thorough system of drainage ditches will be necessary. The soil is productive and is capable of yielding 35 to 40 bushels of corn per acre. Lespedeza and white clover succeed on this type, though additions of lime or ground limestone are probably needed for the other clovers, as both the soil and subsoil are acid to litmus.

## CALHOUN SILT LOAM.

The Calhoun silt loam consists of light-gray to almost white floury silt loam, frequently mottled with yellow, underlain at about 12 to 15 inches by a compact, drab or yellowish-drab clay, mixed with a whitish, floury silt loam, the clay increasing with depth. In places the immediate surface soil is mottled brown, rusty brown, and grayish, the gray increasing with depth. Very often the subsoil to a depth of 12 to 24 inches is a gray silty clay loam, mottled with yellow and rusty brown. In other places the lower subsoil is a plastic, drab clay with only faint mottlings of yellow. Small black concretions are of common occurrence on the surface and through the soil section. Both soil and subsoil are acid to litmus.

In the eastern part of the county there are areas of the type upon which are small mounds ranging from 8 to 15 feet in diameter and from 6 inches to 2 feet in height, composed of a gray to brownish-gray fine sandy loam, usually underlain at a depth of 12 to 15 inches by a gray to rusty-brown silty clay loam, which passes at 24 to 30 inches into a gray to rusty-brown clay. Frequently the fine sandy loam passes at about 15 inches into a gray, sticky medium sand or mottled sandy clay. Included with this type are a few areas of Crowley silt loam too small to map.

The Calhoun silt loam is variously known as "white land," "slash land," and "flats." It occurs in large areas on the broad level terraces on both sides of Crowleys Ridge, and with its shallow phase, is the most extensive soil type in the county. The topography is almost level. There are some marked differences in elevation, but such differences commonly occur as a distinct fall from one terrace level to another. In the lowland east of Crowleys Ridge there are many relatively small elevations above the surrounding Calhoun soils which when large enough have generally been mapped as Olivier silt loam or Lintonia silt loam. West of the ridge the type has a very large area, particularly in the vicinity of Elm Grove School. Along the Cache River bottoms the typical Calhoun silt loam is separated from the edge of the terrace by narrow strips of Lintonia or Olivier soils, although northeast of Dryden it occupies the edge of the terrace.

Both surface drainage and underdrainage of this type are poor because of its low position, flat topography, and the impervious nature of the subsoil, and some areas are covered with water during wet periods. The surface water is carried away very slowly in shallow troughs which frequently do not have any perceptible channel.

In extent the Calhoun silt loam is an important soil, but only about 5 to 10 per cent of it is in cultivation, the remainder being forested mainly with willow oak, water oak, spotted oak, sweet gum, black gum, and maple. In places post oak, white oak, and hickory are abundant.

Some of the type is cultivated, the crops including cotton, corn, wheat, oats, sorghum, and rice. Sorghum and Winter Turf oats do well. Many fields are used for the production of hay and pasturage, the most common grasses being lespedeza, redbud, timothy, and alsike clover. Cowpeas are grown successfully. In the vicinity of Cash and Dryden rice is grown to a considerable extent. Rice is not grown east of Crowleys Ridge.

The yields obtained vary with the drainage conditions and the farm practices. Cotton yields ordinarily one-third to one-half bale, corn 15 to 30 bushels, wheat 8 to 15 bushels, and rice 40 to 50 bushels per acre. Corn and cotton are planted on slight ridges. Plowing, as a rule, is shallow, and subsequent cultivations are not thoroughly performed. The soil is inclined to run together and bake after rains. No commercial fertilizers and practically no barnyard manure is applied to the soil, nor are legumes grown to any great extent.

Unimproved land of this type can be bought for \$20 to \$30 an acre.

The suggestions given in a subsequent paragraph for the utilization and improvement of the Calhoun silt loam, shallow phase, are also applicable to the typical soil.

*Calhoun silt loam, shallow phase.*—The Calhoun silt loam, shallow phase, consists of a white to mottled grayish and brownish floury silt loam, underlain at 5 or 6 inches either by a grayish-yellow to yellowish-drab compact silty clay or by a mixture of white silt loam and a yellowish-drab silty clay, the latter occurring as lenses or nodules in the white silt loam. The lower subsoil usually consists of yellowish-drab clay, although in places the mixed silt loam and clay continue throughout the 3-foot section. In places the subsoil has a faint greenish cast. On the east side of Crowleys Ridge there are included a number of slight elevations too small to map, consisting usually of Olivier silt loam.

