

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

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# SOIL SURVEY OF HEMPSTEAD COUNTY, ARKANSAS.

BY

ARTHUR E. TAYLOR, IN CHARGE, AND W. B. COBB.

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HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

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



WASHINGTON:  
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1917.

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

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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF SOILS,  
*Washington, D. C., June 15, 1917.*

SIR: The accompanying report and soil map cover the survey of Hempstead County, Arkansas, one of the projects undertaken by the bureau during the field season of 1916.

I recommend that these be published as advance sheets of Field Operations of the Bureau of Soils for 1916, as provided by law.

Respectfully,

MILTON WHITNEY,  
*Chief of Bureau.*

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

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### MAP.

Soil map, Hempstead County sheet, Arkansas.

# SOIL SURVEY OF HEMPSTEAD COUNTY, ARKANSAS.

By ARTHUR E. TAYLOR, In Charge, and W. B. COBB.—Area Inspected by  
HUGH H. BENNETT.

## DESCRIPTION OF THE AREA.

Hempstead County is situated in the southwestern corner of Arkansas, being separated from Texas and Louisiana by only one tier of counties. It is bounded by Howard and Pike Counties on the north, Nevada County on the east, Lafayette County on the south, and Miller, Little River, and Howard Counties on the west. The county is irregular in outline, a part of its northern boundary being formed by the Little Missouri River and Hickory Creek and a part of the western boundary by Red, Saline, and Little Rivers. It has an area of approximately 727 square miles, or 465,280 acres.

The topography of the county is undulating to gently rolling with narrow belts of low hills along the bluffs of the main streams. The elevation of the undulating upland is a little more than 300 feet above sea level, ranging in a few places to about 400 feet. The river valleys have been cut to depths of 50 to 200 feet below the upland, though the river bluffs rarely rise abruptly more than 100 feet above the flood-plain levels.

The valleys of the larger streams range from 1 to 5 miles in width, and usually include terrace as well as recent-alluvial belts.

Hempstead County lies within the drainage basins of the Red and Little Missouri Rivers. The principal watershed enters the county from the north at a point about 2½ miles west of Bingen and extends southward to Yancy, where it turns southwestward and then east, following the course of the South Fork of Ozan Creek to a point near St. Annies Church, whence it continues in a general southeasterly direction to a point near Reeds Store. Here it turns south to Hope, whence it follows an easterly direction, passing into Nevada County 2 miles southeast of Rocky Mound Hill. West of this divide the streams flow south and southwest to the Red River. To the east the drainage is carried eastward and northeastward to the Little Missouri River.



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

With the exception of a few comparatively small interstream areas, where the drainage is only partially developed, the upland portion of Hempstead County is well ramified by drainage ways. The flood plains of the larger streams lie 30 to 200 feet below the upland level and are very broad. The flow of stream water is sluggish, and ordinarily the bottom lands are poorly drained. The stream terraces also are usually poorly drained because of the flat surfaces, the impervious nature of many of the subsoils, and the presence of small circular mounds, which impede the natural flow of the water.

The first settlement in this region was made in 1804, three fourths mile northwest of the point where the Hope and Washington Road crosses Caney Creek. Hempstead County was established December 15, 1818, being one of the four original counties of Arkansas. Washington was made the county seat. At that time Hempstead County comprised the territory now occupied by Hempstead, Lafayette, Columbia, Ouachita, Union, Miller, Little River, Sevier, Howard, Pike, and Nevada Counties. The early settlers were of Anglo-Saxon descent and came from North and South Carolina, Tennessee, Kentucky, and Missouri. The present white population consists mainly of descendants of these early settlers, and to some extent of families who in recent years, on account of the low price of land, have come from Iowa, Missouri, Wisconsin, Illinois, Indiana, and other Northern States. There are very few foreigners, but about 35 per cent of the population is colored. The total population of Hempstead County, as reported in the census of 1910, is 28,285, of which 3,639 are urban and the remainder rural. The rural population averages 33.9 persons per square mile.

Hope, with a population, according to the 1910 census, of 3,639, is the largest town, and the most important railroad, shipping, distributing, and banking point. Washington, the county seat, with a population in 1910 of 399, and Fulton, with 647, are also important shipping points, the latter being situated on the Red River. Blevins, in the northeastern corner of the county, is the main shipping point for cantaloupes and early radishes and is the principal town on the Prescott & Northwestern Railroad. Ozan, Tokio, Bingen, and Emmet are other important shipping points.

The county is well supplied with transportation facilities, no point being more than 8 miles from a railroad station. The main line of the St. Louis, Iron Mountain & Southern Railway crosses the southern part of the county in a northeast-southwest direction, with a branch extending from Hope northwest to Nashville, the county seat of Howard County. The Louisiana & Arkansas Railway extends southward from Hope, its northern terminus, to connecting points on the St. Louis Southwestern and the Vicksburg, Shreveport &

Pacific Railways. The Prescott & Northwestern Railroad traverses the extreme northern part of the county in a southeasterly direction from Tokio, passing through Blevins. The Memphis, Dallas & Gulf Railroad crosses the northwestern corner. The Red River affords transportation when the water is at or above normal level, but at present only a comparatively small part of the freight is moved by water.

The public-road system of the county is quite extensive, all sections being fairly well supplied with county and settlement roads. In many places the roads are poor, but all the public roads receive some repairs and the more important are kept in fair condition. Several miles of sand-clay roads have been constructed. Rural mail routes and telephone lines reach many parts of the county and are being extended.

Hope is the principal local market, while Arkadelphia, Little Rock, and St. Louis constitute the principal outside markets for the general farm products. Cantaloupes and early radishes are shipped to all large cities between Pittsburgh and Minneapolis.

#### CLIMATE.

The climate of Hempstead County is characterized by long summers and short, mild winters. The mean annual temperature, according to the records of the Weather Bureau station at Hope, is 62.5° F. January and February are the coldest months, but even during these months zero weather is very rare. Heavy frosts are common in the winter and the ground often freezes to a depth of an inch or two, for a few days at a time. The lowest temperature recorded at Hope is -10° F., and the highest 108°

The mean annual precipitation amounts to 52.71 inches; and this is generally well distributed throughout the year, though the larger part of it occurs during the winter and spring months. In the summer the upland section of the county occasionally suffers from short periods of drought. For the wettest year recorded the total rainfall is reported as 73.42 inches, and for the driest year, 29.20 inches.

The average date of the last killing frost in the spring is March 7, and of the first in the fall October 27. The latest recorded date of a killing frost in the spring is March 21, and that of the earliest in the fall October 10. There is a normal growing season of 234 days, which is long enough for the production of all the important crops of the general region.

The following table gives the normal monthly, seasonal, and annual temperature and precipitation as recorded by the Weather Bureau station at Hope.

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

Month	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December.....	46.3	80	9	4.44	0.77	11.40
January.....	43.6	79	7	5.04	4.86	3.98
February.....	44.4	82	-10	4.18	4.00	3.80
Winter.....	44.8	82	-10	13.66	9.63	19.18
March.....	54.7	90	20	5.31	4.12	4.36
April.....	63.7	91	31	5.32	1.98	7.80
May.....	71.2	94	38	5.42	2.77	12.27
Spring.....	63.2	94	20	16.05	8.87	24.43
June.....	77.1	100	52	3.98	.32	1.66
July.....	80.3	106	59	4.60	.76	7.51
August.....	79.3	108	52	3.36	.90	5.17
Summer.....	78.9	108	52	11.94	1.98	14.34
September.....	73.8	103	44	3.10	2.67	1.61
October.....	62.6	96	33	3.38	4.63	5.61
November.....	53.1	86	16	4.58	1.42	8.25
Fall.....	63.2	103	16	11.06	8.72	15.47
Year.....	62.5	108	-10	52.71	29.20	73.42

## AGRICULTURE.

With the exception of the prairies along the South Fork of Ozan Creek and south of Saratoga and McNab, the entire county was originally forested. The earliest settlers depended mainly on trapping and hunting, but cleared small patches for the production of corn, wheat, and garden crops. A little later, with the advent of settlers from the Carolinas, Tennessee, Kentucky, and Missouri, cotton growing and sheep raising were begun. A part of the cotton and wool produced was used for making homespun clothing. Supplies were obtained in exchange for cotton, wool, and hides at New Orleans, which was reached by way of the Red and Mississippi Rivers. Shortly after Hempstead County was organized a military road was built from the Mississippi River to the Texas border, extending from Fulton through Washington, Blevins, and Wallaceburg, and crossing the Little Missouri River a few miles below the mouth of Ozan Creek. This road still exists. By 1840 large plantations were operated with slave labor. The products from these and other farms were either taken at high-water stage by boat to New Orleans or hauled on wagons to Camden. During the Civil War agricultural operations were largely discontinued, and after

the war development was extremely slow until the building of the St. Louis, Iron Mountain & Southern Railway in 1873-74.

According to the census there were 27,142 acres in cotton in 1879, producing 13,985 bales, and 30,284 acres in corn, with a production of 418,837 bushels. Oats, wheat, hay, and potatoes were grown to a much smaller extent. The value of orchard and market-garden products was \$19,199. The 1890 census showed a marked increase in the area devoted to the leading crops. By 1899 the area in cotton had increased to 49,425 acres and the production to 19,079 bales, while corn was grown on 45,174 acres, from which 681,979 bushels were produced. The value of animals sold and slaughtered was \$152,224, of dairy products \$138,242, and of poultry raised \$33,355.

At present cotton and corn are the principal crops, followed by hay, oats, and cowpeas. Peanuts, sorghum, feterita, vetch, soy beans, velvet beans, rape, lespedeza, kafir, milo, and millet are the most important forage crops. Sugar cane, wheat, rye, and barley are grown to a small extent. Irish potatoes and sweet potatoes occupy a considerable total area, and watermelons and the garden vegetables common to the region are grown to some extent. Cantaloupes and radishes are important special crops.

Cotton is by far the most important crop and the principal money product. The 1910 census reports a total of 52,082 acres in cotton, with a production of 11,605 bales.

Corn ranks next to cotton in importance. Most of the corn is used on the farm, chiefly for feeding the stock, and to some extent as meal. The production of corn is not sufficient to meet the requirements of the county. White and yellow dent and flint varieties are grown. The 1910 census reports 50,492 acres in corn, with a production of 808,159 bushels.

Hay is grown on every farm and is the third crop in importance. The 1910 census reports a total of 2,828 acres in all cultivated grasses, with a production of 4,717 tons. Alfalfa alone occupied 1,278 acres, with a production of 2,112 tons. Other hay crops include Sudan grass, Johnson grass, Bermuda grass, and red, white, alsike, bur, sweet, and crimson clover. It is reported by farmers that there were fully 2,000 acres of Bermuda grass in Hempstead County in 1915. The greater part of the hay is fed on the farm to work stock and dairy and beef cattle. Considerable alfalfa and Bermuda-grass hay is shipped to Little Rock, Arkadelphia, and other points. The principal wild grasses are broom sedge, crab grass, and carpet grass.

Oats were grown on 1,755 acres in 1909, with a production of 24,463 bushels. Both winter and spring oats are grown, the earlier sown crop usually giving best results. Oats are used for pasturage as well as for the production of hay and grain.

Cowpeas are the most important of the minor crops, being grown on 3,046 acres in 1909, with a production of 18,002 bushels of seed. Over 800 acres were devoted to peanuts. This crop is grown mainly for hay, for hog pasturage, and as a soil improver. Sorghum is grown for both hay and sirup. In 1909 there were 1,771 acres devoted to this crop. Sugar cane was grown on 125 acres.

Sweet potatoes and Irish potatoes are grown both for home use and for sale at the local markets. In 1909, 780 acres were devoted to sweet potatoes, 485 acres to Irish potatoes, and 895 acres to all other vegetables.

The 1910 census reports 149,798 peach and nectarine trees and 13,766 apple trees in the county. These fruits are grown both for home consumption and for sale at the local markets. A small part of the fruit produced is shipped to Little Rock, Arkadelphia, and other outside markets. Elberta peaches of fine flavor and quality are produced on the Ruston, Orangeburg, and Norfolk soils. Plums and blackberries grow wild on most of the soils of the county.

Within the last few years the growing of cantaloupes has become a very important special industry along the Prescott & Northwestern Railroad, east of Hope and in the vicinity of Washington. Farmers report over 2,000 acres planted in 1916, of which 200 acres were the Pink Meat variety and the remainder the Rocky Ford. Cantaloupes are shipped to Chicago, St. Louis, Pittsburgh, Minneapolis, Detroit, and many other northern cities.

According to the estimates of shippers, about 3,000 barrels of early radishes were shipped out of Hempstead County in 1916, more than half of these being grown around Blevins. About 25 carloads of watermelons were shipped out of the county in 1915.

The income derived from the sale of dairy products amounted to \$134,671 in 1909, according to the census. There are a few good dairy farms in the vicinity of Hope, and most of the milk, cream, and butter produced is sold in that town. The number of cows kept on these farms ranges from 10 to 70, the purebred Jersey and grades of this breed predominating.

Probably 25 per cent of the farmers have a few hogs and beef cattle to sell each year, but these do not supply the home demand, and large quantities of beef and pork are imported. The leading breeds of hogs are the Duroc Jersey and Poland China. A few farmers are utilizing extensive tracts of undeveloped bottom land as pastures for herds containing 10 to 100 head of cattle. The Texas-fever tick is a serious drawback to cattle raising, but a number of dipping vats have recently been installed and steps are being taken to eradicate this pest. The census reports 12,271 hogs, 1,610 calves, 5,563 other cattle, and 178 sheep and goats sold or slaughtered in 1909.

There are not enough horses and mules raised in the county to supply the local demand.

In stock feeding the pasture grasses are supplemented with cottonseed meal, silage, concentrates, and dry feed. Corn, cowpeas, peanuts, and alfalfa are the principal feeds for hogs, which are maintained largely on pasturage. For work stock pasturage and roughage are supplemented with corn, oats, alfalfa meal, and various mixed feeds.

While most of the farmers understand the adaptation of certain crops to the various soils, only a small percentage of them apply this principle. It is generally recognized that the Houston clay is the best upland soil for the production of corn, cotton, alfalfa, red clover, and cowpeas, and that in the bottoms the Trinity, Miller, and Yahola soils, where properly drained, are best suited to the production of alfalfa, cowpeas, and red clover, and the Ochlockonee soils to the production of corn and cotton. The Ruston, Orangeburg, and Amite series are recognized as excellent cotton and cantaloupe soils and fair corn soils. The types of the Susquehanna series, where properly drained, plowed deep, and supplied with organic matter, are considered good cotton soils.

The Norfolk fine sand is considered well suited to the production of cantaloupes, peanuts, peaches, and garden crops, but is below the average for cotton and corn. With the exception of small areas, the Caddo, Kalmia, Lufkin, and Muskogee soils, on account of poor drainage, are below the average. The Leaf, Bibb, Myatt, and Portland soils, without drainage, are recognized as good for natural pastures and for growing Bermuda grass and lespedeza, but not suitable for general farming.

On farms operated by owners the houses are generally commodious and well built. Most of the fields are fenced with barbed wire, though woven wire is coming into more common use. A few farmers still use the rail fence. The farm machinery in general use includes 1-horse plows, capable only of stirring the soil to a depth of 3 or 4 inches, and narrow-tooth implements. The better farmers use 2-horse turning plows, disk plows, straight-tooth harrows, and multiple-tooth cultivators. Where farmers have only a few acres of small grain or hay, and where the fields are very stumpy, the cradle and scythe are used in harvesting, but in almost all cases where the fields are large and well cleared the binder and mowing machine are used. Mules are preferred as work animals, as they are more easily kept than horses, and endure the warm weather better. The mules are rather small and the horses are of a light harness type. Oxen are used to a very small extent in clearing and breaking land.

In growing cotton the land is usually prepared during the late winter by turning up the soil into ridges about 40 inches apart. The

old ridge is generally turned to each side by a 1-horse turning plow to form a new ridge or bed. Cotton is ordinarily planted late in March or in April. When the plants have come up the earth is turned back and the rows are thinned by chopping out the stalks with hoes, after which cultivation follows, first with a small turning plow or bull-tongue plow, and then with sweeps of various widths. Several hoeings are necessary to clean out the weeds. The boll weevil causes more or less damage every year, depending upon the rainfall. Picking begins the latter part of August and continues during the fall.

Corn is handled in much the same manner as cotton. It is planted from March until June. At the last cultivation cowpeas are frequently sown between the rows. These are either gathered for the seed or left for hog pasture. Corn is usually harvested by snapping the ears, the stalks being left for winter pasturage, but in a few cases both the stalks and ears are used for ensilage, which is considered more profitable. While the average yield of corn for the county is less than 16 bushels per acre, a number of the better farmers, who plow deep and give careful attention to the supplying of organic matter and fertilizers and the selection of seed, obtain yields of 40 to 50 bushels per acre.

Oats are either broadcasted or drilled in, the better results being obtained where the latter method is used.

The advantages of more diversified farming are being appreciated, and this form of agriculture is replacing the prevailing one-crop system. Some farmers select cotton seed in the field from stalks producing the best quality and largest quantity of lint, before the cotton is picked. In some cases the seed corn is selected from the best stalks. Such practices as terracing, ditching, leveling, deep plowing, growing legumes, plowing under green-manure crops, and liming sour soils are gradually being adopted.

Crop rotations are practiced by only a comparatively few farmers, although their value is generally recognized. The most common rotation consists of growing corn after cotton, sowing cowpeas with the corn or after oats, and following with cotton.

Probably two-thirds of the farmers use commercial fertilizers for cotton and corn. According to the census, \$10,891 were expended for fertilizers in 1909, or \$26.24 for each of the 415 farms reporting an outlay. For cotton and corn a mixture analyzing about 8 or 9 per cent phosphoric acid, 2 or 3 per cent nitrogen, and 1 per cent potash is applied. For radishes an 8-4-8 mixture is used, with the addition of nitrate of soda when the radishes begin to form. Barnyard manure is used upon all the upland soils except the Houston clay.

Farm labor is plentiful. Laborers employed by the month are paid \$10 to \$20, while day laborers receive 75 cents a day ordinarily, and \$1 a day for gathering cotton and cantaloupes. Most of the farm

laborers are colored, although quite a number of white men are also employed. The census for 1909 reports a total expenditure of \$117,148 for labor, or \$92.75 for each of the 1,263 farms reporting.

The size of the farms depends somewhat upon the character of the soil. The largest farms are in the extensive first bottoms of the Red, Saline, Little, and Little Missouri Rivers, and on the highly dissected Sumter clay slopes along the South Fork of Ozan Creek, while farms on the Ruston, Orangeburg, Caddo, and Susquehanna soils are relatively small. The 1910 census reports the number of farms in the county as 4,186, comprising 65.4 per cent of the total land area. The average size of the farms was 72.7 acres, of which 40.5 acres, or about 56 per cent, are improved. The percentage of the farms operated by owners was 47.9, by tenants 51.9, and by managers 0.2.

In renting farms the share system is the most common and the most satisfactory. The owner usually directs the farm operations, so that a crop sufficient to cover the rental is assured. Ordinarily where the landlord supplies work stock and tools he receives one-half the crops. Where the tenant supplies these in addition to his labor the landlord receives one-third of the corn, one-fourth of the cotton, and one-fourth of the hay. In some cases 1 bale of cotton constitutes the annual rental for about 20 acres of land. Where land is rented for cash, which is very rarely the case, \$1 to \$4 an acre is paid.

The selling price of the better farming land ranges from \$20 to \$60 an acre, depending upon the soil, topography, drainage, improvements, and the accessibility of markets, schools, and churches. The highest priced lands, excluding areas enhanced in value by being situated near the towns, are the Amite, Houston, Orangeburg, and Ruston soils, and the better drained portions of the Miller, Kalmia, Ochlockonee, Susquehanna, Trinity, and Yahola soils. The poorly drained land, including the soils of the Bibb, Lufkin, Muskoguee, Myatt, and Portland series and the more poorly drained areas of other types sells for \$5 to \$25 an acre. Badly eroded land, including a large part of the Sumter clay, is held at \$5 to \$15 an acre. The average assessed value of farm land in 1910 is given in the census as \$11.95 an acre.

#### SOILS.

Hempstead County lies entirely within the Coastal Plain province. The upland soils consist of sediments transported in former ages from older land areas and laid down as marine deposits under varying conditions of deposition.<sup>1</sup> These water-transported materials

<sup>1</sup> See Professional Paper No. 46, U. S. Geol. Survey, by A. C. Veatch, on the geology and underground water resources of northern Louisiana and southern Arkansas.

now appear as formations consisting of calcareous clays, heavy non-calcareous clays, sandy clays, and sands. All these formations have a slight dip to the southeast and occur in parallel belts, 3 to 12 miles wide, extending northeast and southwest.

The oldest formation occurs in the northwest corner of the county and is known among geologists as the Bingen formation. It consists of grayish and brownish sands and clays containing some green-sand and lignitiferous matter. Immediately south of the Bingen sand belt or formation is the Brownstown formation, which consists of bluish and grayish, calcareous clay containing many fossil oysters. South of the Brownstown formation and extending from Columbus to Marlbrook Creek is the Marlbrook clay, which consists of very calcareous, fossiliferous, gray, white, and blue clay containing beds of bluish to white, arenaceous, chalky marl or argillaceous marl, which runs high in lime. Thin beds of fossiliferous limestone are often interstratified with the clay, and glauconite beds occur as a green, loamy sand between the towns of Washington and Jakajones. An analysis made by the United States Geological Survey of the glauconite material occurring in the bluff 400 feet east of the railroad station at Washington showed 4.7 per cent potash.

Immediately south of the Marlbrook formation is the Nacatoch sand. This formation enters Hempstead County south of Saratoga and crosses it in a northeasterly direction. The Nacatoch sand is composed of a rather incoherent sand with seams or strata of fossiliferous, arenaceous limestone; calcareous sandstone; gray, drab, and yellow arenaceous clay; black and dark-brown clay with gray and yellow sand partings; and plastic, impervious clay. Southeast of the Nacatoch sand is the Arkadelphia clay, on which is situated the town of Hope. This is a calcareous clay with beds of blue and white sandy marl or argillaceous marl. In the southeast corner of the county is the Sabine formation, which is the youngest, geologically, in the county, with the exception of the stream bottoms and terraces. This formation is a part of the Tertiary, while all the other formations belong to the Upper Cretaceous. It is characterized by a series of dark, finely laminated sands and clays containing some lignite and occasional layers containing marine fossils.

In addition to the upland soils, alluvial soils are developed in the bottom lands along streams, consisting of materials washed from the upland soils and laid down by flood waters. The first bottoms of the streams represent the most recently deposited materials of the county. These bottoms are still in progress of building. At each overflow additional sediments are laid down over the surface. The second bottoms or terraces are older. They are made up of sediments laid down over the older flood plains at a time when the overflows reached higher levels than at present, the channels having subsequently been cut deeper.

The soils derived from these several formations are grouped into series on the basis of similarity in origin, extent of weathering, drainage conditions, structure, and topography. The series are subdivided into types, the different types in a series being similar in all respects save texture. In all, 20 series, including 33 types and 1 phase, are mapped in Hempstead County. The upland soils are grouped into 9 series—the Houston, Oktibbeha, Sumter, Susquehanna, Lufkin, Ruston, Orangeburg, Norfolk, and Caddo. The soils of the first bottoms or flood plains are included in the Trinity, Miller, Yahola, Portland, Bibb, and Ochlockonee series, and those of the second bottoms or stream terraces in the Kalmia, Amite, Leaf, Myatt, and Muskogee series.

The Houston series includes types having black surface soils and black, dark-brown, dark-gray, drab, yellowish, or olive-colored subsoils. These types are calcareous, especially in the lower part of the soil section, where in some cases they consist of white chalky marl. The material has been derived from the weathering of the calcareous strata of the Arkadelphia and Marlbrook clays. The Houston clay is the only type of this series mapped in Hempstead County.

The surface soils of the Oktibbeha series are grayish to brownish or reddish-brown, while the subsoils characteristically consist of brownish-red clay passing into mottled reddish, drab, and yellowish or mottled yellowish and drab, plastic heavy clay. The material is derived from Coastal Plain deposits. The surface is mainly level to undulating. The drainage is imperfect in many of the level areas. The Oktibbeha series is represented in Hempstead County by three types—the very fine sandy loam, the silt loam, and the clay.

The surface soils of the Sumter series are light brown to yellow and are characteristically calcareous. The subsoils are yellow. Both surface soil and subsoil often contain fossils. The material comes from the more calcareous strata of the Marlboro and Arkadelphia clays. The Sumter clay is the only representative of this series in Hempstead County.

The surface soils of the Susquehanna series are predominantly grayish to light brown, ranging to reddish brown in case of freshly worked clay. The subsoils are mottled red and gray or red, gray, and yellow, and consist of plastic, heavy clay. The material comes principally from the Arkadelphia and Marlbrook clays and the Brownstown formation and partly from the Sabine and Bingen formations and the Nacatoch sand. This series is represented in Hempstead County by four types—the gravelly loam, very fine sandy loam, silt loam, and clay.

The surface soils of the Lufkin series are gray or brownish gray, with gray to mottled gray and yellow, impervious, plastic clay subsoils. The topography is flat to gently undulating, and this, to-

gether with the impervious subsoils, renders both the surface drainage and underdrainage poor, water often standing for considerable periods after heavy rains. These soils are derived from the Arkadelphia clay. The clay is the only type of this series mapped in Hempstead County.

The Ruston soils are gray to light brown in the surface, while the subsoils are reddish yellow to yellowish red or dull red, and moderately friable. They consist prevailingly of sandy clay and are often mottled with gray and shades of yellow in the lower part. The Ruston series is intermediate between the Orangeburg and Norfolk on the one hand and the Susquehanna on the other in point of subsoil structure, and is closely associated with these soils. It is derived mainly from the Sabine, Brownstown, and Bingen formations and the Nacatoch sand, and to some extent from the Arkadelphia and Marlbrook clays. The Ruston series is represented in Hempstead County by two types, the fine sandy loam and very fine sandy loam, together with a deep phase of the former.

The surface soils of the Orangeburg series are characteristically grayish or light brownish and friable, while the subsoils are red and friable. These soils are derived from the Nacatoch sand and the Sabine formation. Only one type of this series, the fine sandy loam, is mapped in Hempstead County.

The soils of the Norfolk series are grayish and friable in the surface and yellow and friable in the subsoil. They are derived from the Nacatoch sand. Only one type, the fine sand, is mapped in Hempstead County.

The Caddo soils are grayish in the surface, with mottled gray and yellow, or gray, yellow, and red subsoils, usually compact in the lower part. Low, dome-shaped sandy mounds or hummocks are usually present. These soils occur in flat upland areas of imperfect drainage, frequently at the source of streams or on the lower slopes along stream bottoms and terraces. They are derived from the Brownstown, Bingen, and Sabine formations, the Marlbrook and Arkadelphia clays, and the Nacatoch sand. Two types, the Caddo very fine sandy loam and silt loam, are mapped in Hempstead County.

The Trinity soils are dark brown to black. They consist of first-bottom, alluvial material washed largely, or at least in part, from upland soils of the Houston and Sumter series. The material is usually calcareous, at least in the subsoil. The clay is the only type of this series mapped in Hempstead County.

The surface soils of the Miller series range in color from light chocolate brown to chocolate red, while the subsoils are chocolate red or chocolate reddish brown. Both the surface soils and subsoils are calcareous. These soils are developed in the first bottoms of streams receiving sediments washed from the Permian Red Beds of western

Oklahoma and Texas. Other alluvial material also enters into their composition, including wash from the various soils occurring in the drainage basins of the streams contributing water to the Red River. This series is represented in Hempstead County by two types, the very fine sand and the clay.

The soils of the Yahola series are similar to those of the Miller series in color and origin, as well as in their calcareous nature. They differ from the latter series in that the subsoils are lighter in texture than the surface soils, consisting of quite sandy material. The silty clay loam is the only representative of this series in Hempstead County.

The surface soils of the Portland series range in color from gray or grayish brown to drab or black, and the subsoils from mottled drab, yellow, and reddish to pale red or salmon red or sometimes chocolate red in the lower part. The soils of this series conform closely with the Miller and Yahola soils in origin. The drainage between overflows is much poorer than that of the Miller or Yahola soils, which accounts for the dark and mottled color. In Hempstead County the Portland series is represented by only one type—the clay.

The Bibb series includes types having gray to light-gray or almost white surface soils overlying light-gray subsoils, frequently mottled with yellow. Both surface soil and subsoil are somewhat impervious and water stands on the surface for long periods after rains or overflows. The soil material represents wash from Coastal Plain soils. Two types of the Bibb series occur in Hempstead County—the very fine sandy loam and the clay.

The surface soils of the Ochlockonee series are dark gray to brownish in color and the subsoils are either brownish gray or mottled brown, gray, and yellow. These soils are derived from wash from Coastal Plain soils and occur in the first bottoms of creeks and smaller streams. They are subject to overflows. Between inundations the drainage is better than that of the Bibb soils. Three members of this series, the very fine sandy loam, silt loam, and clay are mapped in Hempstead County.

The surface soils of the Kalmia series are gray and the subsoils are yellow or mottled yellow and gray. These soils are of old-alluvial origin, being derived from all the upland types occurring in the county. The surface is usually flat or undulating and the drainage is fair to poor. One member of this series is mapped in Hempstead County, the very fine sandy loam.

The surface soils of the Amite series are brown or reddish brown and the subsoils are red or brownish red. Gravel is usually present in small quantities, and in many places beds of gravel occur at depths of 4 to 6 feet below the surface. The soil material is of alluvial

origin, having been derived from Coastal Plain soils with a very small admixture of gravel from the Ozark country to the north. The Amite loam is the only representative of this series in Hempstead County.

The surface soils of the Leaf series are light brown to brown and are underlain by mottled gray and yellow clay, which grades below into mottled red, gray, and yellow plastic clay. These soils are composed of old alluvium derived from the Coastal Plain soils. In Hempstead County two members of the Leaf series are recognized, the silt loam and the clay.

The Myatt series includes types having gray surface soils, underlain by gray, drab, and yellow mottled, impervious subsoils. These soils are poorly drained. The material consists largely of wash from the various upland soils. Two types of this series are mapped in Hempstead County, the very fine sandy loam and the clay.

The surface soils of the Muskogee series are gray or yellowish gray in color. The subsoils are mottled gray, yellow, and light red in the upper part, gradually becoming darker red and passing finally, at depths ranging from 3 to 6 feet, into a substratum of Miller clay material, which has a dark chocolate red color and is calcareous. There is present in these soils material derived from the Permian Red Beds region. One representative of this series, the clay loam, is mapped in Hempstead County.

The distribution of the various soils of Hempstead County is shown in detail on the map accompanying this report. The following table shows the actual and proportionate extent of each soil:

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Ruston fine sandy loam.....	63,168	15.8	Bibb very fine sandy loam....	10,624	2.3
Deep phase.....	10,176		Muskogee clay loam.....	10,176	2.2
Ruston very fine sandy loam..	56,448	12.1	Caddo silt loam.....	9,536	2.0
Susquehanna very fine sandy loam.....	30,272	6.5	Ochlockonee clay.....	8,448	1.8
Ochlockonee very fine sandy loam.....	24,640	5.3	Bibb clay.....	7,936	1.7
Susquehanna silt loam.....	21,376	4.6	Miller clay.....	7,808	1.7
Susquehanna clay.....	18,880	4.0	Oktibbeha clay.....	6,912	1.5
Orangeburg fine sandy loam..	17,280	3.7	Miller very fine sand.....	6,848	1.5
Caddo very fine sandy loam..	16,000	3.4	Houston clay.....	6,848	1.5
Oktibbeha very fine sandy loam.....	14,912	3.2	Leaf silt loam.....	5,568	1.2
Trinity clay.....	14,784	3.2	Myatt very fine sandy loam..	5,184	1.1
Ochlockonee silt loam.....	14,592	3.1	Amite loam.....	5,120	1.1
Sumter clay.....	12,480	2.7	Oktibbeha silt loam.....	4,352	.9
Kalmia very fine sandy loam..	11,968	2.6	Lufkin clay.....	3,136	.7
Portland clay.....	11,648	2.5	Leaf clay.....	2,240	.5
Susquehanna gravelly loam...	11,584	2.5	Yahola silty clay loam.....	1,920	.4
Norfolk fine sand.....	11,008	2.4	Myatt clay.....	1,408	.3
			Total.....	465,280	.....

## HOUSTON CLAY.

The Houston clay consists of a dark-brown to black clay, 6 to 12 inches deep, resting upon dark-brown or greenish-yellow, plastic clay, which grades at a depth of about 18 inches into greenish-yellow clay, streaked in places with yellow. Beginning at depths ranging from about 2 to 6 feet there is encountered a whitish and greenish-yellow, calcareous, fossiliferous, chalky clay. The surface soil is generally calcareous and the lower subsoil is characteristically so. Outcrops of the white substratum are very common along steep slopes, giving rise to what are known locally as "gall spots." In places the type to a depth of 20 inches consists of black clay, underlain by dark-drab, olive-drab, or yellowish-green clay.

The principal areas of the Houston clay occur between Columbus and Ozan, east of Dolph, northeast of Thrasher, and south of McNab. The surface is undulating to rolling, and the drainage is good. Where the soil is not properly protected by terraces or ditches or by growing cover crops, gullies develop in places.

The Houston clay is the most productive upland type in Hempstead County, and practically all of it is under cultivation. It is a prairie soil and naturally supported little timber other than a few scattered bois d'arc trees. The principal crops are long staple and short-staple cotton and corn. Short-staple cotton yields about one-third to 1 bale,<sup>1</sup> long-staple cotton about one-fourth to three-fourths bale, and corn about 35 to 50 bushels per acre. Alfalfa gives good yields. The alfalfa hay produced is largely shipped out of the county. No systematic rotation of crops is practiced on this type, although corn and cotton are sometimes alternated. No commercial fertilizers are used.

Land of this type sells for \$40 to \$60 an acre, depending upon the improvements and the distance from lines of transportation.

While the Houston clay is naturally a very productive soil, it is gradually deteriorating in fields where erosion is not checked. The plowing under of an occasional crop of cowpeas, especially where the soil is shallow, would improve the soil greatly by increasing the content of organic matter. It is probable that alfalfa could be very profitably grown on a larger acreage.

## OKTIBBEHA VERY FINE SANDY LOAM.

The surface soil of the Oktibbeha very fine sandy loam consists of a light-reddish to brownish-gray very fine sandy loam underlain at about 6 to 15 inches by red plastic clay, mottled or streaked with gray. The gray increases with depth and predominates in the lower

<sup>1</sup> Statements as to yields are based on reports of farmers and observations in the field.

part of the 3-foot section. In local areas there are slight mounds where the soil is decidedly grayish, the subsurface pale yellow, and the subsoil a yellowish-red plastic clay. When wet the subsoil is very sticky and when dry somewhat crumbly. This soil has a more crumbly subsoil than the corresponding Susquehanna type. The Oktibbeha very fine sandy loam is free from gravel and other rock. As a rule, calcareous material underlies the type at depths ranging from about 3 to 12 feet. There are throughout the type small areas of Houston chalk, which were too small to show satisfactorily on the soil map.

The Oktibbeha very fine sandy loam is the most extensive type of the Oktibbeha series. The largest area occurs around Columbus, and another large body in the vicinity of Ozan. Smaller areas occur throughout the Houston-Sumter belt.

The topography is undulating to nearly level, and drainage is fair. The plasticity of the subsoil retards subdrainage to some extent.

Probably 75 per cent of this type is in cultivation, the remainder being covered with timber, consisting principally of shortleaf pine, with some red oak, post oak, elm, ash, bois d'arc, hickory, and red and black haw.

The long-staple varieties of cotton are the principal crop grown on this type. Corn ranks next in importance. Sweet and Irish potatoes, watermelons, cantaloupes, radishes, strawberries, and a number of other vegetables are grown, but only for home use.

Long-staple cotton yields about one-third to one-half bale per acre, corn about 20 to 25 bushels, wheat about 10 to 20 bushels, sweet potatoes about 100 to 200 bushels, and Irish potatoes about 50 to 100 bushels. Little attention is paid to the rotation of crops on this type. As a rule, cowpeas are planted with corn when that crop is laid by. In handling the soil the ground is bedded and rebedded and before planting to corn or cotton very little flat cultivation is practiced. Yields are increased considerably by the liberal use of stable manure. Commercial fertilizers are not used to any important extent.

This type has a wide variation in price, ranging from about \$10 to \$50 an acre, depending upon improvements and location.

#### OKTIBBEHA SILT LOAM.

The soil of the Oktibbeha silt loam to a depth of about 8 to 15 inches is a light-brownish silt loam. The upper portion of the subsoil is a mottled red and gray clay, while the lower portion is a gray plastic clay with red mottling. In the poorly drained areas the subsoil is predominantly gray with red mottlings or streaks. Included in this type are small areas of Oktibbeha very fine sandy loam. Calcareous material underlies this type at rather shallow depths,

usually at about 3 feet. There are some outcrops on the slopes representing patches of Houston chalk.

A large body of the Oktibbeha silt loam occurs east of Yancy, and several small bodies north and northeast of that place. The topography is level to gently undulating, and the drainage not so good as in the case of the other Oktibbeha soils.

Approximately 60 to 75 per cent of this type is under cultivation. The forested areas consist of post oak, hickory, and a few shortleaf pine.

The principal crops are cotton and corn. Cowpeas, oats, sweet potatoes, Irish potatoes, and several other vegetables are grown for home use. Cotton yields about one-quarter to one-half bale per acre, corn 20 to 40 bushels, and cowpeas  $1\frac{1}{2}$  to 3 tons of hay per acre. This type furnishes fairly good Bermuda-grass pasture throughout the year. The adaptability of long-staple cotton is recognized on this type. Barnyard manure gives good increases in yields, if applied only in small amounts. Crops respond readily to commercial fertilizer. Yields probably could be increased considerably by thorough underdrainage and deep fall plowing.

This type is held at from \$15 to \$50 an acre, according to improvements and location.

#### OKTIBBEHA CLAY.

The surface soil of the Oktibbeha clay is a brownish red clay, silt loam, or very fine sandy loam 2 or 3 inches deep, underlain by dull-red or yellowish-red clay, containing faint gray mottlings. At a depth of about 10 to 15 inches the red decreases and gray predominates, and the clay is very plastic. Small areas that have not been severely eroded have a surface soil of very fine sandy loam or clay loam, but these areas were too small to map separately. When freshly plowed, fields of this soil are distinctly red. Near areas of the Sumter or Houston clay, calcareous material is often encountered in the 3-foot section. Usually this calcareous stratum, which is separated from the mottled clay by a very sharp line, is not reached above depths of 3 or 4 feet.

The surface is level to rolling or even hilly, the soil as a rule occurring on slopes and ridges. The surface drainage is good and the underdrainage fair.

An extensive area of this type is found north of Washington adjacent to the Sumter clay belt. There is a rather large area north of Yancy along the west county line and another northeast of Zion Church. Smaller areas occur throughout the Sumter clay.

Probably 50 per cent of this type is in cultivation; the remainder is still covered with its natural timber growth of post oak, white oak, black oak, hickory, walnut, and pecan.

It is used for the same crops as the Oktibbeha very fine sandy loam, cotton and corn, the former being the chief crop. Better yields are reported than from the Susquehanna clay. The soil is believed to be more productive than the Susquehanna clay—a type which it closely resembles. Occasional patches of oats, wheat, peanuts, cowpeas, and sorghum are grown.

Cotton yields about one-third bale per acre of the long-staple variety; corn, 35 to 45 bushels; oats, 30 to 40 bushels; and wheat, 15 to 20 bushels. Cotton and corn are planted and cultivated on ridges. Yields could be increased by deep fall plowing followed by rolling and harrowing well in the spring.

This land is held at \$25 to \$50 an acre, the price varying with improvements and location.

#### SUMTER CLAY.

The surface soil of the Sumter clay is a light-brown, dark grayish brown, olive-brown, or greenish-brown, calcareous clay. This passes at about 12 inches into pale-yellow, calcareous, plastic clay, and may continue to a depth of 3 feet without important change. In places the material below 12 inches is a greenish-yellow, calcareous clay. Fossil shells are scattered over the surface, and disseminated throughout the soil section. The substratum, which consists of a light-gray, calcareous clay or chalk marl interbedded more or less with thinly bedded limestone, is exposed at the surface in many places where gulying and sheet erosion have been active. There are included areas, too small to map, of the Susquehanna clay and Houston clay.

The most extensive areas of the Sumter clay occupy the south slopes of the South Fork of Ozan Creek. Smaller areas occur east and west of Saratoga and east of McNab. The topography is rolling to hilly and the surface drainage is good. Owing to the impervious nature of the subsoil, however, the run-off is excessive and causes very destructive erosion.

Probably 10 per cent of this type is under cultivation. The remainder is very much eroded and dissected by numerous gullies. There are no native trees other than a few scattered bois d'arc. Cotton and corn, the principal crops, are grown to an equal extent. Cowpeas and sorghum are grown for hay. There are a few small fields of Bermuda grass and alfalfa. Cotton yields one-sixth to one-half bale and corn 10 to 20 bushels per acre.

On this type no attention is paid to natural crop adaptations or to crop rotation or the incorporation of organic matter. Some fields have been continuously cultivated to cotton or corn until the surface soil has been washed away and deep gullies have developed.

Land of this type sells for \$5 to \$30 an acre, depending largely on the extent to which erosion and gullyng have progressed.

One of the most important requirements for the improvement of the Sumter clay is the prevention of erosion. By contour cultivation, terracing, and ditching, together with deep plowing, many of the slopes could be tilled to advantage, but it would be better to put all the steep slopes in alfalfa, Bermuda grass, Johnson grass, or some other grass either to be cut as hay or grazed off by stock. On the gentler slopes winter cover crops of rye or oats will maintain the surface soil, as well as provide winter pasturage and green manure to be plowed under in the spring.

#### SUSQUEHANNA GRAVELLY LOAM.

The Susquehanna gravelly loam consists of a grayish to brownish or brownish-red silt loam, silty clay loam or very fine sandy loam, underlain at 6 to 10 inches by a tough, plastic, red clay mottled with yellow, gray, or drab. Chert and quartz gravel are abundant on the surface and throughout the 3-foot section. Included with this type are small patches of Susquehanna gravelly clay and very fine sandy loam. The clay areas are usually eroded spots on hillsides.

The Susquehanna gravelly loam occupies steep slopes and ridges along Hickory, Ozan, and Tribble Creeks. It has a rolling to hilly topography and is usually well drained, but there are many places on the hillsides that are kept wet by springs. Erosion is very active where the slopes are not protected.

Because of its broken surface this is one of the least important soil types of the county. Probably 20 per cent of it is cultivated, the remainder supporting a growth of shortleaf pine, post oak, black-jack oak, white oak, red oak, overcup oak, pin oak, sweet gum, black gum, hickory, and dogwood.

The leading crops are cotton and corn, and approximately an equal area is devoted to each. Some of the land has been seeded to Bermuda grass, and is used for pastures. Cowpeas are grown for hay, hog pasturage, and for improving the soil. Sorghum is grown for hay and sirup. Practically all the farmers have their own work stock, and about 45 per cent of them keep a few cows and raise enough hogs to supply the home with pork. A few farmers have small herds of beef cattle and find the production of beef a profitable industry. The cattle graze on the rough pasture land. Cotton yields one-sixth to one-half bale per acre and corn 10 to 20 bushels.

This type is usually farmed in conjunction with the Ruston fine sandy loam or the Susquehanna very fine sandy loam or clay, and is handled and fertilized in about the same way. Very little attention is given to selecting the best suited crops, to the rotation of

crops, the growing of legumes, the incorporation of organic matter, or to seed selection. An 8-2-2 ready mixed fertilizer is used for cotton.

Farms on the Susquehanna gravelly loam are held at \$5 to \$20 an acre, depending upon the timber, the highway facilities, and the distance from towns and lines of transportation.

In general, suggestions given for the improvement of the Susquehanna very fine sandy loam apply to this type. Special care should be taken to prevent erosion. Contour plowing, terracing, and ditching should be practiced on the slopes. The steeper slopes should be kept in some cover crop. Bermuda grass does well on these slopes and provides excellent pasturage. Areas that are unfit for cultivation could in many cases be profitably used for the grazing of beef cattle.

#### SUSQUEHANNA VERY FINE SANDY LOAM.

The Susquehanna very fine sandy loam consists of a light-brown to brownish-gray very fine sandy loam, underlain at about 5 inches by a yellowish or reddish very fine sandy loam which passes abruptly, usually at about 10 to 12 inches, into red, stiff, plastic clay mottled with gray or drab and yellow. There is frequently some water-worn chert and quartz gravel scattered over the surface and disseminated throughout the soil section. In places a greenish clay, containing glauconitic material, is encountered in the lower subsoil or substratum. There are some included areas, too small to map, of Oktibeha clay, which have calcareous material in the lower subsoil and substratum.

Within about 2 to 5 miles northwest of Washington there are several areas, too small to map, in which greensand outcrops or lies within the 3-foot soil section. Some of these patches have the characteristics of the Collington soils, occurring in the greensand-marl areas of southern New Jersey and of Maryland, which are brownish to greenish in the surface, with greenish to mottled reddish and greenish subsoils. One of the principal patches of this kind of soil occurs one-half mile south of Holts Store.

The Susquehanna very fine sandy loam occurs in practically all the upland sections of the county, but is most extensively developed between Washington and Columbus, between the forks of Ozan Creek, and along Bois d'Arc Creek. In general the surface is rolling to hilly. In the vicinity of Powers, Dolph, Reeds Store, and Goff Chapel there are large areas that have an undulating topography, and here the surface soil is more silty than in the rolling sections. On the whole, the drainage is well established, although in the more level areas water stands on the surface after rains because of the imperviousness of the subsoil. Erosion is very active on the steeper slopes where precautionary measures are not adopted.

The Susquehanna very fine sandy loam is one of the most extensive and important soils of the county. Probably 65 per cent of it is cultivated. The natural forest growth consists mainly of shortleaf pine, pin oak, white oak, post oak, red oak, blackjack oak, overcup oak, sweet gum, black gum, ash, elm, hickory, dogwood, hackberry, and box elder.

Cotton and corn are grown on this type in about equal proportion. Cotton is the principal money crop, while corn is used for feeding the work stock and hogs. Cowpeas are grown for hay, for hog pasturage, for the seed, and for the purpose of improving the soil. Oats are grown as a winter cover crop, to be plowed under in the spring, for pasturage, and for the grain. Bermuda grass is grown for hay and pasturage. Rye is grown as a cover crop and for pasturage and is turned under as a green manure in the spring. Sorghum is grown extensively for hay and sirup. Peanuts are grown for hog pasturage, for the nuts, and as a soil improver. Alfalfa, red clover, bur clover, white clover, sweet clover, crimson clover, alsike clover, timothy, kafir, milo, and barley have been grown on this soil in a small way as experimental crops. About 50 per cent of the farmers keep hogs and dairy cattle to supply the home needs, and a few of them feed steers.

Cotton yields one-fifth to one-half bale, corn 10 to 20 bushels, and hay crops about 1 to 3 tons per acre. This type is handled and fertilized in about the same way as the Ruston fine sandy loam.

The price of land of the Susquehanna very fine sandy loam ranges from \$5 to \$35 an acre, depending upon the topography, improvements, public roads available, and the distance from towns and lines of transportation.

The productiveness of some fields of the Susquehanna very fine sandy loam has been very much reduced on account of continuous cropping to the same crops without replenishing the supply of organic matter. Deep plowing is particularly desirable on this soil, especially where the plastic clay subsoil is within 7 inches of the surface. The growing and plowing under of deep-rooted legumes such as cowpeas is also very beneficial. The steeper slopes should be seeded to Bermuda grass, while on the more gentle slopes contour cultivation, terracing, ditching, and the growing of winter cover crops of rye or oats after corn and cotton should be practiced. More beef and dairy cattle and hogs could be profitably raised on this land.

#### SUSQUEHANNA SILT LOAM.

The Susquehanna silt loam consists of a brown to light-brown, floury silt loam, 6 to 10 inches deep, underlain by a yellow or red silty clay loam or clay, mottled with red and gray, which passes at a

depth of about 16 to 18 inches into mottled red, yellow, and drab or gray plastic clay. In places, as in the flat areas near Hope, the upper part of the subsoil is a yellow clay, somewhat like the upper subsoil of the Caddo silt loam, while the lower part is a mottled red, yellow, and drab or gray clay. Patches of the Caddo silt loam too small to show on the map are included with this type. Near the point of contact between this type and the Sumter clay there are many small inclusions of the latter. In places the red clay subsoil lies within a few inches of the surface.

South of Hope there is a variation of the Susquehanna silt loam in which the surface soil consists of 2 or 3 inches of dark-brownish silt loam, underlain by yellowish-brown silt loam, which passes at about 10 to 12 inches into a yellowish silt loam, and this, at about 20 inches, into a red, yellow, and drab or gray stiff, plastic clay.

The principal areas of this type occur about Hope, north of Powers, along the forks of Ozan Creek, east of Dolph, west of Emmet, and north of Rocky Mound Hill. Small areas occur throughout the county. The topography is flat to gently rolling and the drainage on the whole is rather poor, especially on the more level tracts, where sogginess and standing water are common during rainy seasons. The poor drainage is due largely to the imperviousness of the subsoil.

The Susquehanna silt loam is an important soil in Hempstead County. Probably 55 per cent of the type is in cultivation. The forest growth consists of shortleaf pine, post oak, overcup oak, pin oak, red oak, white oak, blackjack oak, sweet gum, ash, elm, hickory, willow, box elder, hackberry, plum, crabapple and dogwood.

The most important crops are cotton and corn, which are grown in about equal proportions. Bermuda grass and sorghum are also extensively grown. Other important crops are oats, rye, and cowpeas. Red, white, bur, alsike, sweet, and crimson clover, and alfalfa, milo, kafir, lespedeza, and vetch are being tried in an experimental way. Carpet grass, crab grass, and broom sedge make excellent pastures in old fields and in the more open woodland. Vegetables and other garden crops common to the region are grown on this type in the vicinity of Hope. Of these early radishes are the most important. Most farmers have small orchards of peaches and occasionally apples and pears.

There are several good dairies on this type in the vicinity of Hope. Many of the cows are purebred Jerseys, and there are a few small herds of Herefords. Probably 50 per cent of the farmers raise enough hogs to supply the home with pork, and a few have some to sell. The principal breeds of hogs are the Duroc Jersey, Poland China, and Berkshire.

Cotton yields one-fourth to one-half bale, corn about 15 to 35 bushels, and Bermuda grass about 1 ton of hay per acre. The varia-

tions in yields are due mainly to differences in the depth of plowing, the quantity of fertilizer used, and the care exercised in cultivation.

This soil is handled and fertilized in very much the same manner as the Ruston fine sandy loam. The maximum yields are obtained where farmers use cowpeas or other legumes in crop rotations and supply the needs of the soils in the way of fertilizers. Ditching, turning under organic matter, deep plowing, careful seed selection, and liberal applications of barnyard manure have given excellent results. A ready-mixed fertilizer analyzing about 8-2-2 is used in growing cotton.

Near Hope the price of land of the Susquehanna silt loam ranges from \$75 to \$150 an acre, but in other localities the type may be bought for \$25 to \$50 an acre. The prices are dependent upon farm improvements, character of roads, and distance from towns and lines of transportation.

The Susquehanna silt loam is a cold soil and crops on it grow slowly and mature late. On account of the poor drainage, difficulty is encountered in properly preparing the land for cotton and corn in the spring, and unless carefully tilled the fine, silty surface soil tends to harden and crust. Most of the land could be greatly improved by ditching or by the installation of tile drains at shallow depths. Crop rotation, the growing of legumes, deep fall plowing, the incorporation of organic matter, and liming are recommended for the improvement of this soil. Bermuda grass and lespedeza do very well on it and should be grown more extensively. There is no apparent reason why beef cattle could not be profitably raised for market on this land.

#### SUSQUEHANNA CLAY.

The Susquehanna clay consists of a brown silty clay, underlain at about 2 to 4 inches by a stiff, plastic, tenacious red clay, mottled with gray or drab and yellow, which grades at about 14 inches into a mottled red, gray, and yellow, plastic clay. The red color decreases with depth and in a few places is entirely absent at a depth of 3 feet. Along eroded slopes the mottled clay is exposed, while at the base of slopes it may be 15 to 20 inches below the surface. In some places the upper few inches of material consists of a very fine sandy loam. In a few localities the plastic red clay subsoil continues to a depth of 2 or 3 feet before the gray mottlings are encountered. Some of the level areas of the Susquehanna clay have a "hog-wallow" surface, being characterized by small, irregular hummocks and depressions. On the hummocks the clay is mottled red, yellow, and gray or drab, while in the depressions the immediate surface soil is dark colored, and there is more yellow than red in the mottling of the subsoil.

The Susquehanna clay is quite extensive throughout Hempstead County, except in the southeastern quarter. The largest areas occur

along Bridge Creek, the various forks of Ozan Creek, and between the various tributaries of Caruse Creek. The topography is flat to rolling. Where the type occupies slopes surface drainage is fair, but in the level areas the drainage is very poor and the land remains wet for long periods because of the impervious subsoil.

This type is of considerable importance, both on account of its large extent and its agricultural value. About 30 per cent of it is farmed, and the remainder is forested, chiefly with shortleaf pine, post oak, blackjack oak, pin oak, white oak, red oak, overcup oak, sweet gum, black gum, ash, elm, hickory, and dogwood. Cotton and corn, the principal crops, are grown in about equal proportions. Other important crops are cowpeas, sorghum, Bermuda grass, oats, rye, and peanuts.

Cotton yields one-sixth to one-half bale per acre, averaging about one-fourth bale, and corn 10 to 40 bushels, with an average of about 15 bushels. The differences in yields are due mainly to different methods of plowing, fertilizing, and cultivating the crops. The maximum yields are obtained where the land is broken deeply, where cowpeas or other legumes are used in crop rotations, and where commercial fertilizers are applied. The turning under of organic matter and careful seed selection have given excellent results.

This type of soil sells at \$10 to \$20 an acre, depending upon the amount of standing timber, the character of the roads, and the location with respect to towns and railroad stations.

Yields on this soil are generally very small, and could be materially increased by the adoption of proper cultural methods, including deep plowing, the systematic rotation of crops to include cowpeas or other legumes, and the incorporation of organic matter and commercial fertilizer. The steeper slopes should be seeded to Bermuda grass and used as pastures. On the gentler slopes more care should be exercised in terracing, ditching, and contour cultivation in order to keep the soil from washing. Rye or oats should be grown after cotton and corn as a winter cover to hold the soil and to be plowed under as a green manure in the spring. Stock could probably be raised with profit on this land. Beef cattle could be raised largely on pasturage, with a short period of winter feeding.

#### LUFKIN CLAY.

The surface soil of the Lufkin clay to a depth of 5 to 8 inches is a brownish-gray silty clay with mottlings of darker gray and brown. Below this is encountered a stiff, plastic, gray or drab clay with yellow mottlings, which passes at about 16 inches into drab, plastic clay with yellow and brown mottlings. Reddish mottlings and iron concretions are sometimes encountered at a depth of 24 to 36 inches.

In small, basinlike areas the surface soil contains considerable organic matter and has a dark-gray or dark brownish gray color, while the subsoil is a brownish-drab clay, mottled with yellow and containing small black, ferruginous concretions. In places, especially along gullied slopes, there are included small patches of Tabor clay, in which the surface soil is a brownish-gray silty clay, passing at about 6 or 7 inches into yellow, plastic clay mottled with gray or light drab.

The Lufkin clay occurs northwest of Emmet and south of Dolph. The topography is level or flat. Owing to the impervious nature of the subsoil, water stands on the surface for considerable periods after rains, so that some areas are boggy.

This is an unimportant type. Probably 40 per cent of it is under cultivation, while the remainder is mainly forested with shortleaf pine, white oak, red oak, pin oak, overcup oak, sweet gum, black gum, hickory, ash, elm, and dogwood. Yields of all crops on this soil are below the average for the county. Cotton, corn, oats, sorghum, and Bermuda grass are grown.

The selling price of cleared land of this type ranges from \$10 to \$25 an acre, depending upon the farm improvements, public roads, and distance from towns and railroad facilities.

The suggestions offered for the improvement of the Susquehanna clay are applicable to this type. Ditching, deep plowing, and the growing and turning under of cowpeas or other green-manure crops have been found to increase the yields greatly.

#### RUSTON FINE SANDY LOAM.

The Ruston fine sandy loam consists of a gray loamy fine sand, passing at about 6 to 8 inches into pale-yellow fine sandy loam and at about 12 to 15 inches into reddish-yellow to dull-red, friable sandy clay, which is often mottled with yellow and grayish in the lower part. In places the lower subsoil is noticeably compact and contains ferruginous concretions. A strip of Ruston fine sandy loam northeast of Grassy Lake has a dark-gray surface soil, but the subsoil is the typical reddish-yellow sandy clay. In the vicinity of Rocky Mound and Rocky Mound Hill the texture is decidedly coarser than usual, approaching that of a sandy loam. In other places, especially near large areas of Susquehanna very fine sandy loam, the subsoil is a rather plastic, sandy clay. Throughout the areas of this type there are many included bodies of the Susquehanna, Caddo, and Ruston very fine sandy loams that were too small to map. On the eroded slopes and narrow ridges there are many patches of the yellowish-red or dull-red sandy clay. There are also small areas of Ruston gravelly sandy loam, which were not considered of sufficient

importance to be mapped as a separate type. The areas of this kind have been indicated where practicable by gravel symbols.

The Ruston fine sandy loam is the most extensive and one of the most important types in Hempstead County. It occurs in all parts of the upland. The surface is undulating to gently rolling and in some places rolling to hilly. The drainage is good. The friable structure of the subsoil permits a large absorption of moisture, so that crops suffer only during severe droughts. Probably 75 per cent of the type is under cultivation. The native forest growth consists of shortleaf pine, post oak, white oak, black oak, blackjack oak, pin oak, overcup oak, red oak, hickory, walnut, sweet gum, black gum, dogwood, crabapple, elm, sycamore, pecan, persimmon, and ironwood.

Cotton and corn are the leading crops and are grown in about equal proportions. The other important crops are cowpeas, peanuts, sorghum, oats, and Bermuda grass. Red, white, bur, alsike, sweet, and crimson clover, and lespedeza, alfalfa, soy beans, velvet beans, kafir, milo, and vetch are grown to a very small extent. Many farmers have small orchards, devoted mainly to peaches, but usually including enough apple and pear trees to supply the home. Scuppernong grapes do very well, but are not extensively grown. About half the farmers raise enough hogs to supply their own needs. Few cattle and hogs are sold, and some farmers do not keep enough cows to supply milk and butter for their own use. There are a few good dairies on this type in the vicinity of Hope. Cantaloupes and early radishes have become very important special crops on this type in the vicinity of Blevins and along the Prescott & Northwestern Railroad. The former crop matures from July 4 to August 4, and the latter matures the last week in March and the first three weeks in April. Watermelons are grown to a small extent for the outside market.

On this type cotton yields ordinarily one-fourth to three-fourths bale to the acre, but 1 bale per acre has been obtained where the soil is well supplied with organic matter and where moderate applications of commercial fertilizer or barnyard manure are made in conjunction with deep plowing and careful cultivation. Ordinary yields of corn range from 10 to 35 bushels, with an average of 15 bushels per acre. Cowpeas yield 10 to 15 bushels of seed and 1 ton of hay, cantaloupes 50 to 200 crates, early radishes about 35 barrels, Irish potatoes about 125 bushels, sweet potatoes about 175 bushels, and Bermuda grass about 1 ton of hay per acre. In a few cases alfalfa has given a yield of about 2 tons per acre.

The Ruston fine sandy loam is a strong, easily cultivated soil and can be readily improved, but many fields have shown a very marked decrease in productiveness, due to the use of raw commercial fertilizer year after year in growing cotton, without the addition of

organic matter. A 3-year rotation that has proved very satisfactory consists of cotton, corn, and oats, with cowpeas sown both at the last cultivation of the corn and after harvesting the oats. Deep plowing and thorough preparation of the seed bed have resulted in a very noticeable increase in the yields of cotton and corn. Ready-mixed fertilizers are used by most farmers for cotton and by some for corn, the usual application consisting of 100 to 200 pounds per acre of an 8-2-2 mixture. An acreage application of 400 pounds of a 10-2-5 mixture, however, has been found much more effective for cotton.

Land of this type is valued at \$10 to \$60 an acre, depending on farm improvements, location with respect to transportation facilities and towns, and the character of the roads.

To obtain best results on the Ruston fine sandy loam the incorporation of organic matter is absolutely necessary. This may be supplied by the liberal application of barnyard and green manures. Leguminous crops, in addition to supplying needed vegetable matter, add considerable nitrogen to the soil, so that this element may be largely eliminated in the fertilizing mixtures.

In growing alfalfa it has been found best to add lime in liberal quantities, and usually to inoculate the soil, which is done by simply scattering on the surface several hundred pounds to the acre of fresh soil obtained from an established field of alfalfa. In addition, a mellow and highly fertile seed bed, free from weeds, is generally necessary for good results.

Bermuda grass could be profitably grown more extensively on this soil, especially on steep slopes where erosion is active. Where slopes are cultivated great care should be exercised in ditching and terracing to hold the soil. Where the land is within 5 miles of railroad facilities the growing of early radishes, cantaloupes, and watermelons could be profitably extended. Sugar cane and vegetables are well suited to this soil. Lespedeza does well and should be grown more extensively. With better market facilities the production of peaches on a commercial scale would be profitable. The raising of more live stock would encourage the growing of the legumes and other forage crops and would make larger quantities of manure available.

*Ruston fine sandy loam, deep phase.*—The Ruston fine sandy loam, deep phase, consists of a gray to light-brown, rather loose fine sand, passing at about 6 to 8 inches into a pale-yellow fine sand, which is underlain at about 20 to 30 inches by reddish-yellow or dull-red, friable sandy clay. In places the sandy clay subsoil is scarcely reached within the 3-foot section. The soil is deficient in organic matter and of low moisture-holding capacity. The Ruston fine

sandy loam, deep phase, is intermediate between the typical Ruston fine sandy loam and the Norfolk fine sand, and as mapped includes many areas of both which are too small to show on the map.

This phase is not extensive. The largest areas occur southeast of Blevins, and south of Tokio; smaller areas are encountered in the vicinity of Washington and north of Antioch Church. It usually occupies the lower slopes where material washed from higher lying soils has accumulated. The topography is undulating to hilly, and the natural drainage is adequate and in many places excessive. Erosion is active where the slopes are not protected by a growing crop.

The deep phase is used for the production of the same crops and is cultivated and fertilized in the same manner as the typical soil. Yields of cotton and corn are somewhat lower. Cantaloupes and early radishes are important crops on the part of this phase occurring southeast of Blevins. Peaches do very well.

The price of this land ranges from about \$10 to \$40 an acre, depending upon the farm improvements, the character of the wagon roads, the topography, and the location.

Suggestions for the improvement of the typical Ruston fine sandy loam apply also to its deep phase.

#### RUSTON VERY FINE SANDY LOAM.

The Ruston very fine sandy loam consists of a gray to light-brown, friable very fine sandy loam, changing at about 3 to 5 inches to a pale-yellow to reddish-yellow very fine sandy loam. This extends to a depth of 8 to 12 inches, where a reddish-yellow to yellowish-red, friable fine sandy clay is encountered. In many places the lower subsoil contains mottlings of yellow, red, and gray, the gray increasing with depth. In some places it is noticeably compact and contains ferruginous concretions. In the extreme southern part of the county there are areas in which the lower subsoil is compact and mottled with red but does not contain concretions or have the nature of hardpan. Large and small fragments of ferruginous rocks, mainly sandstone, are of common occurrence over the surface of such areas.

North of Dotson a variation occurs in which the surface soil consists of a light-brown or reddish-brown very fine sandy loam, loamy very fine sand, or very fine sand, passing at about 8 or 10 inches into a rather dull red, friable very fine sandy clay, which continues to a depth of 3 feet or more without important change. Some quartz and chert gravel are scattered throughout both the surface soil and subsoil of this variation.

There are included with the Ruston very fine sandy loam a number of areas having a silt loam texture which were not shown on the

map owing to their small extent. The largest of these areas occurs in the vicinity of Melrose Church, and the others are widely scattered.

The Ruston very fine sandy loam is the predominant type in the southeastern part of the county. Smaller areas occur in the vicinities of McCaskill, Compton, and Liberty School. The topography is undulating to gently rolling. On the whole the surface drainage is well established, while the friable nature of the subsoil permits a ready absorption of moisture. On the slopes where there is no covering of vegetation the soil is somewhat subject to blanket erosion and gullying, but this in many cases is overcome by terracing and contour plowing.

This is one of the most important and extensive soils of Hempstead County. About 75 per cent of it is under cultivation, the remainder being largely forested with shortleaf pine, post oak, black oak, red oak, pin oak, blackjack oak, overcup oak, white oak, hickory, sweet gum, black gum, plum, crabapple, dogwood, persimmon, elm, and sycamore. The principal crops are cotton, corn, cowpeas, peanuts, sorghum, Bermuda grass, oats, and rye. Where the soil is properly limed, inoculated, and prepared alfalfa does well. Bur, sweet, crimson, red, white, and alsike clover, and lespedeza, rape, soy beans, velvet beans, kafir, milo, wheat, and barley are grown to a very small extent. Most farmers keep a few dairy cattle and hogs to supply their own needs, and some have a surplus of butter and meat for the home market. Early radishes and cantaloupes are important special crops along the Prescott & Northwestern Railroad.

Cotton ordinarily yields one-fourth to two-thirds bale per acre, although one bale or more has often been obtained by improved methods of farming. Corn yields 15 to 35 bushels, cowpeas 10 to 15 bushels of seed and 1 ton of hay, cantaloupes 50 to 200 crates, radishes about 35 barrels, Irish potatoes about 125 bushels, and sweet potatoes about 175 bushels per acre.

The Ruston very fine sandy loam is handled and fertilized in practically the same way as the Ruston fine sandy loam.

Land of this type sells for \$10 to \$60 an acre, the price depending upon the farm improvements, the public roads, and the distance from towns and shipping points.

The suggestions made for the improvement of the Ruston fine sandy loam are applicable to this type.

#### ORANGEBURG FINE SANDY LOAM.

The Orangeburg fine sandy loam consists of a light-brown to reddish-brown fine sandy loam, underlain at about 8 to 10 inches by red, friable sandy clay. Usually chert and quartz gravel are present in both surface soil and subsoil. Some small areas are reddish at

the surface, representing inclusions of Greenville fine sandy loam. In the southeastern part of the county there are some areas in which the subsoil is rather compact at about 24 inches, but again becomes friable at about 30 inches. Scattered over the surface and throughout the soil section of such areas are fragments of ferruginous sandstone. Northeast of Blevins, northwest of Bingen, and south of Bethlehem Church are a few small areas of the gravelly fine sandy loam of the series. These are indicated on the map by gravel symbol, but are not of sufficient importance to deserve detailed discussion.

This type occurs for the most part in small, scattered areas associated with the Ruston fine sandy loam in the northeastern part of the county and with the Ruston very fine sandy loam in the southeastern part. The topography is prevailingly undulating to gently rolling. Some of the slopes are steep. The type is generally well drained. In some places, however, where it is associated with the Caddo very fine sandy loam the surface is flat and poorly drained.

Although comparatively inextensive, the Orangeburg fine sandy loam is an important type. Probably 75 per cent of it is cultivated. The forested areas support a growth of shortleaf pine, post oak, white oak, red oak, pin oak, sweet gum, hickory, and dogwood. Cotton and corn are the principal crops. Cowpeas are often intertilled with the corn. Bermuda grass does well. Cantaloupes and radishes are grown near Blevins and do as well as on any other soil in the county. There are numerous small peach orchards on this soil, and they are considered the best in the county.

Cotton yields one-third to two-thirds bale, corn 15 to 30 bushels, cowpeas 10 to 15 bushels, and hay crops 1 to 3 tons to the acre. The Orangeburg fine sandy loam is handled and fertilized in practically the same way as the Ruston fine sandy loam and very fine sandy loam.

Farm land of this type sells for \$30 to \$60 an acre, depending upon the farm improvements, the character of the roads, and the distance from towns and lines of transportation.

The suggestions made for the improvement of the Ruston fine sandy loam apply also to the Orangeburg fine sandy loam.

#### NORFOLK FINE SAND.

The Norfolk fine sand consists of a grayish loose fine sand, which passes at a depth of 5 or 6 inches into a light-gray or pale-yellow, incoherent fine sand. In places the lower part of the 3-foot section is a sticky fine sand. Over flat areas and along lower slopes the surface soil is darker than usual. Quartz and chert gravel are present in places.

This type is developed in large areas between Atkins Store and Chestnut Ridge School, in the northeastern part of the county. A number of small areas occur throughout the county. The topography is gently rolling to hilly, the type occurring mainly on slopes. Drainage is good to excessive.

Probably 70 per cent of the Norfolk fine sand is in cultivation. Small areas are forested with shortleaf pine, red oak, blackjack oak, white oak, post oak, pin oak, hickory, sweet gum, black gum, persimmon, and dogwood. The principal crops are cotton, corn, sorghum, and cowpeas. Although the soil is especially well suited to trucking, this industry has not been developed. The growing of cantaloupes has become an important industry in the vicinity of Blevins and along the Prescott & Northwestern Railroad. There are a few small commercial peach orchards. Corn yields 10 to 25 bushels and cotton one-fifth to one-third bale per acre. The methods of handling and fertilizing this type are practically the same as those followed on the Ruston fine sandy loam.

Farm land of this type sells for \$5 to \$30 an acre, the higher prices prevailing near good shipping points and where the farm improvements are best.

The methods suggested for the improvement of the Ruston fine sandy loam are in general applicable to this type. The soil could well be used more extensively for growing vegetables, berries, and peaches.

#### CADDO VERY FINE SANDY LOAM.

The Caddo very fine sandy loam consists of a pale-yellow or yellowish-gray very fine sandy loam, 8 to 12 inches deep, underlain by a yellow, friable clay, which generally passes at about 16 to 20 inches into a mottled yellow and gray or drab clay. In places the subsoil contains reddish or brownish mottlings, and it is often compact in the lower part. Where the surface is level or depressed and the drainage very poor the soil is grayish or mottled gray and yellow, and dark-colored concretions are common in the lower subsoil. Dome-shaped mounds of Ruston very fine sandy loam and Caddo fine sandy loam, with very little mottling, are of common occurrence in areas of the Caddo very fine sandy loam. There are also some included mounds of Norfolk very fine sandy loam, having a gray or light-brown surface soil and a yellow, friable sandy clay subsoil, and many irregular patches of Caddo silt loam.

The largest area of the Caddo very fine sandy loam occurs east of Blevins, occupying one of the highest positions in the county, where few streams have developed. Other areas are scattered throughout the southeastern part of the county, northeast and west of Hope and

between Ozan and Belton. The surface is characteristically flat, and in places depressed, and drainage is generally poor.

Because of the poor drainage, only about 10 per cent of the Caddo very fine sandy loam is under cultivation. The forested areas support a growth of shortleaf pine, post oak, overcup oak, pin oak, ash, elm, dogwood, hickory, black gum, and sweet gum.

The principal crops grown on this type are cotton, corn, and grasses. Bermuda grass and lespedeza are grown to a small extent and do well. Cantaloupes, watermelons, and early radishes make good yields. Cotton yields one-fifth to one-half bale and corn 10 to 20 bushels per acre.

Land of this type sells for \$5 to \$20 an acre, depending largely upon the farm improvements and the location.

In most cases the Caddo very fine sandy loam is favorably situated for the establishment of artificial drainage. With good drainage it is especially well suited to the production of vegetables. The cantaloupes, watermelons, and early radishes produced on this soil are of fine quality and these crops should be grown more extensively. The supply of organic matter can be maintained by the liberal application of barnyard manure and the growing and turning under of leguminous crops such as velvet beans and cowpeas.

#### CADDO SILT LOAM.

The surface soil of the Caddo silt loam consists of a brownish silt loam which passes at a depth of about 1 inch into a light-brown or brownish-gray, moderately compact silt loam, and this at about 6 to 8 inches into a pale-yellow silt loam or very fine sandy loam, mottled with yellow. At a depth of about 16 inches there is encountered a mottled yellow and gray or drab silty clay, which becomes heavier with depth, passing at about 24 inches into a mottled yellow and gray or drab clay, which is usually compact and often contains black or ferruginous concretions, in places enough to give it a hardpan character. In places there is red mottling in the subsoil. The surface soil frequently contains a high percentage of very fine sand. There are included with this type numerous dome-shaped mounds of Caddo very fine sandy loam and a number of areas of Lufkin silt loam, all of which are too small to map. The areas of Lufkin silt loam occupy shallow basins and other very poorly drained positions.

The Caddo silt loam is developed mainly in the vicinity of McCaskill and north of Hope. It usually occupies flat, interstream positions where drainage is not well established. A few narrow strips occur on the lower valley slopes bordering the stream bottoms.

Owing to its poor drainage this type is of little importance in the agriculture of the county. Probably 25 per cent of it is cultivated.

The remainder is forested with shortleaf pine, post oak, overcup oak, pin oak, ash, elm, dogwood, hickory, sweet gum, and black gum. Cotton and corn are grown in about equal proportions. Bermuda grass does well. In dry years cotton yields one-fourth to one-half bale and corn 15 to 25 bushels per acre. In the vicinity of Hope there are some farmers engaged in growing cantaloupes and early radishes for the northern markets. This type is handled and fertilized practically in the same manner as the Caddo very fine sandy loam and Ruston fine sandy loam.

Land of this type sells for \$5 to \$35 an acre, depending upon the improvements and location.

Extensive ditching will be necessary before this type can be farmed to best advantage, except perhaps for crops like Bermuda grass and lespedeza. When properly drained it has been found well suited to the general farm crops of the region. The soil is deficient in organic matter and is in an acid condition. The content of organic matter can be increased by adding barnyard manure and by plowing under green-manure crops, especially velvet beans and other legumes. Ground limestone or lime should be used to correct the acidity.

#### TRINITY CLAY.

The Trinity clay consists of a dark-brown to black, calcareous clay which either shows little change in the 3-foot section or becomes somewhat lighter in color with depth. Below 12 inches slight mottlings of yellow are often encountered. The characteristic dark color is due to a high percentage of organic matter. Areas of Ochlockonee clay and silt loam, too small to be mapped separately, are included with this type.

The Trinity clay is confined to the flood plains of streams. The principal areas lie along Ozan Creek and its forks and south of Saratoga along Yellow Creek. Drainage is poor.

This is a strong, productive soil, of considerable importance agriculturally. About 80 per cent of it is under cultivation. The remainder is largely in swamps and forests, the trees consisting of oak, gum, sycamore, elm, ash, shortleaf pine, hickory, and willow. Cotton and corn are the principal crops.

Where properly ditched and protected from overflows this soil is well suited to the production of alfalfa. Bermuda grass is grown extensively in areas subject to inundations. Lespedeza does well. Cotton yields about one-fourth to 1 bale and corn 20 to 60 bushels per acre. Alfalfa yields about 3 and Bermuda grass  $1\frac{1}{2}$  to 2 tons of hay per acre.

If this type is plowed when too wet or too dry clods are formed, but under the optimum moisture conditions it is possible to obtain a good, friable seed bed. Crop rotation is seldom practiced, although

some farmers have obtained greatly increased yields of corn by growing it on land on which fall-sown oats have been plowed under in the spring and followed by cowpeas.

Land of this type sells for \$30 to \$80 an acre, depending mainly upon drainage conditions and the general farm improvements.

Before the Trinity clay can be farmed to best advantage levees or dredged ditches, or both, will have to be installed.

#### MILLER VERY FINE SAND.

The Miller very fine sand consists of a chocolate reddish brown, calcareous very fine sand which changes little within the 3-foot section. In places a thin layer of heavier material, usually very fine sandy loam or silt loam, is encountered in both surface soil and subsoil, and in some instances a layer of very fine sandy clay about one-half inch in thickness occurs on the surface of slight depressions.

Some small areas of a very fine sandy loam type in the vicinity of Fulton are included. These areas are similar to the Miller very fine sand, except that at a depth of about 20 inches a chocolate-red very fine sandy clay is encountered. A variation occurs in the southwestern part of the county, near Clear Lake, in which both the surface soil and subsoil are lighter colored than usual, the former to a depth of 10 inches consisting of a gray very fine sand with a slight reddish tinge.

The Miller very fine sand occurs in the flood plain of Red River. The topography is level, except for occasional depressions and inequalities caused by overflow water. Drainage is adequate, except during overflows. That part of the type lying nearest the river is sometimes excessively drained during periods of drought.

The Miller very fine sand is less extensive than the Miller clay. Probably 75 per cent of the type is farmed, the remainder being forested with oak, gum, hickory, and cedar.

Cotton is the most important crop, followed closely by corn and Bermuda grass. Oats are grown to some extent, and truck crops for the local market are grown in the vicinity of Fulton. Cattle and hogs graze on the wooded areas. Bermuda-grass pastures and occasionally winter pastures of rye are provided for cattle and sheep.

Cotton yields on this type are slightly smaller than on the Miller clay, except in very wet seasons, and corn yields are somewhat larger. Bermuda grass yields  $1\frac{1}{2}$  to 2 tons of hay to the acre. No commercial fertilizer is used.

Unimproved land of the Miller very fine sand is valued at \$10 to \$20 an acre. Improved land sells at about \$20 to \$50 an acre, depending upon the improvements and location.

This soil could no doubt be greatly improved by incorporating with it large quantities of barnyard manure and plowing under green-manure crops.

## MILLER CLAY.

The Miller clay consists of a dark chocolate red or chocolate reddish brown clay to silty clay, grading at a depth of 8 or 10 inches into a plastic clay of the same color, which continues with little change to a depth of 3 feet or more. Both surface soil and subsoil are as a rule calcareous. In places very fine sandy clay or silty clay is reached at about 30 to 36 inches. Upon drying large cracks form in both surface soil and subsoil and the material tends to break up into small aggregates, giving a "buckshot" structure. The soil is very sticky when wet.

This type is confined to the southwestern part of the county, occurring in the first bottoms of the Red River, south of Fulton, and along Bairds Lake and Yellow Creek in the Little River bottoms. Usually areas of Miller very fine sand or Yahola silty clay loam, or both, lie between this type and the Red River.

The surface of the Miller clay is almost level, being interrupted only by an occasional slough or bayou marking the location of old stream channels. Owing to the impervious nature of the soil and subsoil, rain water usually stands on the surface for some time. A considerable area is protected from overflows by levees and drained by open ditches.

Although not very extensive, the Miller clay is an important type in Hempstead County. About 20 per cent is in cultivation, the remainder supporting a forest growth consisting of red oak, overcup oak, pin oak, post oak, hickory, elm, ash, persimmon, pecan, sweet gum, black gum, cypress, willow, box elder, bois d'arc, and sycamore. The principal crops are cotton, corn, Bermuda grass, and oats. Where artificial drainage has been established alfalfa has given good results. With proper cultivation cotton yields as much as one bale to the acre, but the average yield is about one-half bale. Corn yields 15 to 40 bushels, Bermuda grass about 2 tons of hay, and oats 35 bushels per acre. The Miller clay is handled in practically the same way as the Trinity clay. No fertilizer is used.

Wooded areas of this type are valued at \$10 to \$20 an acre, and improved land at \$20 to \$50.

The construction of levees and ditches is necessary to protect crops on this type against overflows.

## YAHOLA SILTY CLAY LOAM.

The surface soil of the Yahola silty clay loam is a chocolate-brown, dark chocolate brown, or chocolate reddish brown heavy silt loam to silty clay loam. The material usually becomes gradually lighter in texture to a depth of 12 to 20 inches, where the

subsoil, consisting of very fine sandy loam or very fine sand, is encountered. Both surface soil and subsoil are calcareous. In places the texture is that of a silty clay loam or silty clay throughout the 3-foot section. As mapped this type includes some very small areas of Miller clay and very fine sand, and Yahola silt loam and clay.

The Yahola silty clay loam is developed most extensively in the Red River bottoms south of Fulton. The surface varies from level to slightly uneven, there being many low ridges and depressions, the latter predominating in extent. On the ridges the heavier surface soil may be only a few inches in thickness, while in the depressions it usually extends to a depth of 18 to 20 inches. The type is subject to inundations and the water table remains rather near the surface for long periods. Drainage is generally insufficient.

Although comparatively inextensive, the Yahola silty clay loam is an important soil. About 75 per cent of it is under cultivation, the remainder being forested with cottonwood, red cedar, willow, cypress, elm, ash, gum, oak, box elder, pecan, and redbud.

Cotton is grown more extensively than any other crop and corn ranks second. Alfalfa, Bermuda grass, and sorghum are also grown. Cotton ordinarily yields somewhat less than on the Miller clay, while corn gives slightly higher returns than on the latter soil. Bermuda grass yields about 2 tons of hay to the acre and alfalfa about 3 tons. Bermuda grass is the surer crop, because it is not injured by overflows. The Yahola silty clay loam is handled in practically the same manner as the Miller soils. Commercial fertilizer is not used.

The price of land of the Yahola silty clay loam ranges from \$25 to \$50 an acre, depending on the farm improvements, character of roads, and distance from Fulton.

Better levees and a more extensive system of ditches are particularly needed in the lower lying areas of this type.

In the following table are shown the results of mechanical analyses of samples of the soil and subsoil of the Yahola silty clay loam:

*Mechanical analyses of Yahola silty clay loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
461356, 461358.....	Soil.....	0.1	0.1	0.2	2.3	19.5	49.5	28.2
461357, 461359.....	Subsoil.....	.0	.0	.1	19.3	43.8	28.4	8.0

## PORTLAND CLAY.

The Portland clay to a depth of about 8 inches consists of a brown or dark-gray clay, with gray, drab, or rusty-brown mottlings, passing into light chocolate red clay mottled with brown, yellow, and gray or drab. This at 20 to 30 inches grades into chocolate-red or dark chocolate red, rather plastic clay, which continues to a depth of 3 feet or more. In a narrow area of this type lying west of McNab the surface soil to a depth of 15 to 30 inches is black, underlain by the typical subsoil. Where the type borders areas of Miller clay the plastic, chocolate-colored clay is usually encountered at 15 to 20 inches and in a few cases within 2 or 3 inches of the surface.

The most extensive areas of Portland clay occur in the western part of the county between Little River and Bairds Lake. Smaller areas occur near Fulton, around Fish and Clear Lakes, and where the Bois d'Arc bottom joins the Red River bottom in the southwestern part of the county. The type is subject to frequent overflows. The topography is level and the surface drainage and underdrainage are poor.

Because of its poor drainage the Portland clay is unimportant agriculturally. Probably less than 5 per cent of it is under cultivation, while the remainder is forested with hickory, pin oak, overcup oak, elm, ash, sweet gum, black gum, willow, and cypress.

The small cultivated areas are cropped about equally to cotton and corn. Over the greater part of the type a few cattle and hogs are grazed. The less thickly wooded sections support a fair growth of grass from early spring until fall. Cotton yields one-fourth to three-fourths bale and corn 25 to 30 bushels per acre. The type is handled in the same manner as the Trinity clay. No fertilizers are used.

The average selling value of land of this type is about \$10 an acre, but improved areas are worth \$25 to \$40 an acre, depending largely upon drainage conditions.

This is naturally a strong and productive soil, but for the successful production of general farm crops it needs an extensive system of levees and artificial drainage. Where cultivated crops are grown deeper and more thorough breaking of the land is needed, such as could be accomplished by the use of large turning or disk plows. With the growing of such crops as Bermuda and Johnson grass and lespedeza, all of this type could be used for pasturage and the production of hay without being protected by levees.

The following table shows the results of mechanical analyses of samples of the soil and subsoil of the Portland clay:

*Mechanical analyses of Portland clay.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
461354.....	Soil.....	0.0	0.9	1.1	2.6	1.0	33.7	60.9
461355.....	Subsoil.....	.0	.2	.4	1.2	.7	27.7	70.1

BIBB VERY FINE SANDY LOAM.

The surface soil of the Bibb very fine sandy loam, to a depth of 6 to 10 inches, consists of a gray or dingy-gray very fine sandy loam, faintly mottled with brown. The subsoil is a gray or light-gray very fine sandy loam or heavy very fine sandy loam, slightly mottled with yellow or brown. The lower subsoil is frequently compact and impervious. Occasionally iron concretions are encountered in the subsoil. Along the Little Missouri River and Hickory Creek and small tributaries of Bridge and Bois d'Arc Creeks south of Sprudel there are some areas of silt loam texture which were not separated in mapping, owing to their small extent.

The Bibb very fine sandy loam is a first-bottom soil and is subject to overflows. It is developed mainly along Bodcaw, Little Bodcaw, and Flat Bodcaw Creeks and some of their tributaries. Other areas occur along Hickory Creek and Little Missouri River in the north-eastern part of the county. It is flat and poorly drained, water frequently standing on the surface for long periods after overflows or rains. The type is inextensive and is not under cultivation. The tree growth consists mainly of shortleaf pine, water oak, pin oak, overcup oak, sweet gum, black gum, and holly. A few cattle and hogs are raised.

Land of this type is sold only with larger areas of other soil types. It is valued at about \$5 an acre.

With the deepening and straightening of the streams, in connection with the establishment of drainage by means of lateral ditches or tile, and the supplying of organic matter, moderate yields of cotton and corn can be obtained on this type. Bermuda grass and lespedeza can be grown without improving the drainage.

BIBB CLAY.

The surface soil of the Bibb clay, to a depth of 6 to 8 inches, is a gray clay mottled with brown and yellow. The subsoil, extending to a depth of 5 feet or more, is a gray or light-drab, impervious clay,

usually mottled somewhat with yellow and occasionally with brown or red. In some instances, where more than the usual quantity of organic matter has accumulated, the surface soil is rather dark gray or dark grayish brown in color to a depth of 4 or 5 inches.

The Bibb clay is developed mainly in the first bottoms of the Little and Saline Rivers in the western part of the county and along Bois d'Arc and Bridge Creeks in the southwestern part. The greater part of the type is flat and poorly drained. It is frequently overflowed.

This type is of very little agricultural importance in Hempstead County. Only a few acres are in cultivation, while the remainder supports a growth of sweet gum, black gum, pin oak, water oak, hickory, shortleaf pine, ash, and elm. The few acres in cultivation are planted to cotton and corn. Yields are a little less than on the Ochlockonee clay. The more open and elevated areas support a good growth of grass and afford pasturage for cattle and hogs. Land of this type is valued at about \$8 or \$10 an acre.

The Bibb clay could be improved by the establishment of levees and drainage ditches, thorough cultivation, and the addition of organic matter. Bermuda grass and lespedeza flourish on this soil, and can be grown for pasturage or hay without drainage.

#### OCHLOCKONEE VERY FINE SANDY LOAM.

The Ochlockonee very fine sandy loam consists of a brown or light-brown very fine sandy loam, changing at a depth of 10 or 12 inches to a grayish-brown very fine sandy loam or silt loam. This grades into a mottled brown, gray, and yellow or light grayish brown material which may be a very fine sandy loam, silt loam, silty clay, or sandy clay. The type as mapped includes small areas of Ochlockonee very fine sand, silt loam, and clay.

The Ochlockonee very fine sandy loam is the most extensive flood-plain soil of the county, occurring along nearly every important stream, with the exception of the Red, Saline, and Little Rivers. Along the creeks and larger branches it lies 4 to 8 feet above the normal water level.

The surface is level to slightly hummocky and is traversed in places by old stream channels and cut-offs. Small circular mounds dot the surface along many of the streams. While not well drained, this type has better surface drainage than any other first-bottom soil in the county except the Miller very fine sand.

About 30 per cent of the type is in cultivation, while the remainder supports a growth of sweet gum, black gum, elm, ash, pin oak, overcup oak, post oak, sycamore, willow, shortleaf pine, hickory, dogwood, and persimmon. Corn and cotton are the staple crops. Some vege-

tables are grown for home consumption and the local markets. Bermuda grass is grown for hay and pasturage. The type is considered better suited to corn than to cotton. Corn yields 15 to 40 bushels per acre, cotton one-fourth to 1 bale, and Bermuda grass  $1\frac{1}{2}$  to 2 tons of hay.

Land of this type is sold only with larger tracts of other soils.

Since this type is subject to overflows its successful reclamation involves the construction of levees and a systematic series of drainage ditches. Where this has been done some of the best corn yields of Hempstead County are obtained. Bermuda grass, lespedeza, and Johnson grass can be successfully grown without drainage.

#### OCHLOCKONEE SILT LOAM.

The Ochlockonee silt loam consists of a brown silt loam, grading into a light-brown or yellowish-brown, moderately compact silt loam or silty clay with gray and rusty-brown mottlings. North of Dotson, along the Little Missouri River, there are some included areas of Thompson silt loam which are not shown on the soil map on account of their small size.

The largest areas of the Ochlockonee silt loam occur in the first bottoms of the Little Missouri River, the North Fork of Ozan Creek, and Pate Creek. Other areas occur along many of the smaller streams. The surface is flat but is dissected with sloughs and ditch-like channels of small tributaries of the river and creeks. The type lies 7 to 15 feet above the normal level of the streams. Surface drainage is poor and all the type is subject to occasional overflows.

Probably 10 per cent of this type is cultivated, the remainder being forested with shortleaf pine, sweet gum, black gum, ash, elm, pin oak, overcup oak, post oak, hickory, holly, redbud, willow, dogwood, ironwood, and persimmon. Uncultivated areas are used chiefly for grazing. This is naturally one of the most productive soils of Hempstead County. Corn, hay, and cotton are the principal crops, named in the order of their importance. Corn yields 20 to 40 bushels, Bermuda grass  $1\frac{1}{2}$  tons of hay, and cotton one-fourth to two-thirds bale per acre.

Land of this type is sold in conjunction with other soils.

Corn and cotton can not be grown extensively on the Ochlockonee silt loam until the natural drainage ways are straightened and deepened. All the type, however, could be used for hay and pasturage crops, such as lespedeza and Bermuda grass, even without protection from overflows.

#### OCHLOCKONEE CLAY.

The Ochlockonee clay to a depth of about 10 inches is a dark-brown to light-brown silty clay, underlain by a light-brown clay which

passes into brownish-gray, gray, or drab clay, mottled in places with yellow or brown. In some places, where the content of organic matter is high, the surface soil is almost black to a depth of about 5 or 6 inches.

The Ochlockonee clay occurs in the bottoms of a number of the creeks and smaller streams throughout the county, lying 4 to 8 feet above the stream levels. The largest areas occur along Caney, Bois d'Arc, Terre Rouge, and Ozan Creeks. The topography is level and the drainage is ordinarily poor, although it is usually better than that of the associated Bibb clay. Artificial drainage is required to make cultivation profitable.

The Ochlockonee clay is unimportant in Hempstead County. Only a few small patches of it are under cultivation, the greater part being forested with pin oak, overcup oak, post oak, ash, elm, sweet gum, black gum, shortleaf pine, sycamore, willow, hickory, and dogwood.

Cotton and corn are about the only crops grown. Under favorable conditions cotton yields one-third to three-fourths bale and corn 25 to 30 bushels per acre. Some cattle and hogs are pastured on the forested areas. The type is handled in about the same manner as the Susquehanna clay. No commercial fertilizers are used.

The selling price of land of the Ochlockonee clay ranges from \$5 to \$25 an acre, according to the value of the timber, the drainage, and the distance from markets.

Deeper plowing and more drainage ditches would increase the productiveness of this type. Bermuda grass and lespedeza can be grown for hay and pasturage without drainage.

#### KALMIA VERY FINE SANDY LOAM.

The Kalmia very fine sandy loam consists of a grayish to light-brown very fine sand to very fine sandy loam, grading at about 3 to 5 inches into pale-yellow very fine sand to fine sandy loam. This extends to a depth of about 15 to 24 inches and is underlain by pale-yellow, friable sandy clay, mottled with gray and in some places with red or brown. In the dome-shaped mounds with which this type is dotted the subsoil is more sandy than elsewhere, while in spots along terrace escarpments and drainage ways it consists of a yellow sandy clay.

The Kalmia very fine sandy loam occupies second bottoms along most of the creeks of the county, but is most extensively developed along Ozan Creek and its forks and along the Little Missouri River southeast of its confluence with Ozan Creek.

The surface is that of a nearly level terrace interrupted by moderately shallow drainage ways, shallow basins, and small, dome-shaped mounds. The type lies above overflow, its elevation above the first

bottoms ranging from about 5 to 15 feet. On the whole the drainage is poor, but on many of the circular mounds and near the bluffs and drainage ways it is fairly well established.

Because of its imperfect drainage and small extent, the *Kalmia* very fine sandy loam is not important in the agriculture of Hempstead County. Probably one-sixth of the type is cultivated, the remainder being forested, mainly with shortleaf pine, black gum, sweet gum, overcup oak, post oak, white oak, red oak, pin oak, blackjack oak, hickory, walnut, ash, elm, dogwood, holly, and persimmon.

Cotton and corn, the principal crops, occupy about an equal acreage. Sorghum, oats, cowpeas, Bermuda grass, cantaloupes, and early radishes also are grown. Cotton yields about one-fifth to one-half bale, corn 10 to 25 bushels, early radishes 30 to 40 barrels, and cantaloupes 50 to 200 crates per acre.

The price of land of this type ranges from about \$10 to \$20 an acre, depending upon the farm improvements, character of the roads, and distance from towns and transportation facilities.

Suggestions offered for the improvement of the Caddo very fine sandy loam apply also to the *Kalmia* very fine sandy loam. Artificial drainage and the addition of organic matter are particularly needed.

#### AMITE LOAM.

The Amite loam consists of a brown to reddish-brown loam, about 10 inches deep, underlain by a moderately friable, red or brownish-red fine sandy clay, which extends to a depth of 3 feet or more. The type usually contains a small quantity of chert and quartz gravel, and there are many slightly elevated patches, a few yards in diameter, in which the gravel is abundant and may be encountered anywhere within the 3-foot section. There are included areas of grayish-brown fine sandy loam or very fine sandy loam that are not indicated on the map owing to their small size.

On the terraces along Ozan Creek north of Maxwell Bridge, along Bois d'Arc Creek south of Guernsey, and in the vicinity of Bethel School south of the Little Missouri River there are a number of areas which would have been mapped as Cahaba very fine sandy loam had they been of sufficient extent. In these areas the surface soil is a light-brown to reddish-brown, friable, very fine sandy loam, passing at about 10 inches into dull-red or yellowish-red sandy clay, which extends to a depth of 3 feet or more.

The largest development of the Amite loam occurs along the upper branches of the North Fork of Ozan Creek in the vicinity of Bingen, occupying a second-bottom position just above high-water stage. Narrow strips subject to occasional overflows occur along the

larger branches of the creek. The topography is nearly level, but because of the porous subsoil and substratum drainage is good.

Although inextensive, this type ranks among the better general-farming and trucking soils of Hempstead County. Nearly all of it is under cultivation. The principal crops are corn, cotton, Bermuda grass, cowpeas, sorghum, oats, peanuts, and cantaloupes. Some farmers grow Irish potatoes and sweet potatoes. Corn ordinarily yields 15 to 25 bushels per acre, but in some cases yields of 40 to 50 bushels are obtained. Cotton yields one-half to two-thirds of a bale per acre, cowpeas and Bermuda grass 1 to 2 tons of hay, Irish potatoes about 125 bushels, and cantaloupes about 80 crates. Cultivation is done with implements drawn by one or two horses or mules. Deep plowing is practiced by the more successful farmers. Commercial fertilizers are not used. Land of this type is valued at about \$50 an acre.

The Amite loam can be improved by the incorporation of organic matter and deep plowing. In some sections of the South alfalfa has been successfully grown on land of this type.

#### LEAF SILT LOAM.

The Leaf silt loam consists of a light-brown to brown silt loam, underlain at about 6 to 10 inches by yellow or red clay, which passes into red plastic clay mottled with yellow and gray. In some places the stiff subsoil is very near the surface or outcrops, while in others the surface mantle of silt loam is as much as 15 inches thick. There are some included areas of Leaf clay and very fine sandy loam too small to indicate on the map.

This type is developed mainly on the second bottoms of Ozan Creek and its forks, Bois d'Arc, Howard, and Pate Creeks. The topography is level to slightly undulating, and both the surface drainage and underdrainage are poor. In depressions and over flat areas water stands on the surface for some time after rains. Probably 50 per cent of this type, comprising the slightly undulating areas, is under cultivation. The remainder usually is too wet for farming and is forested with shortleaf pine, post oak, white oak, red oak, pin oak, black oak, sweet gum, black gum, ash, hickory, dogwood, and elm.

The most important crops are cotton, corn, cowpeas, Bermuda grass, and sorghum. Cotton yields one-fourth to one-half bale and corn 15 to 30 bushels per acre.

This type is handled and fertilized in practically the same manner as the Susquehanna silt loam. The suggestions offered for the improvement of the latter type are also applicable to it.

## LEAF CLAY.

The Leaf clay consists of a brownish clay or clay loam, usually slightly mottled with gray, changing at about 6 to 8 inches to a mottled gray and yellow clay, which in turn passes at about 12 to 15 inches into mottled red, gray, and yellow plastic clay. Areas of this type lying east of Bois d'Arc Creek have 3 or 4 inches of silt loam on the immediate surface except in eroded spots.

The largest areas of the Leaf clay occupy terrace positions about 12 to 15 feet above the first bottoms of Bois d'Arc Creek and some of its tributaries. Smaller areas occur along the South Fork of Ozan Creek. The topography is flat and the drainage, except where small channels cross the type, is poor.

This type, because of its poor surface drainage and small extent, is unimportant in the agriculture of the county. Probably not over 10 per cent of it is under cultivation. The cultivated areas lie near the small drainage channels or along the bluff-terrace escarpments. The forest growth consists of pin oak, post oak, red oak, overcup oak, sweet gum, black gum, ash, elm, dogwood, and shortleaf pine.

Moderate yields of cotton, corn, and hay are obtained. Native grasses provide pasturage for cattle, horses, and mules.

Land of this type is valued at \$5 to \$15 an acre, according to the improvements or the marketable timber.

Better drainage, more thorough cultivation, and the addition of vegetable matter by plowing under cowpeas or other crops would greatly increase the productiveness of this soil. The application of lime or ground limestone would probably give good results.

## MYATT VERY FINE SANDY LOAM.

The surface soil of the Myatt very fine sandy loam, extending to a depth of 6 inches, is a gray or dingy-gray, rather silty very fine sandy loam, usually containing faint yellowish or brownish mottlings. The subsoil is gray or light gray in color and varies from a silty very fine sandy loam or sticky very fine sandy loam to very fine sandy clay. These different textures frequently occur in the same soil section, the heavier material being underlain at about 15 to 20 inches by a compact, heavy very fine sandy loam which resembles hardpan. In some cases the very fine sandy clay continues to a depth of 3 feet or more, becoming heavier with increasing depth. Such areas occur north of the Middle Fork of Ozan Creek.

The Myatt very fine sandy loam is most extensively developed on the second bottoms along Bodcaw Creek in the southeastern part of the county, and along the Middle Fork of Ozan Creek in the central-northwestern part. Except for occasional sandy mounds or hummocks the topography is flat. These mounds usually occur along the terrace escarpments, and consequently hinder the drainage of the type as a whole.

The Myatt very fine sandy loam is unimportant in the agriculture of the county, because of its small area and poor drainage. Probably less than 5 per cent of the type is utilized for agriculture. The uncultivated areas support a growth of post oak, pin oak, overcup oak, hickory, sweet gum, black gum, and elm.

Cotton and corn are the principal crops. Yields are somewhat lower than on the Caddo very fine sandy loam and silt loam. Some cattle and hogs are raised to supply home needs. The type is handled in about the same manner as the Caddo silt loam.

This land sells for \$5 to \$15 an acre, according to the extent of improvements, character of roads, and distance from towns and railroad stations.

This soil could be improved by the use of stable manure, the growing and plowing under of cowpeas and other green manures, the rotation of crops, more thorough cultivation, and more extensive ditching.

#### MYATT CLAY.

The Myatt clay consists of a gray or light-brownish silty clay which passes at about 1 inch into gray or drab clay mottled slightly with yellow and rusty brown. This may continue to a depth of 3 feet or more, being slightly lighter in color below 6 inches, or it may become light drab in color, with yellow mottlings, at a depth of about 20 inches. In places a compact, impervious layer or hardpan is encountered in the lower subsoil, usually at a depth of about 30 inches.

This type occupies second bottoms along Sandy Bois d'Arc Creek; west and south of Powers. A small area occurs along Ozan Creek near Hickory Grove School. Its surface is flat, and the drainage is poor. The type is very inextensive and is not farmed. The forest growth consists mainly of gum, oak, elm, ash, and hickory.

Land of this type is valued chiefly for its timber. Prices range from \$5 to \$10 an acre.

Fair yields of cotton and corn could be obtained on this type with ditching, deep plowing, and the addition of organic matter. Applications of lime undoubtedly would improve the soil.

#### MUSKOGEE CLAY LOAM.

The surface soil of the Muskogee clay loam, to a depth of 2 to 6 inches, is a grayish-brown silt loam, which, on drying, appears gray or light gray on the immediate surface. This is underlain by a layer, 2 to 3 inches thick, of brownish-gray silty clay, which passes into a grayish or drab clay mottled with yellow and yellowish red. The reddish color increases with depth, and the material from 24 to 36 inches is a yellowish-red, plastic clay mottled with drab and in places

with yellow. Plowing brings to the surface a clay, which, when mixed with the silty material, changes the texture to a clay loam. Where the Muskogee clay loam borders areas of Orangeburg fine sandy loam the surface material to a depth of 2 to 4 inches may be a very fine sandy loam. In eroded areas the plastic clay may be exposed at the surface. In deep gullies the chocolate-red, calcareous clay of the Miller soils, which seems to underlie the entire area of Muskogee clay loam at depths ranging from 4 to 6 feet, is exposed.

The Muskogee clay loam occupies a terrace position on the Red River. It is mapped in one large area extending from a point near Allens Ferry and Fulton almost to the place where the bluff road extending south from Fulton crosses Bois d'Arc Creek. The greater part of the type has a flat surface, and in places, especially where the soil is heavier than usual, there are numerous small depressions, or "hog wallows." A system of drainage channels is gradually working its way back into the type, affording fair surface drainage for the land immediately adjacent, but over the greater part of the type both surface drainage and underdrainage are poor. The cultivated fields are located along the drainage ways.

Because of its poor drainage this type is not important agriculturally. Probably about 5 per cent of it is under cultivation. The remainder supports a growth of shortleaf pine, oak, gum, hickory, elm, ash, and dogwood.

Cotton and corn, to which about an equal acreage is devoted, are the principal crops. Oats, cowpeas, vegetables, and Bermuda grass also are grown. Dairying is carried on to a small extent, the surplus milk and butter being sold in Fulton. Some cattle and hogs are grazed in the wooded areas, which afford fair pasturage during the spring, summer, and fall. Cotton yields ordinarily about one-half bale to the acre and corn 10 to 20 bushels. