

Issued March 13, 1914.

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

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SOIL SURVEY OF ASHLEY COUNTY,  
ARKANSAS.

BY

E. S. VANATTA, B. D. GILBERT, E. B. WATSON,  
AND A. H. MEYER.

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HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

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[Advance Sheets—Field Operations of the Bureau of Soils, 1913.]



WASHINGTON:  
GOVERNMENT PRINTING OFFICE.

1914.

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## LETTER OF TRANSMITTAL

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF SOILS,  
*Washington, D. C., December 27, 1913.*

SIR: During the field season of 1913 a soil survey was made of Ashley County, Ark., for the purpose of securing such information relative to the individual characteristics of the soils and their crop adaptabilities as would lead to a further development of the agricultural resources of the area.

I have the honor to transmit herewith the manuscript report and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1913, as provided by law.

Very respectfully,

MILTON WHITNEY,  
*Chief of Bureau.*

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

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### MAP.

Soil map, Ashley County sheet, Arkansas.



# SOIL SURVEY OF ASHLEY COUNTY, ARKANSAS.

By E. S. VANATTA, B. D. GILBERT, E. B. WATSON,  
and A. H. MEYER.

## DESCRIPTION OF THE AREA.

Ashley County is located in southeastern Arkansas. It is bounded on the east by Chicot County, on the north by Drew County, on the west by Bradley and Union Counties, the Saline and Ouachita Rivers forming the dividing line, and on the south by Morehouse Parish, Louisiana. But for the irregular western boundary line formed by the Ouachita and Saline Rivers it would be in the form of a rectangle,

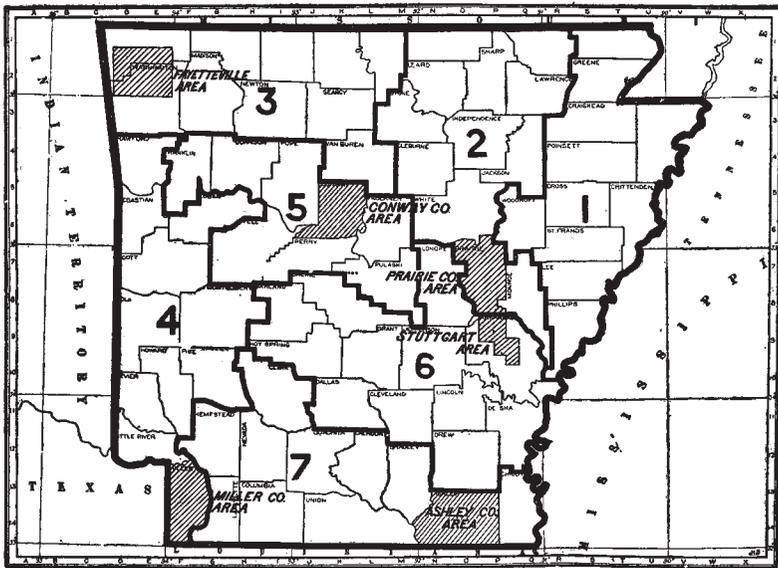


FIG. 1.—Sketch map showing areas surveyed in Arkansas.

27 miles wide north and south and 36 miles long east and west. The county comprises an area of 596,480 acres, or 932 square miles.

The county comprises two broad divisions—the uplands and the bottom lands. The line of separation is mostly marked by bluffs or sharp slopes 30 to 50 feet in height along the eastern edge of the uplands and about 30 feet along the western edge. There are places in which there is only a gradual slope, the change from the bottoms to the uplands being barely discernible. The surface of the uplands is prevailingly flat and nearly level to undulating, though there are

gently rolling or strongly undulating sections, as in the case of the Beech Creek Hills, and of the country occupied by the Ruston and Orangeburg soils. The bottoms of the eastern part of the county, those of the Mississippi River and Bayou Bartholomew, comprise flat, poorly drained areas locally known as "breaks" and "swamps," and low ridges or swells and hummocky areas which have better drainage. The flat bottoms here are subject to overflow by backwater from the Mississippi River, but the higher swells are no longer inundated. The bottoms of the Saline and Ouachita Rivers, constituting the western border of the county, comprise broad, level, low-lying first bottoms and higher lying bottoms of a terracelike nature, with occasional sand ridges. Here the bottoms are subject to frequent deep inundation, only the ridges standing above normal overflow.

The greatest recorded elevation in Ashley County is that of Longview, given as 190 feet above sea level by the United States Geological Survey. The lowest recorded elevation in the uplands is that at Crossett, given by the St. Louis, Iron Mountain & Southern Railway as 161 feet. The general slope of the county is to the south.

Topographically practically the entire area of the county is easily tillable. Numerous low dome-shaped mounds from 2 to 5 feet in height and of a diameter ranging from 25 to 100 feet occur throughout the county. They are more numerous in the uplands than in the bottoms, and again apparently more numerous and larger in the prairies and better drained forested lands than in the poorly drained "flatwoods." Their origin has never been satisfactorily explained.

Drainage conditions are poor over a considerable portion of the uplands, owing not alone to the flat surface, but also to the sluggish character of the winding streams. Over much of the bottom lands the drainage is good, though it can be improved in some cases by ditching or tiling. Surface drainage over most of the sandy land, the Portland very fine sandy loam, of the eastern bottoms is good, but the heavier land, the Portland clay, is badly in need of artificial drainage, and this must be accomplished before it can be efficiently farmed. Aside from a few scattered sandy ridges, the western bottoms, especially the lower two-thirds, are very poorly drained. In its present water-logged and overflowed condition the soil is practically worthless agriculturally.

The western part of the county drains mainly through Flat, Fountain, and Snake Creeks and Big and Little Brushy Bayous into the Saline and Ouachita Rivers, and thence south through Louisiana into the Black and Red Rivers, finally emptying into the Mississippi River below Concordia Parish. The drainage waters of the eastern part are carried into Bayou Bartholomew mainly by Bearhouse, Beech, West,

and Chimanahaw Creeks, and thence south and west through Louisiana into the Ouachita near Monroe.

The divide between the main eastern and western drainage systems is of very slight elevation and may be traced as follows: Crossing the northern county line near Fountain Hill, it follows southward through Fountain Prairie, thence to the southwest, passing about 4 miles west of Hamburg, where it again swings to the south through Smith Prairie, turns to the southwest to a point  $1\frac{1}{2}$  miles east of Crossett, then south through Frost Prairie, and then, swinging slightly east of south, passes across the southern boundary of the county.

The bottoms of the eastern part of the county are protected from floods in the Mississippi River by levees. Very seldom does the river inflict serious damage upon this region. Twenty years ago the bottoms were flooded, and again during the high waters of the springs of 1912 and 1913, when the levees broke in several places and all but the higher ridges were inundated.

With the exception of several large prairies, the upland region was originally covered by an excellent growth of shortleaf yellow pine and various hardwoods, principally oak and hickory. Areas representing old abandoned farms have in the last 50 years grown up with "old-field" yellow pine and scrubby hardwoods. Perhaps 15 per cent of the entire county is at present cleared and in cultivation. By far the greater part of the cleared country of the upland region is contained in the northern portion. The western bottoms are at present practically all occupied by forests of hardwoods with some pine, there being only a few cleared areas, and these altogether upon small, sandy ridges. Practically all of the sandy type of the eastern bottoms is cleared and in cultivation. The "breaks" and low areas comprising the clay type of this area are practically all in forest or cut-over land. A considerable amount of gum, oak, hickory, and cypress has been and is being taken from this section of the eastern bottoms.

Lumbering is at present the main source of revenue in the county. The largest mill is at Crossett. This cuts yellow pine, sawing an average of 300,000 to 350,000 feet per day. A smaller hardwood mill is also operated in conjunction with it and a new hardwood mill is being erected. Numerous smaller mills, for sawing pine and hardwood, and stave and bolt mills are operated throughout the county.

The first white settlers in the area which embraces Ashley County located along Bayou Bartholomew between 1835 and 1840. Prior to this time the country had been occupied only by wandering Indian tribes. During 1841 a settlement was made on Fountain Prairie, which was soon followed by one at Fountain Hill. In 1842 several clearings had been made on the western bank of the Saline River near the site of Longview, which was undoubtedly settled soon after. Settlements were made in the neighborhood of Berea in 1845.

The county was organized and Hamburg named as the county seat in 1846. For the first year or so court was held at Fountain Hill, then a log courthouse was erected in Hamburg.

According to the census reports, the population of Ashley County in 1900 was 19,734, and in 1910, 25,268, showing an increase of over 21 per cent in the last 10 years. Between 25 and 30 per cent of the population of the county live in the towns. Negroes constitute a large proportion of the population, their labor being used principally in the sawmills and on the plantations and smaller farms of the county. The white population is largely of American birth, as the county was originally settled by families coming mainly from the adjoining and other Southern States. Of late years, with the development of the county, considerable northern capital has been invested here. A number of northern farmers are also moving in each year. Hamburg, the county seat, is a town of about 1,800 inhabitants and is centrally located in the county. Crossett, a town of over 2,000, owned by the Crossett Lumber Co., is widely known as "the model mill town." Portland, Wilmot, Morrell, Parkdale, and Montrose, all located in the eastern bottoms, are the other towns having a population of more than 200. Several smaller towns and post offices are scattered through the county.

Facilities for railroad transportation are good. The main line of the St. Louis, Iron Mountain & Southern Railway passes through the county from north to south, following a slight elevation along the eastern side of Bayou Bartholomew. A branch line of this road extends from Crossett through Hamburg, crossing the main line at Montrose, and reaches Lunas Landing, a point in Chicot County along the Mississippi River, where ferry connections are made. The Arkansas, Louisiana & Gulf Railway extends from Monroe, La., where it connects with the main line of the St. Louis, Iron Mountain & Southern, to Rolfe Junction, in Ashley County, where it branches—one terminal being Hamburg, the other Crossett. A branch line of the Chicago, Rock Island & Pacific Railway extends northwest from Crossett, leaves the county at Emory, and connects with the main line at Tinsman, some 40 miles northwest of Ashley County. The Ashley, Drew & Northern, at present nearing completion, connects Crossett with the main line of the St. Louis, Iron Mountain & Southern at Monticello. A branch line of the latter, known as the Eldorado & Bastrop, reaching from Eldorado, Ark., to Bastrop, La., traverses the southwestern corner of the county. There are also several smaller branch lines. At present, no clearing in the county is more than 10 miles from a railroad shipping point. River transportation might be had, especially on the Ouachita, which is a navigable stream. All shipments, however, are made by rail.

The wagon roads of the county are very poor, many being little more than winding trails, especially in the less developed southern portion of the county. Very little grading has ever been done, bridges are insufficient, and the roads have not been laid out systematically. Excellent dirt roads could be constructed if built with well-rounded crowns and ditched so as to drain well. The soil has a tendency to pack, and excellent results have been obtained wherever the split-log road drag has been used.

The telephone, while used in all the towns, has not yet been adopted to any great extent by the farmers. Rural free delivery is made to some extent; there are many homes in the county that it has not yet reached.

#### CLIMATE.

The climate of Ashley County is typical of that of the southern regions not materially influenced by the proximity of large bodies of water. The mean temperature during the months of December, January, and February is 45° F. The lowest recorded temperature during those months is 10° below zero and the highest 82° F. Very seldom does the weather become as cold as zero. Heavy frosts are frequent during the winter and occasionally the ground freezes to a shallow depth, though it rarely remains in this condition longer than two or three days. The average temperature during the day is 40° to 50° F., with cool, frosty nights. The average rainfall during the winter months is 14.1 inches. The rains usually come as cold, steady downpours lasting two or more days at a time, and followed with cold, clear weather. The bottoms and depressions are kept wet with the run-off through the greater part of the winter months.

The transition from winter to spring is very gradual. The mean temperature for this latter period is 63° F. The early part of spring is mild, peaches, plums, etc., blossoming by the middle of March. Occasionally frosts occur late enough to injure these fruits. The mean rainfall is practically the same as that of the winter season, being 14.2 inches. Thunderstorms, during which the rain falls in torrents, are of frequent occurrence during the spring months.

The summer months represent a period of even although not extreme hot weather; the mean for the three months is 81° F. There is an average rainfall of only 9.4 inches for these months, and the county, especially the upland portion, suffers frequently from short periods of drought.

The fall months, with a mean temperature of 64° F., and a mean rainfall of 11.3 inches, constitute the pleasantest part of the year.

A study of the climatic conditions of Ashley County, as set forth in the following table, will show that the winter season is favorable to the growth of hardy pasture grasses and winter vegetables. The

mild, open winters and the comparative freedom from marked extremes throughout the year make the region well suited to the stock, dairy, poultry, and beekeeping industries. The development of truck growing would seemingly be possible in the county.

There is no Weather Bureau station in Ashley County, but the following data, taken from records kept at Warren, Bradley County, are believed to be fairly representative of local conditions:

*Normal monthly, seasonal, and annual temperature and precipitation at Warren, Bradley County.*

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	° F.	° F.	° F.	Inches.	Inches.	Inches.	Inches.
December.....	46	75	7	4.4	2.8	7.4	1.2
January.....	44	80	10	5.0	4.4	4.1	1.4
February.....	44	82	-10	4.7	6.0	3.8	2.1
Winter.....	45			14.1	13.2	15.3	4.7
March.....	55	87	22	5.6	7.8	6.7	1.0
April.....	62	94	28	4.4	4.8	4.8	0.0
May.....	72	98	34	4.2	2.0	4.2	0.0
Spring.....	63			14.2	14.6	15.7	1.0
June.....	78	106	47	3.6	2.5	6.3	0.0
July.....	83	108	53	2.6	1.2	4.3	0.0
August.....	82	108	55	3.2	3.8	0.9	0.0
Summer.....	81			9.4	7.5	11.5	0.0
September.....	75	105	40	3.5	3.4	6.7	0.0
October.....	64	96	27	4.0	5.3	5.5	0.0
November.....	53	82	12	3.8	4.0	6.5	0.0
Fall.....	64			11.3	12.7	18.7	0.0
Year.....	63	108	-10	49.0	48.0	61.2	5.7

Average date of first killing frost in autumn, Nov. 4; of last in spring, Mar. 30. Date of earliest killing frost in autumn, Oct. 10; of latest in spring, Apr. 8.

#### AGRICULTURE.

With the exception of its large prairie regions, Ashley County was originally covered with heavy forests of pines and hardwoods, the former mainly on the uplands and the latter mainly in the bottoms, though to some extent on the uplands. The earliest settlers cleared only small patches in these forests, as they depended entirely upon their own labor and that of their families.

Between 1850 and 1860 marked development took place and many settlers located throughout the county. Large plantations, operated

by slave labor, were built up along Bayou Bartholomew. The produce from these and other farms was taken by boat down the Ouachita, on the west, or down Bayou Bartholomew and the Ouachita from the east, and thence down the Mississippi River to New Orleans. Usually one trip was made each year and the year's produce traded for supplies. This period of development and prosperity prevailed until the outbreak of the Civil War. At the close of the war agriculture was badly demoralized and it took many years to regain the lost ground. In fact development was extremely slow until within the last decade or so. Conditions are now improving steadily. The bottom lands in the eastern part of the county are still for the most part in large holdings, but they are farmed under the system of leasing small areas to tenants, most of them negroes. The uplands are being cleared, and in many cases the land is being worked and occupied by the owner. Vast areas of the uplands and western bottom regions are either owned outright or are held under leases by lumber companies. This will tend to retard the agricultural development of the county for years to come.

Cotton has been from the earliest days the leading crop, and, notwithstanding the damage wrought by the boll weevil, it continues the chief money crop throughout the county. The best average yields are produced on the Portland very fine sandy loam of the eastern bottoms, the smaller requirements of fertilizer, together with the less injurious effects of drought, contributing to make this the best cotton soil in the county.

According to the figures of the United States census, there has been a gradual increase in the acreage and a corresponding decrease in the yield per acre of the cotton crop for the past 40 years, although, owing to the possible influence of seasonal differences in climate, it is not right to draw too definite conclusions from such data. A large drop in yield for the year 1909 may probably be ascribed to damage by the boll weevil. The gradual decrease in yield and the increase in acreage may, however, be attributed in part to the decrease in soil productivity caused by continuous cropping without rotation and proper soil management, and the attempt to produce a certain amount of cotton by putting larger areas per unit of labor, resulting in poorer cultivation. The acreage in cotton increased from 19,555 acres in 1879 to 44,024 acres in 1909.

Cotton is usually planted from the last of March on through April. It is planted on ridges about 40 inches apart. The old ridge is turned to each side by a 1-horse turning plow and the remainder of the ridge thrown out with a "middle buster." Following this the new ridge is smoothed with a harrow and the cotton seed drilled in with a 1-horse drill.

The cultivation of the crop consists of first turning the dirt from the row, then "chopping" or thinning out the stalks, after which the middles are kept stirred during the growing season. Several hoeings are necessary to clean the weeds out of the row.

Owing to the damage wrought on cotton by the boll weevil and to the influx of northern farmers, the acreage devoted to corn is rapidly increasing.

As with cotton, there has been an increase in the acreage of corn during the last 40 years, attended by a decrease in the yield per acre, apparently due to improper methods of farming. The acreage of corn in 1879 was 15,335 and in 1909, 29,070 acres. The yield for the latter year was only 14.4 bushels per acre.

Corn is planted and cultivated in much the same manner as cotton. When possible, two general plantings are made, an early crop in March and a late one the latter part of April. The early planting matures before the summer drought and may be harvested in time to permit all attention being given to cotton. It is interesting to note that while the average yield per acre of corn is only a little more than 14 bushels, several farmers in the county, by using flat cultivation and other modern practices, obtained 50 bushels or more from their fields. As an illustration of what can be done on the soils of the county, the State premium for the highest yield of corn went this year (1912) to an Ashley County boy, who produced 172 bushels on an acre of land.

Usually corn is harvested by snapping the ears, leaving the stalks standing in the field. Later the stalks are winter pastured and what remains is piled and burned the following spring. Both white and yellow dent varieties are grown. Probably the Mosley and Powell are the most popular kinds. Little, if any, corn is shipped from the county.

The oat crop is not of great importance, though the acreage has increased somewhat in the last few years. Oats may be successfully grown on any of the soils in the county, but the Portland very fine sandy loam gives a higher average yield than any of the other types. A considerable quantity of oats is grown on the Ruston soils, and in one instance 60 bushels per acre were obtained from a large field of this type. Both winter and spring oats are grown, the former being more profitable, except when the winters are extremely cold. Winter oats are usually sown in October and spring oats in February. The Texas Rust Proof is the most popular oat grown in the county.

Rice was grown for home consumption early in the history of the county. It was usually planted on low, moist land and was not irrigated. Its production has never been extensive, although in recent years more attention has been given it. Owing to their smooth topography, compact subsoil, and the greater ease with which

they may be prepared, the prairie soils usually have been selected for this crop. "Levees" about 15 to 24 inches in height, for holding water at the necessary depth over the various subfields, are built at intervals of 75 to 100 feet. Water to flood the fields is provided by pumping from deep wells. The seed is sown, as a rule, during April, at the rate of 125 to 200 pounds per acre. When the young plants reach a height of 4 to 6 inches the field is flooded and kept so until a few days before harvesting. Harvesting is usually done with the ordinary binder during the month of September. The rice is cut and left in the shock until thrashing time.

Rice yields from 55 to 90 bushels per acre, the best yields being produced on the prairie soils. The average price is about 90 cents per bushel.

Although well adapted to the soils of the county, especially the sandier ones, rye is very little grown.

Wheat is not a satisfactory grain crop for this section.

Lespedeza or Japan clover is the main hay crop of the county. It is an annual and when cut for hay or pastured too close must be reseeded for the succeeding crop. The hay is of excellent quality, fully equal to that of red clover. It is sown in the spring, usually with oats as a nurse crop. The oats are cut about the middle of August, leaving a stubble higher than the clover. The clover springs up quickly after the oats are removed and usually makes two cuttings, one in early September and another in early October. If a nurse crop is not used, the clover generally must be clipped once before cutting in order to rid the field of weeds. The average crop is about 2 tons per acre. Soy beans and cowpeas are other leguminous crops grown to some extent in the county. These supply forage and grazing and are grown also by the more progressive farmers in an effort to maintain the productiveness of their soils.

Bermuda is without doubt the most important grass in the county at present. It grows well on all the soils. It is a good grazing as well as hay grass and is also of value in preventing erosion on areas of steep slope. It spreads rapidly and makes a heavy mat-like growth. Crab grass is a fairly good pasture and a very good hay crop. Both these grasses are troublesome in the cultivated fields. Broom sedge grows naturally over the prairie areas and cleared upland and bottom areas. These are generally burned over during the winter in order to improve the early spring pasture. While the shoots are young, cattle relish this grass, but later the stalks become woody and less palatable. Various water grasses growing on the low, moist areas furnish a considerable amount of pasturage. Wild cane, found growing only in the eastern bottoms, and there chiefly on the lower, heavy textured areas, also makes excellent grazing for cattle during the entire year.

Sugar cane does well in the county, although its production is limited. It is used for making sirup, and the greater part is consumed at home or disposed of in the local markets. In recent years some shipments of sirup have been made to outside markets. The crop is usually grown in the bottoms along small streams and in upland depressions. It can be successfully grown on any of the cultivated soils of the county. The sirup from cane grown on the lighter soils is of somewhat better quality than that grown on the heavier, stronger soils, although the latter produce a heavier yield.

Sugar cane is planted late in February and March, if the weather permits, by laying sections of stalks saved from the previous year's growth in shallow furrows and covering them with soil. Harvesting takes place after the first frost.

Peanuts thrive on both the sandy and silt loam soils. The former soils are, however, better suited to their production. The crop is planted during the months of April and May, either alone or between corn rows. The crop ripens in September and October. Peanuts make an excellent field feed for hogs, to be finished later on corn.

Practically all farmers raise enough sweet potatoes for home consumption and some produce a surplus. The most common varieties grown are bunch yam, pumpkin yam, and the white and red yams. The sandy loam soils are best suited to their production. Yields ordinarily range from 100 to 150 bushels per acre. The seed potatoes are usually planted in some sort of hotbed in March, and the sets transplanted to the field from the first of May to the latter part of June. In cultivation the dirt is first turned away from the ridge, and later the plants are plowed one or two times. The plants are hilled as soon as they have reached a sufficient size. Sweet potatoes are harvested in September or October at the time of the first frost.

Irish potatoes have not been grown as a commercial crop in Ashley County, but are grown for domestic use. The earlier varieties are better suited to the higher, sandier soils, and the later-maturing ones to the silt loams.

The sandy soils of Ashley County are adapted to the production of many different vegetables. The silt loams and flatter areas of the sandy types are better adapted to those vegetables which are of slower growth, such as late cabbage, cauliflower, collards, spinach, beets, and turnips. With the development of the county, trucking will undoubtedly gain prominence in this section. At present sufficient vegetables are produced to supply home markets and some shipments are made to outside points.

Among the fruits, peaches, plums, blackberries, and figs are grown. Elberta peaches of fine flavor and quality are produced

on the Ruston very fine sandy loam and on the Ruston fine sandy loam. There is reason to believe that any of the well-drained areas of the sandy soils, particularly, will give good results with this fruit. At present the home markets consume the supply. Plums have been successfully grown wherever tried. Wild plums are numerous about old clearings and farmhouses throughout the county. They do best on the Ruston and Orangeburg soils and on the better drained Richland and Crowley silt loams and the Portland very fine sandy loam. Figs, giving a fair quality of fruit, are often grown in yards and gardens. Blackberries grow wild almost everywhere. Strawberries are grown on a limited scale on the well-drained soils. A few farmers are at present planting pecans.

Watermelons and cantaloupes will succeed on all the well-drained sandy lands. Cantaloupes, possibly, would also do well on the better drained silt loams.

The combination of a very temperate climate and extensive range furnishes every inducement to stock raising. Although steadily improving, the stock of the county is as a rule inferior. This is especially true of hogs and cattle. It has been the practice to brand the cattle and hogs and turn them out to subsist upon the pasturage and mast, rounding them up once or twice a year, picking out those in good condition for food and sale, and turning the remainder back to the range. Owing to the development of the country and the increasing number of stock kept, this system is gradually giving way to the more modern method of feeding and pasturing the stock throughout the year.

The Texas cattle tick is at present a serious drawback to cattle raising, and until it is eradicated there can be no great development in this class of live stock.

Dairying is a very much neglected phase of agriculture in this county. Several small dairies are operated, the largest one 3 miles north of Crossett. Their output is consumed in the county and much butter is also shipped in. Poultry raising receives but little attention.

Owing to the light-draft farm implements used in the county, a small inferior class of horses and mules prevails. With the adoption of deeper cultivation, which must eventually come, there will also come a call for heavier draft animals. There are several farms and plantations on which a number of large northern-bred animals are used. The majority, however, are westerns. A good many mules are produced in the county, but several carloads of mules and horses are annually imported.

Under the farming practice of the past, in which cotton and corn have been the main crops, too little attention has been given to crop rotation. As these principal crops are given clean cultivation the

soil has been kept stirred, open, and uncovered the greater part of the year with the result that the humus content has been depleted, especially in the uplands. Owing to this condition the sandy soils have reached a stage where they are very loose and have lost to a great extent their moisture-holding capacity and the silt loams have become inclined to clod and crust and are very liable to injury from drought.

The necessity for a change in farm practice is recognized by many of the farmers, and as a result some have begun growing the various legumes either as catch crops or as a separate step in the rotation. As yet sufficient time is not allotted to these and other cover crops.

As the plowing practiced over the county is too shallow and too uniformly at one depth, resulting in the formation of an impervious, hardpanlike layer (plow sole) lying just below the depth of breaking, the land should gradually be broken deeper until at least 8 inches is turned. The small 1-horse plows now in use can hardly be expected to accomplish this. With the gentle topography of the greater part of the county, there is no reason why gang plows operated by horse or by tractors could not be used to advantage on the larger fields. The introduction of other modern implements, such as harrows, multitooth cultivators, and weeders, is also feasible.

Commercial fertilizers are used in increasing quantities each year. Most of this is used in growing cotton, though applications for corn are becoming more general. The fertilizers used are mainly ready-mixed brands analyzing approximately 10-2-1. Little stable manure is produced in the county and little attention is paid to the proper handling of the relatively small quantity made.

Certain soils of the county require lime. The Portland clay, level areas of Portland very fine sandy loam, the poorly-drained and prairie phases of Richland silt loam, the Crowley silt loam, the Waverly silt loam, the Vicksburg silt loam, and the western bottoms, when they shall be developed, will all benefit by the application of this soil amendment. On most of these areas at least 1 ton per acre of burned lime will be needed. The function of lime is to correct the acidity and to improve the poor structural condition of the soil. Lighter applications on the remaining upland soils, especially the Richland silt loam, should prove beneficial.

According to the Twelfth Census there were 3,002 farms in Ashley County in 1900, of which 35.5 per cent were operated by their owners. The average size of farms was 78.6 acres.<sup>1</sup> The Thirteenth Census places the number of farms at 3,421, the average size at 68.4 acres, and the percentage operated by owners at 40.2.

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<sup>1</sup> Each tenancy was tabulated as a farm in making the census returns.

The share system of renting prevails with varying agreements as to division of crops and the supplying of food, stock, implements, and shelter. When renting on "halves" the owner furnishes half the fertilizer, stock, and implements and receives half the crop. In general the supply of labor is sufficient to meet all demands.

#### SOILS.

The soils of Ashley County are somewhat varied in character of material and in point of origin. They have been grouped into three fairly well defined divisions: (1) Upland soils, derived from loessial or Coastal Plain materials; (2) recent alluvial soils, forming first bottoms along the streams; and (3) terrace or second-bottom soils.

On account of the gentle topography of the upland region of the county, due to the immaturity of the drainage systems, erosion has not as yet had a very important influence upon the soils. The types are uniform and occur in the main as large areas with well-defined boundaries.

A layer of silty material which apparently was deposited by water over the entire uplands of the county, having been washed off only from the higher points and ridges in the western part, constitutes the surface material of the greater proportion of the county. The Richland silt loam and its phases are derived wholly from this formation and the upper section, at least, of the Crowley silt loam and its timbered phase. The heavy, plastic red and drab clay subsoil of the Crowley silt loam occurring within the 3-foot section and underlying the Richland soils at depths ranging from 6 to 10 feet evidently belongs to an earlier formation, possibly the Port Hudson. Other types in the upland, Ruston and Orangeburg soils, have been derived wholly from Coastal Plain deposits. They occur where erosion has been sufficiently active to remove the silty deposit from the surface.

The strips of lowlands in the eastern part of the county, along the outer edge of the Mississippi River bottoms and in the bottoms of Bayou Bartholomew, comprise a large part of the recent alluvial soils of the county. Although at present protected from floods in the Mississippi River by levees and thus comparatively free from overflow, this area was formerly very wet and subject to frequent inundation. Owing to exceptionally high water during the springs of 1912 and 1913, the Mississippi River levees have broken and all but the higher portion of the ridges forming the Portland very fine sandy loam have been inundated. Only the finer material carried by the Mississippi River and Bayou Bartholomew waters has been deposited in Ashley County, giving rise to two types, the

Portland clay and Portland very fine sandy loam, the latter formed probably during overflow of the various bayous whose courses it follows in low wide ridges. The first bottoms of streams flowing through the uplands, which vary from a few rods to a mile or more in width, are occupied by alluvium derived altogether from local upland soils, chiefly the Richland silt loam. Owing to the predominant silty texture of the parent material, the soils here are silt loams. They have been mapped as the Vicksburg and Waverly silt loams, and are all more or less poorly drained and subject to overflow. The lowest portion of the first bottoms along the Saline and Ouachita Rivers, where examined, appears to consist mostly of the Waverly silt loam and the Waverly clay. Owing to its inaccessibility, the result of prolonged winter and spring overflow, this portion of the alluvial bottoms was mapped as Swamp.

Along the outer margin of the Ouachita-Saline bottoms there is a strip of higher bottom land holding the position of a low terrace. The land here is subject to overflow, and is mainly Swamp, the the Waverly silt loam, heavy subsoil phase, and the Waverly very fine sandy loam. Numerous small islandlike areas of very fine sandy loam to fine sandy loam have been mapped through the western bottoms. For the most part these areas have an elevation sufficient to avoid inundation, except in extremely high flood. This land holds a position corresponding rather closely with that of second-bottom land. These areas have been mapped as the Boeuf very fine sandy loam. Some of this type undoubtedly is included with the areas mapped as Swamp.

In the following type descriptions the various soils are described in detail, and their agricultural value, crop adaptation, and general needs are pointed out. The following table gives the names and extent of the several soils of the county:

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Richland silt loam.....	133,568	} 47.1	Waverly silt loam.....	4,224	} 3.2
Poorly drained phase.....	129,152		Heavy subsoil phase.....	14,656	
Prairie phase.....	17,920		Waverly very fine sandy loam..	11,520	
Portland clay.....	87,488	14.7	Crowley silt loam.....	1,856	} 1.6
Portland very fine sandy loam..	62,272	10.4	Timbered phase.....	7,680	
Ruston fine sandy loam.....	37,248	6.2	Boeuf very fine sandy loam...	1,728	.3
Vicksburg silt loam.....	35,392	5.9	Orangeburg fine sandy loam..	1,088	.2
Swamp.....	31,488	5.3			
Ruston very fine sandy loam..	19,200	3.2	Total.....	596,480	.....

## BROWN SOILS.

## WATER-LAID MATERIAL—MIXED DERIVATION.

## RICHLAND SERIES.

The Richland series is characterized by the light-brown to yellowish-brown color and silty texture of the surface soils and the somewhat lighter color and more compact structure of the subsoils. These soils are derived from loess and occur in association with the Memphis soils. The Richland series represents areas of loessial soils having a smooth, flat to undulating topography, with drainage well established.

## RICHLAND SILT LOAM.

The soil of the typical Richland silt loam consists of a light-brown to light yellowish brown silt loam, with an average depth of about 8 inches. The subsoil is only slightly heavier than the surface soil, the material consisting of a compact silt loam to silty clay loam, with an occasional small lense of silty clay. The color gradually becomes somewhat lighter and more yellowish with depth, showing occasionally some grayish mottling. The color of the soil is very much influenced by the topography, with its effect upon drainage. The more nearly level areas, having less perfect drainage, are lighter in color in the soil and more mottled in the subsoil. In places of better drainage the upper subsoil is sometimes buff or reddish yellow. Iron concretions the size of a pea and smaller are numerous, especially in the subsoil. The texture of the soil is remarkably uniform for a type covering so large an area. The low, domelike mounds mentioned elsewhere in this report reach their best development on this type and its phases. The soil in these mounds shows less mottling in the subsoil than that of the main portion of the type—the flat, inter-mound areas. Usually the soil of the mounds is a light loam or silt loam underlain at about 6 inches by yellowish-brown silt loam which sometimes has a reddish tinge. On these mounds, which are almost circular and which vary from about 25 to 50 feet in diameter and from about 1 to 4 feet in height, the drainage is better established than in the flatter areas of the type.

The Richland silt loam is the main upland soil of the county. It is derived very probably from loesslike material, which was apparently laid down upon the older Coastal Plain deposits probably as a stream terrace.<sup>1</sup> A layer of deep reddish brown or red and drab plastic clay, which comes within the 3-foot section of the Crowley silt loam type, in some places underlies the Richland silt loam at depths

<sup>1</sup> Geology and Underground Waters of Northern Louisiana and Southern Arkansas—Professional Paper No. 46, U. S. Geol. Surv.

of about 6 feet. This same layer outcrops frequently along the eastern bluffs and in eroded cuts in the eastern part of the uplands. Except in these small eroded areas this heavy substratum material has no marked effect upon the agricultural value of this soil. Those areas in which this mottled reddish and drab plastic clay comes to or near the surface would have been mapped as Morse clay had they been of sufficient size.

The topography of the Richland silt loam is the most varied in the county. It ranges from almost flat, though gently rolling, to rolling or hilly, the latter surface configuration being represented by what is known as the Beech Creek hills. Characteristically the surface is flat to gently undulating, the only conspicuous surface features being the mounds already described. In its entirety, practically, this land is well suited to tillage operations, most of it to the use of labor-saving machinery. Aside from the tendency of water to stand over the level portions during and after wet seasons the soil has good drainage. Nevertheless the installation of tile drains would improve the drainage of the greater part of the land and result in making it much more productive and easier to cultivate. In the more rolling areas of the type surface drainage is often excessive and erosion is severe. Here the roads are often washed to pieces and fields gullied in a single season. This tendency of the soil may be greatly reduced by proper management. Many old farms washed and abandoned are found. These have grown up with "old field" or "bull" pine, scrub oaks, and hickory, dogwood, and various grasses, broom sedge being the most prominent.

Only a relatively small proportion of the type is in cultivation. Cotton and corn are the principal crops. A considerable area of the type is also devoted to oats. Lespedeza, cowpeas, and soy beans are the principal cultivated forage and hay crops. Bermuda makes an excellent hay and good pasture. The ordinary yield of cotton is one-fourth to one-third bale, and of corn 20 to 25 bushels per acre, although much better yields are obtained by the best farmers. Late vegetables and various berries are very successfully grown on this soil.

The price of land of the Richland silt loam type is variable and depends largely upon the character of the improvements. Much of it is covered with forest, the value of which is sometimes the factor determining the price. Most of the land may be purchased for \$6 to \$15 an acre.

*Richland silt loam, poorly drained phase.*—The soil of the Richland silt loam, poorly drained phase, consists of 6 inches of mottled yellowish brown and drab or mottled gray, yellow, and rusty brown silt loam. The subsoil is a little heavier than the soil in the upper part of the section and becomes more compact with depth. At about 30 inches the subsoil is usually quite dry, owing to the com-

pactness and imperviousness of the layer above. This stratum is quite compact itself, and is locally known as "hardpan." The color of the subsoil is practically the same throughout the section. It is yellow, mottled with drab or gray, with a slight increase in the degree of mottling with depth.

Small iron concretions are very numerous throughout the soil section. The mounds mentioned in the description of the main type are characteristic of the phase also.

Areas of Richland silt loam, poorly drained phase, form a considerable proportion of the upland region of Ashley County. The topography is characteristically level, the areas usually representing broad flats of the same general level as that of the main type, but as yet unreached by the comparatively young drainage courses. Occasionally, however, it exists as low areas immediately bordering small, sluggish streams. Owing to its poor drainage, this land is covered with water during the rainy season, which escapes in the spring only through evaporation and seepage, the latter being slow, owing to the compact stratum in the subsoil.

At present the greater part of this phase is forested with pin oak, black gum, water oak, and pine. Considerable pine has been cut off by lumbermen. A number of clearings have been made in the better drained portions.

As would naturally be expected, the physical structure of the soil is poor, and crops are likely to suffer injury from drought. The same general farm crops are grown on it as on the main type, but the yields are small. Artificial drainage is necessary for the proper agricultural development of this soil.

In a number of tests this soil gave an acid reaction with litmus and it is locally spoken of as being "sour." Lime should be applied to correct this condition.

In its present condition the Richland silt loam, poorly drained phase, is less desirable than the typical soil, though there is not much difference in price. Areas not supporting valuable forest may be bought for \$4 to \$10 an acre.

*Richland silt loam, prairie phase.*—The soil of the Richland silt loam, prairie phase, consists of about 10 inches of silt loam varying from grayish brown to yellowish brown in color. Below this the material usually is of a drab or gray color mottled with light yellowish brown, or of a mottled dark drab, dark brown, and dingy brown color. In places the surface soil is dark brown. There is not much change in texture throughout the 3-foot section, the material rarely carrying more clay than a heavy silt loam to silty clay loam. At about 28 to 30 inches, however, the subsoil is usually noticeably compact. Upon drying out in the spring, this lower section becomes very impervious and is locally known as "hardpan." Brownish

iron oxide stains are very conspicuous in the freshly exposed subsoil, and iron concretions occur throughout the soil section. The mounds so common to this section stand out especially prominent over the surface of this soil.

This phase occurs as isolated prairies of varying extent scattered mainly through the central portion of the county. The more important of these prairies are known as Pine, Smith, and Twin Prairies. Old settlers say that the prairies are much smaller than they were 40 years ago, owing to the gradual encroachment of the forest growth.

As implied by its name, this phase is naturally covered by a growth of wild grasses, chief among which is broom sedge. The topography is flat to gently undulating. In their natural state the flat areas are very poorly drained and the soil is cold and acid. The more undulating areas are better drained, yet inclined to be sour.

Owing largely to its insufficient drainage and its sourness, this soil is in a poor physical condition and crops are subjected to serious injury during seasons either of protracted drought or rain. Formerly only general farm crops, such as cotton, corn, and oats, were grown for market, but within the last few years this soil has been in demand for rice growing, and a good many northern farmers have bought up land for that purpose. Artificial drainage is necessary for the successful growth of general farm crops on this phase. The native grasses furnish good pasture while in the early stage of growth. They are also cut for hay.

The value of this soil has rapidly increased, owing to the demand for it as a rice soil and to the fact that it needs little clearing. Prices vary from \$8 to \$25 an acre, the latter price for areas that have been improved.

#### PORTLAND SERIES.

This series is characterized by the brown color of the surface soil and by the salmon-red or light pinkish red color of the usual silty clay subsoil. The type locality of the series is in the outer edge of the Mississippi bottoms and along Bayou Bartholomew in southeastern Arkansas. The material is alluvial in origin and contains enough reddish material to suggest a possible former deposition of Miller material in this region by the Arkansas River. A considerable proportion of the material undoubtedly comes from the silty soils occupying the flat country or old terraces of the Mississippi River of southeastern Arkansas. The soils characteristically occur in first bottoms which are subject to inundation both from the streams along which they occur and from backwater from the Mississippi. Portions of these soils occupying high situations are not subject to overflow—at least they have not been overflowed in recent years. In this case the land really represents second-bottom soil, but on

account of the intimate association of the higher portion with the lower overflowed land, no attempt has been made to separate the first bottoms from the higher areas. A considerable proportion of the Portland soils have poor drainage between overflows, and here the color of the soil is lighter than is characteristic of the series.

PORTLAND VERY FINE SANDY LOAM.

The Portland very fine sandy loam consists of a light-brown to brown very fine sandy loam, underlain at a depth of 5 to 10 inches by pale-yellow material of about the same texture. The material gradually becomes heavier and redder, until at depths ranging from 24 to 30 inches it grades into salmon-red or light pinkish red silty clay loam to silty clay. Near the lower limit of the profile the texture of the subsoil is variable, in places consisting of a plastic clay and again of a very fine sandy loam. The material in the mounds in this soil is lighter in color and texture, consisting usually of brownish and yellowish very fine sandy loam to a depth of 3 feet. In many places, especially where the surface has been slightly eroded, black iron concretions are quite numerous upon the surface and are present to a smaller extent through the soil section.

Several minor variations from the typical description of this soil as given above have been encountered. Along Bayou Bartholomew the soil is not so deep and the heavy subsoil comes closer to the surface, within 15 to 18 inches, and its color is a brighter red. Again there are several patches farther away from the bayou in which the very fine sandy loam persists to depths greater than 3 feet. In depressions and other poorly drained flat areas a lighter colored phase is developed, the soil here consisting of a yellowish-gray to dark-gray heavy very fine sandy loam, underlain at about 8 to 10 inches by light-gray, almost white, heavy very fine sandy loam, which in turn passes at about 20 to 24 inches into a reddish silty clay loam or silty clay. In some places the gray-colored material persists to a depth of 36 inches or more. This last-named phase exists as a rule in very small areas interspersed throughout the typical soil and often along the border line between it and the Portland clay. The largest of these areas lie in the vicinity of Sunshine. Numerous small areas of Portland clay, too small for separation, have also been included with the very fine sandy loam.

The Portland very fine sandy loam is an alluvial soil and represents material in part deposited by the waters of Bayou Bartholomew and in part by the overflow waters of the Mississippi River. Only the lower lying areas of the type are ever overflowed and then only in times of exceptionally high floods, when breaks occur in the Mississippi River levees. Such floods happened in the springs of 1912 and 1913.

This is the most important soil in the Mississippi-Bayou Bartholomew bottoms. It is confined to the eastern part of the county, giving way on the east to the "buckshot" lands of Chicot County. The type normally occupies the front lands and passes at a distance from the streams into the heavier Portland clay type.

The topography of the Portland very fine sandy loam varies from flat to very gently undulating. Hummocks and swells are of common occurrence, but the dome-shaped mounds so common in the uplands are absent except in occasional areas. The natural drainage is good except in the depressions and along the marginal areas adjoining the Portland clay. In many places, especially along the bayou, the type is badly cut up by sloughs, oxbow lakes, "breaks," and bayous.

The original forest growth on this soil was principally sweet gum, white, willow, pin, red, and post oak, black and shellbark hickory, and holly. At present about 95 per cent of the type is cleared and in cultivation.

The Portland very fine sandy loam is a very easy soil to cultivate and can be worked under a wide range of moisture conditions. The physical character of the soil is such that a good surface mulch can be easily obtained. The soil is fairly rich in organic matter and is neutral, as indicated by the litmus test. Cotton is the main crop grown on this soil, and it is considered the best cotton soil in the county. Before the advent of the boll weevil a yield of 1 bale per acre was not uncommon. At present one-third bale per acre is about the average crop. Simpkins and Triumph are the favorite varieties of cotton. Corn is the second crop in importance and yields from 15 to 40 bushels per acre with ordinary methods of cultivation. The favorite varieties are Powell and Mosley. Both the yellow and white dent corns are adapted to the section. Lespedeza and cowpeas are gaining favor with the farmers. Lespedeza is cut two or three times a season and produces from 2 to 3 tons of hay. Cowpeas do well and make excellent hay. Soy beans also thrive and a good many farmers are taking up their cultivation. Oats yield from 20 to 30 bushels per acre, much larger yields could certainly be obtained were the seed bed more carefully prepared.

Sugar cane, peanuts, sweet and Irish potatoes, and garden vegetables, are the leading special crops. Sugar cane does well, producing from 200 to 500 gallons of sirup per acre. Peanuts, although they make an excellent crop and are of benefit to the soil, are grown in quantities barely sufficient for home consumption. All the vegetables suited to this county thrive on the Portland very fine sandy loam, yet are grown in only one or two cases in a commercial way. Sweet potatoes yield from 100 to 150 bushels and Irish

potatoes from 125 to 150 bushels per acre, but neither crop is produced for shipment. Peaches, plums, and small fruits give good results. The fig, when planted in sheltered positions, also fruits well.

Notwithstanding the fact that this is at present the most productive and valuable land in the county, it is safe to say that the present yields can be at least doubled with the best methods of cultivation.

The price of land of this type is rather variable and ranges from \$20 to \$60 or more an acre, depending upon improvements and proximity to markets. One small area is reported to have brought \$100 an acre.

In the following table are given the results of mechanical analyses of samples of the soil and subsoil of the Portland very fine sandy loam:

*Mechanical analyses of Portland very fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
460613.....	Soil.....	0.1	0.3	0.2	1.1	45.5	43.9	8.9
460614.....	Subsoil.....	.....	.2	.2	1.4	35.8	43.6	19.0

#### PORTLAND CLAY.

The Portland clay consists of a mottled drab and brownish-yellow or dingy-brown heavy silty clay loam to silty clay, 16 to 24 inches deep. Below this there lies a plastic, sticky clay of a peculiar salmon red to chocolate-red color. In the lower and flatter areas the color of the surface soil is lighter than typical, and there are spots on the higher hummocks and swells where the surface soil is a brown silt loam. Along Bayou Bartholomew the soil is better drained, more undulating, and more eroded than in the case of the typical soil. The entire 3-foot section of eroded areas here takes on the reddish color characteristic of the lower portion of the type. Numerous iron concretions occur throughout the soil section and give rise to the local term "buckshot land." The better drained areas are often locally known as "black buckshot land" and the flatter areas as "gray buckshot land." The greater part of the clay type along Overflow Creek, owing to its low position and consequent frequent inundation, being of lighter color, is known by the latter term.

This type has been mapped only in the bottoms of the eastern part of the county and owes its origin to the activities of the same streams giving the Portland very fine sandy loam. It comprises large areas lying along the lower course of Overflow Creek, and known

as Overflow Swamp. It also occurs just east of the main sandy ridge following Bayou Bartholomew. The lower part of this area is known as Boeuf River Swamp. Scattering areas are found throughout the eastern bottoms.

The Portland clay is generally flat and lies at a low level. It is consequently subject to frequent overflow and during the greater part of the winter months the lower areas are more or less covered with water.

Owing to its present waterlogged condition, very little attempt has been made to clear and cultivate this soil. Practically all of it supports a forest consisting of various oaks, gum, hickory, and cypress, with an undergrowth of swamp palmetto and cane. A large amount of valuable timber has been and is being taken from this type and either worked up in local mills or floated down the Bayou to Monroe, La.

Drainage will be necessary before the Portland clay can be successfully cultivated. A dredged ditch is nearing completion, which, as described elsewhere, will undoubtedly be of value for carrying off surface water, especially at the upper end of the ditch, but, owing to the lack of a sufficient outlet, will be of small value farther down. It is likely that other ditches will follow as the advantages of artificial drainage become more apparent and as the country develops. After the proper installation of dredged ditches and laterals, tiling will likely prove profitable in many cases.

It is very probable that as this type is developed it will prove to be a strong soil, suited to the production of corn, oats, and grasses. Long-staple cotton is said to have given good results in several trials on small areas of the better drained portion of this type. Under boll-weevil conditions, soils that mature cotton early will be better suited to cotton than this type.

Land of the Portland clay type is valued at present primarily upon the basis of its forest growth and varies accordingly. In its present state the type is of value only for lumbering and as a range for cattle and hogs.

The results of mechanical analyses of samples of the soil and subsoil of this type are given in the following table:

*Mechanical analyses of Portland clay.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
460615.....	Soil.....	0.3	1.4	1.3	2.9	5.7	38.4	50.4
460616.....	Subsoil.....		.2	.2	.9	3.3	30.3	65.2

## VICKSBURG SERIES.

The soils of the Vicksburg series are characterized by the brownish color and prevailing silty texture of the surface portion, and by the brown or dark-brown color and friable structure of the subsoil. The material represents alluvial deposits derived from brown loess or soils like the Memphis and Knox. Along some of the smaller streams much of the material is of a colluvial character or partly colluvial, having been moved only a short distance from the adjacent slopes and lateral drainage ways, but the typical soils occur as first-bottom, frequently overflowed alluvium. Along some streams inundation is not always from the central or main stream channels, but from the smaller tributaries.

## VICKSBURG SILT LOAM.

The Vicksburg silt loam consists typically of a brown mellow silt loam, with but little change from the surface downward. At about 12 inches the color of the soil frequently becomes a slightly lighter brown. Occasionally there is a slight mottling of drab or gray in the lower subsoil section, while faint dingy or rusty-brown mottling is fairly conspicuous. Some areas of Waverly silt loam too small to be accurately separated have been included in this type.

This is an alluvial first-bottom soil occurring along the majority of the watercourses in the uplands region. The material is derived mainly from the Richland silt loam, from which it was washed and subsequently deposited over the flood plains of the streams during periods of overflow.

Owing to its flat surface and low position and to the crooked courses and sluggish character of the streams, this land is subject to frequent inundation. For this reason only a small proportion of it has been cleared and put in cultivation. The greater part at present supports a heavy growth of red and water oak, hickory, beech, sycamore, holly, gum, dogwood, haw, and some pine.

This soil is very productive and wherever possible should be brought into cultivation. Areas too wet for cultivation might well be cleared and put in grass, such as Bermuda and Lespedeza, for hay and pasturage. Straightening and clearing the stream channels would do much to prevent the minor overflows.

Very good yields of cotton, corn, and oats are produced on this soil. The grass and legume crops also do well.

## BOEUF SERIES.

The surface soils are brown, with yellow plastic subsoils. The members occupy low areas in the vicinity of drainage ways, and are usually found associated with the loessial soils. They are derived from Piedmont-Appalachian material.

## BOEUF VERY FINE SANDY LOAM.

The Boeuf very fine sandy loam consists of a light-brown to yellowish-brown very fine sandy loam, underlain at about 10 inches by yellowish-brown very fine sandy loam, which persists to an average depth of 18 to 20 inches, where a very fine sandy clay of a mottled yellowish-brown and red color is encountered. At about 30 inches the soil as a rule becomes coarser, averaging a heavy fine sandy loam. While the upper section of this type is fairly uniform, the subsoil shows a considerable variation in texture, ranging from the very fine sandy clay as described above to a sticky very fine sandy loam. The closer the soil lies to the river, the coarser the material, as a rule. One small ridge too small to map consisted of a light-brown to yellowish-brown medium sand, underlain by material of the same texture but of a somewhat lighter color, and containing a noticeable amount of fine gravel. The elevation of this strip is only slightly greater than that of the main type and it is subject to practically as frequent overflow. This strip occurs on the break between the first and second bottoms near the Marie-Saline landing, and there may possibly be other small areas of the same character within the bottoms mapped as Swamp. This higher land is probably the soil mapped as Boeuf fine sandy loam in the survey of East and West Carroll Parishes, La.

The Boeuf very fine sandy loam occurs as islandlike ridges varying in extent from a few acres to a square mile or more. These areas occur irregularly from near the uplands to the river front. Their elevation is higher than that of the surrounding bottoms, and as a rule they are overflowed only during extremely high water, although some of the lower lying ridges are inundated perhaps once every spring. This type owes its origin most probably to deposits laid down by the Ouachita and Saline Rivers in earlier times when the waters of these streams reached higher levels than at present.

Drainage over the greater part of the type is fairly good. The natural forest growth consists mainly of hardwoods, although there is considerable shortleaf yellow pine. Much of the type has been logged off. Settlers long ago sought out these ridges for their farms and the majority that are large enough have been cleared and put under cultivation.

This is the only soil of the Ouachita and Saline bottoms that has any present agricultural value. Owing to its texture and drainage conditions it is easily handled. It is naturally quite productive, but is often in poor physical condition as the result of continuous cropping. General farm crops, such as cotton, corn, and oats are the main crops. Lespedeza and Bermuda grass are the chief hay and forage crops.

The value of this land depends largely upon the class of improvements. It may ordinarily be bought for \$5 to \$10 an acre.

Mechanical analyses of samples of the soil and subsoil of this type gave the following results:

*Mechanical analyses of Boeuf very fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
460635.....	Soil.....	0.2	0.4	0.2	15.9	34.8	40.3	7.8
460636.....	Subsoil.....		.2	.2	14.9	40.9	28.0	16.0

SEDIMENTARY MATERIAL—SANDS AND CLAYS.

CROWLEY SERIES.

The soils range from ashy gray to light brown in color, with mottled brown, yellow, and red to almost uniformly yellow clay subsoils. Lime and iron concretions are present in the subsoil, which is quite impervious to water. This feature favors the production of rice. The surface configuration is very flat. These are the typical prairie soils of Louisiana and Arkansas, formed of reworked loessial material.

CROWLEY SILT LOAM.

The Crowley silt loam consists of a grayish-brown to brown silt loam 8 to 12 inches deep, underlain by yellowish-brown silt loam which becomes heavier with depth, grading at about 15 inches into mottled gray or drab, yellow and reddish silty clay loam. The subsoil proper begins at about 20 inches. This is a plastic clay or silty clay mottled with gray, drab, yellow, and red. The red mottlings increase with depth and occasionally the subsoil becomes a solid red within the 3-foot section. This heavy plastic layer is undoubtedly of the same origin as the heavy red clay layer underlying the Richland soils at depths of 6 feet or more. The color of the soil of this type varies considerably with its drainage conditions, the poorly drained areas being much lighter in color than those better drained. The surface dries out to an ashy-gray or light-grayish color. Iron concretions and rust-brown stains are common throughout the body of the soil. The soil gives an acid reaction with the litmus test. The mounds, which are very numerous on this type, are composed of rather coarse silt loam, grading downward into a very fine sandy loam. This mound soil frequently contains rounded gravel of chert and granitic material, identical with that found in the Ruston fine sandy loam.

The surface soil of the Crowley silt loam is identical in texture with that of the Richland silt loam and is undoubtedly closely related to it in origin. The subsoil very likely belongs to an older sedimentary formation—probably the Port Hudson.

This type has been mapped mainly in Fountain Prairie, with one or more scattering areas elsewhere. It occupies the northern portion of the divide between the eastern and western drainage systems, and its drainage is therefore divided between these systems. Its topography varies from level to gently undulating. In places the dome-shaped mounds are sufficiently numerous to give the surface a billowy configuration. The drainage courses are shallow, the currents are sluggish, and drainage conditions poor, the subsoil remaining saturated or soggy in many places throughout the greater part of the year. Owing to its position, this type could be easily ditched and good outlets provided for lateral drains. The impervious subsoil makes drainage necessary for the best results.

The natural vegetation of the type consists of various grasses, chief among which is broom sedge. The comparatively large amount of organic matter in this soil represents the accumulated remains of these grasses. The mounds usually support scattered sassafras trees in addition to the grass.

Probably one-half of the Crowley silt loam is under fence, although only a small proportion of the fenced area is under cultivation. Cotton and corn are the principal crops. Fairly good yields of these are obtained. Of late rice growing has been gaining in importance. The soil is well suited to the production of rice and is being used for this crop successfully in portions of southern Arkansas, southern Louisiana and southeastern Texas. Considerable attention is being given to the growth of legumes and to their incorporation in a systematic rotation.

Farm improvements on the Crowley silt loam compare favorably with the average of the county. The price of the land is higher than that of the surrounding upland soil types, mainly on account of its cleared condition and its adaptability to the growing of rice. Its average price is about \$20 an acre.

*Crowley silt loam, timbered phase.*—To a depth of 6 to 8 inches the soil of the Crowley silt loam, timbered phase, consists of a grayish-brown to dark-brown silt loam. The immediate surface is usually slightly darker than the underlying soil, owing to the accumulation of organic material. The subsurface is a mottled gray and dingy-brown silt loam or heavy silt loam to about 16 inches, where a drab or mottled gray, drab, and red silty clay loam to silty clay is encountered. This clay layer becomes very plastic with depth and the red mottling increases and predominates in the lower depths.

The origin of this phase is undoubtedly the same as that of the main type. Its principal points of difference lie in drainage, in vegetation, and in the color and depth of the soil.

The Crowley silt loam, timbered phase, was mapped principally in the northern part of the county, the main body of it lying adjacent to and north of Fountain Prairie. The topography varies from very slightly undulating to flat. The drainage is poor.

As may be inferred from its name, this soil supports forest, the growth being heavy. Red oak, post oak, white oak, hickory, mixed with some pine, are the prevailing species. Gum, and willow oak predominate in the poorer drained areas.

The peculiar mounds of the region are numerous in the phase, although not so prominent and apparently smaller than those on the areas of the typical soil.

Very little of this phase is farmed. Fair yields are obtained on the better drained areas. When drained, cotton, corn, oats, and the various legumes and grasses which succeed in this region should prove successful crops under proper management. With the extension of rice growing this soil will probably be found a desirable type for this crop.

In general the price of this soil ranges from \$5 to \$10 an acre. Areas supporting a valuable growth of forest bring higher prices, based upon the estimated cut of lumber.

#### ORANGEBURG SERIES.

The soils of this series are marked by their gray to reddish-brown color and open structure. The subsoils consist of a friable sandy clay. They are confined to the uplands of the Atlantic and Gulf Coastal Plains, being most extensively developed in a belt extending from southern North Carolina to central Texas. In origin they are commonly ascribed to the Lafayette formation of Piedmont-Appalachian material.

#### ORANGEBURG FINE SANDY LOAM.

The Orangeburg fine sandy loam consists of 6 to 12 inches of a brown to reddish-brown fine sandy loam, gradually passing into a subsoil of reddish-brown to red, friable, fine sandy clay. The red color increases with depth, and at times in the lower depths the structure becomes somewhat loose, owing to an increased amount of sand and fine gravel. Gravel is often abundant over the surface and throughout the soil section.

This type has only a small extent in Ashley County. The areas contain many small patches of Ruston fine sandy loam, so that the extent of typical soil is even less than the map would indicate. The areas lie mostly in the west-central part of the uplands, though there

are a few small areas in the southwestern part. It is derived from Coastal Plain deposits, and aside from its red color is very similar to the fine sandy loam member of the Ruston series. Its topography is undulating to gently rolling and drainage well established.

A considerable proportion of this type is cleared and used for general farming. It is easily cultivated and yet heavy enough to be retentive of moisture. Such soils are well adapted to the production of a wide range of crops. Locally cotton, corn, oats, cowpeas, soy beans, lespedeza, and Bermuda grass do well. Such vegetables as Irish and sweet potatoes, cabbage, and tomatoes give good yields.

The Orangeburg fine sandy loam in some other southern areas has become notable for the large, firm-fleshed, highly colored, and well-flavored peaches it produces. The greater part of this soil as mapped in Ashley County likely could be successfully used in growing this fruit.

Land of this type has about the same value as the uplands of the region generally and may be bought for \$5 to \$15 an acre.

#### GRAY SOILS.

##### WATER-LAID MATERIAL—MIXED DERIVATION.

##### WAVERLY SERIES.

The surface soils are light gray in color and overlie gray or mottled yellowish and grayish subsoils. This series is typically developed in the poorest 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 used for corn and grass, to which they are fairly well adapted.

##### WAVERLY SILT LOAM.

To an average depth of about 6 inches the Waverly silt loam consists of a gray to mottled gray and yellow silt loam, with frequent splotches of brown iron stains. Below this the material consists of a gray to drab silt loam, becoming very compact with depth. Yellowish and brownish iron stains give a mottled appearance to this lower section also. Occasionally the lower subsoil contains thin lenses of clay, although the soil as a whole averages a compact silt loam. Iron concretions are found in both the soil and subsoil.

The Waverly silt loam is not an extensive type in this county. It has been mapped chiefly in the southwestern part, where it occurs as low first bottoms along the various upland streams.

The surface of this soil is very flat and the drainage even between overflows is poor. Its grayish color may be attributed largely to this condition and the consequent lack of oxidation. The straightening

and deepening of the stream channels is of prime importance in improving this soil.

Very little of the type is under cultivation, the main portion being occupied by a heavy growth of timber. Several corn and cotton fields and small pastures were seen, but owing to their frequent inundation the yields are very uncertain. More of it should be cleared for grass, however, as it is an excellent pasture and hay soil, lespedeza doing well.

*Waverly silt loam, heavy subsoil phase.*—The surface soil of the Waverly silt loam, heavy subsoil phase, consists of a gray silt loam, slightly mottled with pale yellow. This is underlain at 10 inches by gray silty clay loam, which passes at about 24 to 30 inches into plastic silty clay with a fairly uniform pale brownish drab color. Gray mottlings become more conspicuous with depth. The texture of the soil varies locally from heavy silt loam to very fine sandy loam where it lies adjacent to the very fine sandy loam type.

This soil occupies a strip of high first bottoms or low, imperfect terraces along the Saline and Ouachita Rivers. It occupies a somewhat lower elevation in general than does the very fine sandy loam, but the difference is often so slight that it can not be detected by the eye.

The surface of the Waverly silt loam, heavy subsoil phase, is generally level, but it may be broken by small depressions, bayous, and lakes. During winter and spring much of this land is inaccessible owing to the mirey, water-logged condition of the roads. Frequent winter and spring overflows from the Ouachita and Saline Rivers flood a great part of this type.

Under present conditions none of the type can be cultivated. With sufficient levee protection, both this soil and the Waverly very fine sandy loam could be successfully farmed. Corn, oats, peanuts, cowpeas, Irish potatoes, lespedeza, rice, soy beans, and sugar cane should succeed.

In its present condition the type, aside from its forests of valuable hardwood, is of use only as a range for stock.

Below are given the results of mechanical analyses of samples of the soil and subsoil of the Waverly silt loam, heavy subsoil phase:

*Mechanical analyses of Waverly silt loam, heavy subsoil phase.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
460627.....	Soil.....		0.2	0.2	2.0	5.0	80.3	12.3
460628.....	Subsoil.....	0.2	.1	.2	1.5	4.3	57.7	36.0

## WAVERLY VERY FINE SANDY LOAM.

The Waverly very fine sandy loam consists of a gray or white to mottled gray and pale-yellow very fine sandy loam, underlain at an average depth of about 6 inches by mottled drab and yellow silty clay. At about 24 inches a heavy plastic silty clay is reached. The color of the subsoil changes in the lower part to drab or dark gray.

Some small areas were included in which clay is exposed at the surface. A heavy growth of swamp palmetto usually characterizes these heavier areas.

This type occupies a terracelike or high bottom situation along the Ouachita and lower Saline Rivers and Snake Creek. The type is subject to heavy inundation during time of high overflow.

The surface is flat. Numerous depressions and bayous representing old stream channels exist. The drainage is poorly established.

The type is covered with a medium heavy growth of trees, consisting principally of pine, various oaks, gum, and dogwood. Swamp palmetto is a characteristic plant in the undergrowth. There are some open grassy areas. In these broom sedge and various water-loving grasses are found. Aside from the range it affords, this soil is agriculturally worthless in its present condition. Successful reclamation would entail the construction of levees to protect from overflow and ditching to carry off the surplus rainfall. Lespedeza, sugar cane, oats, and forage crops would be more likely to succeed than other crops, except rice.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

*Mechanical analyses of Waverly very fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
460633.....	Soil.....	.....	0.1	0.2	17.4	27.8	47.8	6.3
460634.....	Subsoil.....	.....	.1	.2	9.3	19.3	41.6	29.7

## SEDIMENTARY MATERIAL—SANDS AND CLAYS.

## RUSTON SERIES.

The soils are gray to grayish brown, and are underlain by reddish-yellow to yellowish-red or dull-red, moderately friable subsoils, prevailing of sandy clay. The series holds an intermediate place between the Orangeburg and Norfolk soils in the color of its subsoils, and a similar place between the Orangeburg and Norfolk, on the one side, and the Susquehanna on the other side, in point of subsoil structure. Occasionally the lower subsoils are mottled with gray and shades

of yellow. The soils are closely associated with the Orangeburg and Susquehanna, although probably derived from practically the same formation as the Orangeburg.

#### RUSTON FINE SANDY LOAM.

To depths ranging from about 8 to 12 inches the Ruston fine sandy loam consists of a pale-yellow to grayish-brown fine sandy loam. Its structure is loose and open, and the texture somewhat variable, although averaging a fine sandy loam. The subsoil varies from a heavy fine sandy loam to friable fine sandy clay, and ranges in color from a yellowish red to reddish yellow. The above description is applicable more to the lighter, better drained portion, as that on the mounds or hummocks. The lower areas—the intermound and flat areas—are occupied by a brownish heavy fine sandy loam with yellowish fine sandy clay subsoil, which frequently shows a mottling of gray. The presence of waterworn gravel is a characteristic of this soil. It is usually most abundant upon the surface, but is present throughout the soil section. A variation from the description of the main type has been encountered in small, flat depressions and occasional areas bordering small streams, which, though sufficiently distinct for classification, owing to their small extent have not been separated. The soil in these areas is much lighter in color and somewhat coarser in texture, averaging a grayish, relatively coarse-textured fine sandy loam.

The Ruston fine sandy loam is derived from the Coastal Plain deposits that underlie the silt stratum over a considerable part of the uplands. Areas of this soil are confined mainly to the northwestern part of the county. The topography varies from gently undulating to gently rolling, and in places hilly. The drainage is good to excessive, except in the poorly drained depressions or flats bordering small streams. The rather heavy though porous subsoil enables the soil to absorb and hold a relatively large proportion of the rainfall, thus reducing erosion to a minimum and enabling crops to withstand protracted droughts.

The Ruston fine sandy loam originally supported a heavy growth of shortleaf yellow pine and hardwoods. A greater proportion of it is now cleared and under cultivation than of any other upland soil in the county. Probably the forest has been removed from 50 per cent of its area, although some of the cleared land is in old abandoned fields. Under ordinary conditions cotton produces one-third to one-half bale and corn 20 to 30 bushels per acre. Oats produce well. To show what may be done with this crop, one carefully cultivated field gave an average of 60 bushels per acre last year (1912). The various grasses and legumes also do well on this type. Sugar cane gives good yields, especially in the moist depressions.

Peaches, plums, and small fruits give satisfactory results on the well-drained areas. Early vegetables and garden truck might be made profitable crops on this early well-drained soil, with proper fertilization and cultivation. Irish potatoes should also be a profitable crop.

The Ruston fine sandy loam is a soil that is apparently easily impoverished, and on the other hand may be easily built up. Owing to its productiveness and easy tillage, this type has been continuously and heavily cropped, until in some instances the crops are no longer profitable.

General farm improvements on this type are better than the average for the county. The price of the land is about the same as that of the surrounding types—from \$8 to \$15 an acre.

#### RUSTON VERY FINE SANDY LOAM.

The soil of the Ruston very fine sandy loam consists of a pale-yellow to grayish-brown very fine sandy loam, underlain at about 8 to 10 inches by reddish-yellow to dull-red silty clay loam carrying enough very fine sand to impart a friable structure. This grades below into friable, dull-red fine sandy clay. Frequently a layer of very fine sandy loam is encountered below the clay, usually at about 30 inches. Mottlings of brown and gray are common in the lower subsoil. In places the very fine sandy loam soil grades directly into fine sandy clay, without the intervening stratum of silty clay loam. Occasionally small areas occur where the poor drainage tends to give the soil a gray cast throughout the upper section, though not appreciably affecting the subsoil. The soil of these grayish areas is, as a rule, acid. Gravel is seldom encountered in this soil, and then not so abundantly as in the coarser type of this series.

Mounds are numerous, their texture being somewhat coarser than that of the surrounding soil. In cultivated fields, also, owing to their elevation and consequent better aeration, the material of the mounds has been leached and oxidized in such a way that the soil is considerably lighter in color than the surrounding soil.

This type occurs mainly in the northwestern portion of the county in association with the Ruston fine sandy loam. Its topography varies from nearly flat to gently rolling. The flatter areas usually occur as strips bordering sluggish small streams, and consequently are at present poorly drained. By straightening and cleaning out the channels of these streams the drainage of these areas could be greatly improved. The undulating to gently rolling areas of this type have adequate drainage.

Probably 20 per cent of this type is cleared and in cultivation. Occasional old deserted fields have grown up in old-field pine and

brush. The greater part of the type supports a fine growth of short-leaf yellow pine, loblolly pine, various oaks, hickory, beach, and maple. Gum, and willow oak are numerous on the poorer drained areas.

Owing to its finer texture, this soil is not so much inclined to lose its organic matter as the coarser members of the series. The land is easy to till and to keep in good pulverulent conditions. Cotton, corn, and oats produce very satisfactory crops. Peanuts should do well. Cowpeas, soy beans, vetch, lespedeza, Bermuda grass, and various winter cover crops may be easily grown. The type, especially the well-drained portion, is very well suited to truck farming. The soil warms up fairly early. Vegetables may be ready for the table in early April.

Peaches, plums, and small fruits produce well on this soil. There is one large orchard of Elberta peaches, on a truck and dairy farm north of Crossett, which produces a fruit of fine quality and good color under no better natural conditions than exist over a large part of the type.

Land values on the Ruston very fine sandy loam vary with the amount of cleared land and the class of improvements. The general price for average land is, however, between \$8 and \$15 an acre.

#### MISCELLANEOUS MATERIAL.

##### SWAMP.

A strip of land from 1 to 3½ miles wide, bordering the Ouachita River and the lower course of the Saline River could not be surveyed in detail owing to its flooded condition during the time when the field work was in progress. This area is shown on the map as Swamp. It doubtless includes areas of the Waverly silt loam, Waverly very fine sandy loam, Bœuf very fine sandy loam, and various sands with clays occupying the local depressions.

Oak, gum, and various other hardwoods with much excellent shortleaf yellow pine constitute the principal forest growth on this area.

In its present state this Swamp is of no agricultural value. It can be reclaimed and brought into cultivation only by leveeing the Ouachita and Saline Rivers and straightening and deepening the channels of the numerous bayous which traverse the bottoms. If once reclaimed, these bottoms could be used with varying degrees of success, according to the texture and drainage of the land, for corn, oats, cotton, grass, forage crops, rice, and potatoes and other vegetables.

## SUMMARY.

Ashley County lies near the eastern end of the southern tier of counties in Arkansas, one county separating it from the Mississippi River. It has an area of 932 square miles, or 596,480 acres. It lies within the Gulf Coastal Plains. Its upland soils are both loessial and sedimentary.

The surface of the uplands varies from flat, through gently undulating, to rolling. The stream bottoms and terraces are generally flat and poorly drained. Numerous mounds of doubtful origin occur throughout the county. The general slope of the county is to the south.

The first settlements were made along Bayou Bartholomew between 1835 and 1840. In 1841 the first settlement took place upon the uplands. Ashley County was organized in 1846.

The population of the county in 1910 was 25,268. Hamburg, the county seat, has a population of about 1,800. Crossett, the largest town, has a population of over 2,000.

Railroad transportation facilities throughout the county are good.

The mean annual temperature of the county is 63° F. The highest recorded temperature is 108° and the lowest -10°. The mean annual rainfall is 49 inches.

Lumbering is the main source of revenue at present, though agriculture is growing in importance. Cotton, in spite of the damage wrought by the boll weevil, continues to be the main crop. Corn is the crop of next importance. The production of rice is extending, especially in the prairie regions. Cowpeas, soy beans, lespedeza, vetch, and Bermuda grass are the forage and pasture crops. Peaches, plums, and small fruits thrive, especially on the Ruston and Orangeburg soils. Truck farming is followed only to an extent sufficient to supply home markets. The opportunity for this class of farming is good.

There is unlimited range for hogs and cattle. Dairying is carried on to a very limited extent, hardly supplying sufficient milk for local town consumption.

Most of the farms in the eastern bottoms are operated by tenants. The proportion of tenanted farms in the uplands is hardly so large. Only about 15 per cent of the land in the county is at present cleared and in cultivation.

Including Swamp, 12 soil types have been mapped in Ashley County.

The Richland silt loam is by far the most extensive type. It is derived from the loess. It is best suited to the production of general farm crops. A poorly drained phase and a prairie phase, the latter affording excellent pasturage and general farming land, are dis-

tinguished on the map. In recent years the prairie phase has been in demand for rice growing.

The Crowley silt loam is a productive soil in considerable demand for rice growing. A timbered phase will need draining to fit it for cultivation.

The Ruston fine sandy loam and very fine sandy loam are for the most part well-drained soils, suitable for all farm, truck, and fruit crops. If not properly handled they are soon depleted of organic matter.

A small area of the Orangeburg fine sandy loam exists in the county. It is especially well suited to trucking and orcharding, as well as to the general farm crops.

The Portland very fine sandy loam is the most productive soil in the county. It occupies slight ridges in the eastern bottoms and is well adapted to general farm and truck crops.

The Portland clay is more or less swampy and is in very evident need of drainage, after which it will likely become a strong and lasting soil.

The Vicksburg silt loam is a productive first-bottom soil occurring along upland streams, and subject to frequent inundation. On areas that are not too often overflowed excellent crops are produced.

The Waverly silt loam is a grayish first-bottom soil lying along the Ouachita and Saline Rivers and the upland streams. Owing to its poor drainage and frequent inundations it is in a water-logged condition.

The Waverly silt loam, heavy subsoil phase, and Waverly very fine sandy loam constitute the greater part of the flat, imperfectly formed terraces along the Ouachita and Saline bottoms. In their present overflowed condition they are unfit for cultivation. Some portions are used as range for hogs.

The Boeuf very fine sandy loam occupies small, irregular ridges lying from 3 to 5 feet above the surrounding terrace areas. They are usually cleared and in cultivation and are not seriously affected by floods.

Swamp includes the narrow strip of first bottom occurring along the Saline and Ouachita Rivers and a strip of terrace formation most likely composed of the Waverly and Boeuf soils with interspersed sand and clay depressions. Owing to its inaccessibility, due to the high water, no attempt was made to separate this area into soil types.

[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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