The shallow phase of the Calhoun silt loam is far more extensive than the typical silt loam, and occurs in large areas in both the east and west lowland countries. It is extensively developed west of Egypt, and between the Cache River and Crowleys Ridge. Beginning at the north county line there are several large areas, closely associated with better drained areas of the typical silt loam. South of the road due east from Cash and east of the Bono & Southern branch of the St. Louis & San Francisco Railroad there is a very large area of the shallow phase which extends east to the Bayou De View bottom. Another large area occurs in T. 13 N., R. 3 E. East of Crowleys Ridge this soil extends in a wide belt from Greene County on the north to Poinsett County on the south, with only a few small areas of other types included.

The surface of this phase is even more flat and level than that of the typical silt loam. The surface drainage is very poor, and large

areas are covered with several inches to a foot or more of water during wet seasons. The impervious subsoil, which really is a clay "hardpan," permits very little water to sink below the surface, most of it being removed either by surface run-off into sloughs or by evaporation. In the eastern development of the phase several drainage canals have been constructed.

Almost all of this phase is forested, mainly with willow oak, with some post oak, water oak, and spotted oak. Many cattle and hogs are allowed to range in the woods. Only a very small percentage of the phase is now in cultivation. This is used for the growing of cotton, corn, sorghum, hay, and rice. The yields commonly obtained are somewhat lower than on the typical silt loam.

The average price of land of the Calhoun silt loam, shallow phase, is about \$25 an acre.

The principal needs of this soil are underdrainage and the incorporation of organic matter. On one large plantation composed mainly of the phase and partly of the typical silt loam excellent yields are obtained through improved farm methods. With an acreage application of 4 tons of ground limestone, the incorporation of a large quantity of manure, and the thorough pulverization of the seed bed an excellent stand of alfalfa has been obtained, yielding 4 cuttings the first year. Where drought is likely to injure the alfalfa disking is practiced. The following cropping system is used successfully: Peas, soy beans, and sorghums are drilled and cut for hay; wheat is sown in the fall, and the following February lespedeza is sown broadcast in the wheat field. The field may remain in lespedeza for one or two years. Good yields of corn have been obtained by the application of barnyard manure. Sorghum of the Japanese seeded cane variety returned a yield of 132 gallons of sirup of excellent quality from three-eighths of an acre.

Under conditions similar to those in Craighead County the application of acid phosphate or the raw ground rock phosphate has been beneficial to crops on the Calhoun soils. Considering the good average yields and good quality of rice that can be grown, it would seem that this industry should be extended. The raising of live stock should prove profitable on this phase.

#### OLIVIER FINE SANDY LOAM.

The Olivier fine sandy loam consists of a brown fine sandy loam, passing into a yellowish-brown fine sandy loam, which grades at 12 to 18 inches into a compact, gray or drab clay, mottled brownish and containing some concretions. In the eastern part of the county there are included sand mounds, in which the surface soil consists of brownish sand and the subsoil of yellowish to grayish sand. In many places the surface brown fine sandy loam may be

slightly mottled with gray to yellowish gray. This grades into a mottled gray and rusty-brown silty clay loam, which passes into a compact clay of about the same color. There are also included small depressions in which the soil approximates the Olivier silt loam or Calhoun silt loam.

The Olivier fine sandy loam occupies low terraces in the eastern part of the county. The largest areas occur in the northeast corner of the county, west of Monette, and south of Hancock. There are smaller areas on the west side of the St. Francis River. Several islands in the "sunk lands," such as Hatchie Coon and Rush Islands, consist principally of Olivier fine sandy loam, although there are included small patches of Lintonia fine sandy loam and Olivier silt loam.

The surface is generally level. Drainage is frequently poor, portions of the type being covered with water during wet seasons. The type is not very extensive, and much of it is in forest and not easily accessible. The prevailing species of trees are hackberry, sweet gum, sycamore, swamp maple, elm, oak, and ironwood.

A large part of the Olivier fine sandy loam is owned by lumber companies. After the timber has been removed the land can be bought for \$20 to \$35 an acre.

Much of this soil must be drained before it can be placed in cultivation, but when this is done it is capable of producing good yields of cotton, corn, and forage crops.

#### OLIVIER SILT LOAM.

The surface soil of the Olivier silt loam consists of a brown, mellow silt loam passing at about 8 inches into a yellowish-brown or yellow silt loam. This is underlain by a mottled yellow and gray or rusty-brown and gray silty clay loam, which changes at a depth of 15 to 20 inches into a compact silty clay, mottled with gray, brown, and yellow. The lower subsoil, in places consists of a pale-yellowish or yellowish-drab, plastic clay, with bluish mottlings. Black and brownish iron concretions are usually abundant in the subsoil. The type is intermediate between the Calhoun silt loam and the Lintonia silt loam, and several small areas of these two types are included.

While this type is not so extensive as the Calhoun silt loam, it is found on all the terraces in the county. A characteristic position is on the edges of terraces. It occurs in long strips, either adjacent to the Memphis soils or separated from them by an area of Grenada silt loam. This is well illustrated in the vicinity of Bono, east from Ridge and northeast from Nettleton to Brookland. There are many areas which occur as slight elevations above the surrounding Calhoun silt loam. Where the type occurs in fairly close proximity to the St. Francis River it is marked by numerous sand mounds. Such areas occur near Bay, south of Bowman, and at Shaw. North of

Jonesboro, where the land has been rendered practically free from overflow by the diversion of Lost Creek into a deep drainage ditch, an area of Olivier silt loam has been mapped with rather arbitrary boundaries between it and the Collins silt loam.

The topography is almost level and the surface drainage is fair, but underdrainage is generally poor, because of the impervious nature of the lower subsoil.

The Olivier silt loam is an extensive and important soil type. About 75 or 80 per cent of it is now in cultivation. The forest growth consists of swamp maple, sweet gum, sycamore, elm, ironwood, hickory, and oak.

The principal crops are cotton and corn, with wheat, oats, and peanuts next in importance. (See Pl. I, fig. 2.) Southeast of Prairie Grove School some rice is grown on this type, and it is said to be superior to that grown on the Calhoun silt loam. The soil is productive, but there is considerable range in yields, due mainly to differences in drainage conditions. Cotton yields one-half to 1 bale, corn 30 to 50 bushels, wheat 10 to 18 bushels, and rice about 50 bushels per acre.

Where land of this type is accessible to markets and well improved the price ranges from \$75 to \$100 an acre. In more remote situations it sells for \$35 to \$50 an acre.

One of the principal needs of this type is better drainage, which can be effected by the installation of tiles. Systematic crop rotation, including legumes, and a gradual increase in the depth of plowing would be beneficial. The soil is acid, indicating a need of lime.

#### LINTONIA LOAMY SAND.

The Lintonia loamy sand is a brown loamy sand which passes at about 15 to 18 inches into a yellowish-brown to rusty-brown loamy sand. In the lower, poorer drained situations the subsoil is pale yellow in color, with some faint gray mottlings in the lower part. There are a few included areas having a sandy loam subsoil.

This type is confined mainly to the vicinity of Lake City and south of that city. One area occurs near Shaw.

The topography is level to slightly billowy, and drainage is good. Under ordinary conditions of precipitation sufficient moisture is retained by the soil for the production of crops.

The Lintonia loamy sand is highly esteemed for the production of cotton and corn, practically all of it being in cultivation. Because of its loose structure the soil is easily tilled. Cotton yields an average of three-fourths of a bale and corn 35 to 50 bushels to the acre.

Because of its productiveness and accessibility, very little of this type can be bought for less than \$75 to \$100 an acre.

Care should be taken to maintain the supply of organic matter in this soil. Deep plowing and frequent shallow cultivations should be

practiced. The legumes, such as clover, soy beans, and cowpeas, should be included in the crop rotations.

#### LINTONIA FINE SANDY LOAM.

The Lintonia fine sandy loam consists of a brown fine sandy loam, grading at about 8 or 10 inches into a yellowish-brown fine sandy loam, and this at about 20 to 30 inches into a yellowish-brown sandy clay. In places, as on the terraces of Cache River, a rather stiff, reddish-yellow or buff sandy clay is encountered within 8 or 10 inches of the surface. Sand mounds consisting of brownish sand underlain by grayish to yellowish sand are of common occurrence in the eastern part of the county. On the lower levels the type grades into the Olivier fine sandy loam. Where the sand hummocks are very numerous, as in the vicinity of Hancock, the areas between them include the Lintonia and Olivier fine sandy loams, silt loams, and silty clay loams.

The Lintonia fine sandy loam occupies the higher terraces locally called "ridges" in the eastern part of the county. It is commonly associated with the Sharkey clay, and the terraces upon which the type occurs are usually elevated from 3 to 15 feet above the Sharkey clay. These terraces have a general north and south direction. The largest areas occur at Macey, Monette, Black Oak, Hancock, Mangrum, Poplar Ridge, and Cane Island. At the latter place some small areas of Lintonia loamy sand are included with the fine sandy loam. On the west side of the St. Francis River the type is extensively developed along the edge of the river bottoms and sloughs and on a number of isolated ridges. In the western part of the county the area of Lintonia fine sandy loam is fairly large in the vicinity of Cash. Here the type occurs on the edges of terraces or as elevations surrounded by Waverly clay.

The topography is almost level and drainage is generally good. This type constitutes one of the most important farming soils in the county. The least productive areas are those having many sand hummocks. Practically all of the less sand spotted areas are in cultivation. The forest growth consists mainly of ironwood, willow oak, maple, sycamore, hackberry, elm, black gum, sweet gum, and oak.

Cotton and corn are the most important crops. In the present year (1916) a large acreage of wheat was sown. Several fields had an excellent stand of red clover. West of Cash alfalfa is grown successfully, 5 cuttings being made in a season, the first one about May 10 and the last about the middle of October. Peanuts, cowpeas, sweet and Irish potatoes, and truck crops do well. Cotton yields three-fourths to 1 bale and corn 40 to 60 bushels per acre. Both ridge and level planting are done, the former method predominating. Modern implements, such as disk and riding plows, are in common use. No fertilizer is used.

Improved land of this type is held at \$75 to \$100 an acre. Some of the cut-over land and areas marked by sand mounds can be bought for \$25 to \$50 an acre. Much of the type is occupied by tenants some of whom rent for cash and others on shares. In the former case the rental ranges from \$6 to \$10 an acre, and in the latter the landowner receives one-third of the corn and one-fourth of the cotton produced.

During the course of the survey it was noted that yields were beginning to decrease where the land had been in cultivation for a considerable length of time. This condition should be met by a rotation which would permit the occasional growing and plowing under of leguminous crops. Frequent shallow cultivations are very desirable during the growing season in order to conserve moisture.

#### LINTONIA SILT LOAM.

The surface soil of the Lintonia silt loam consists of a brown, mellow silt loam about 12 inches deep. This is underlain by a light-brown to brownish-yellow, compact silty clay loam, which changes at a depth of about 24 inches to a brownish-yellow silty clay, slightly mottled with gray. In places there is an appreciable quantity of very fine sand in the surface soil.

The principal occurrence of the type is on the terraces of Cache River, where it is developed in long, narrow strips. One small area, east of Oak Valley School, represents a colluvial phase of the type. Small areas of this soil are found east of Crowleys Ridge, in the vicinity of Phillips School, and south of Thompson Creek Ditch. The topography is almost level to gently undulating. Surface and underdrainage are generally good.

The greater part of this type is under cultivation to cotton and corn. It is a strong soil and produces somewhat larger yields than the Olivier silt loam. Because of the distance from markets, the price of most of this land is relatively low, considering its inherent value, ranging from \$40 to \$50 an acre.

#### CROWLEY SILT LOAM.

The Crowley silt loam consists of a brownish silt loam, mottled in most places with gray or grayish brown, passing at an average depth of about 10 inches into a yellowish or reddish-yellow silty clay loam, somewhat mottled with gray and this at about 18 inches into a mottled red and drab, plastic clay, which in the lower part of the 3-foot section is mottled with yellowish drab.

This type is encountered south of Gilkerson, extending thence to the county line. It occurs in close association with the Calhoun silt loam and has the appearance of a terrace along Bayou De View. Part of the type consists of prairie, but much of it is forested with various oaks and some hickory.

Probably 60 per cent of this type is used for the production of rice, to which it is well suited. The area in other crops is small. The average yield of rice is about 45 bushels per acre. The land is plowed as soon as possible in the spring and thoroughly harrowed, after which the rice is sown in drills. Flooding is not done until the rice is 4 to 6 inches high. Land of this type sells for \$25 to \$40 an acre.

At Otwell a small area of the Crowley silt loam has been tile-drained and the excellent results obtained would indicate that crops other than rice can be grown successfully where this is done.

#### SUMMARY.

Craighead County is located in northeastern Arkansas, has an area of 708 square miles, or 453,120 acres.

Four-fifths of the county consists of flat to gently undulating stream bottoms and terraces, the remainder being occupied by Crowleys Ridge, the topography of which ranges from gently rolling to very hilly.

Drainage in the uplands is good, while over the greater part of the lowlands it is generally poor. A system of drainage ditches is now being constructed in the eastern part of the county.

The 1910 census reports the population of the county as 27,627. There are two county seats, Jonesboro and Lake City, with populations of 7,123 and 448, respectively. Jonesboro is an important railroad center and has a number of industries.

Railroad transportation facilities are excellent, and wagon roads are generally good.

There are occasional extremes of temperature, but in general the climate is fairly mild. The mean annual temperature is 61° F. and the mean annual rainfall is 49.3 inches. The normal growing season is about 214 days.

The principal crops are cotton, corn, hay and forage crops, and rice. The raising of live stock is increasing in importance. Some farmers now practice diversification of crops. Very little commercial fertilizer is used. There are 3,106 farms in the county of an average size of 61.8 acres.<sup>1</sup> Land values range from \$7.50 to \$100 an acre.

The greater part of the soils belong in the lowlands, comprising both first and second bottoms. The soils range in texture from heavy plastic clay to loamy sand. In all, 13 types of soil, one with a shallow phase, are mapped in Craighead County. These are grouped in 9 series.

The Memphis soils are encountered throughout the extent of Crowleys Ridge. They are well drained and are used mainly for the growing of cotton and corn. Fruits, vegetables, and peanuts, lespedeza, white clover, Bermuda grass, and forage crops do well.

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<sup>1</sup>The census tabulates each tenancy as a "farm."

The Grenada silt loam is also an upland type, but is less well drained than the Memphis soils. This type is easily cultivated and is highly esteemed for growing cotton, corn, and peanuts. Lespedeza, white clover, and Bermuda grass afford good grazing.

The Collins silt loam is a first-bottom soil occurring within the limits of Crowleys Ridge. It is developed principally along Big Creek and its tributaries. It is subject to overflow and is poorly drained. The principal crops are cotton, corn, and hay. Lespedeza does well and can be grown to good advantage, both for hay and pasturage. White clover and Bermuda grass also afford good pasturage.

The Sharkey clay, locally known as "gumbo," is encountered in the sloughs and the "sunk lands" lying east of Crowleys Ridge. The typical forest growth is cypress and tupelo gum. Although much of this land is now covered with water, drainage canals are being constructed which should reclaim large areas. Only a small part of the type is cultivated. Where drainage is good cotton and corn do well.

The Waverly clay occurs in the western part of the county along Cache River. It is poorly drained first-bottom soil and practically none of it is in cultivation. With artificial drainage this type will be productive. It will be found especially adapted to grasses and forage crops. Lespedeza, clover, and Bermuda grass will give good yields of hay and pasturage.

The Calhoun silt loam and its shallow phase constitute the "white" soils on the broad terraces on both sides of Crowleys Ridge. Drainage is poor. The greater part of these soils is forested. Corn, cotton, wheat, oats, sorghum, rice, lespedeza, Bermuda grass, redtop, alsike, clover, and cowpeas are grown to some extent.

The Olivier fine sandy loam and silt loam are terrace soils, used principally for growing cotton and corn. In places the underdrainage is poor, but in general the soils of this series are sufficiently drained and productive. It is well suited to the production of lespedeza, white clover, and Bermuda grass.

The Lintonia fine sandy loam, loamy sand, and silt loam are among the best soils in the county and produce excellent yields of cotton and corn. They occur as second-bottoms, or terraces, and are generally well drained. The greatest development of the series is near the St. Francis River. It also occurs in the vicinity of the Cache River. Cotton and corn are the principal crops. Lespedeza, white clover, and Bermuda grass do well, especially on the silt loam.

The Crowley silt loam is used mainly for the production of rice. If thorough drainage were established, preferably with tile drains, the type could be used successfully for the production of the other crops of the region.

[PUBLIC RESOLUTION—No. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,* That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

"That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided,* That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture."

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]



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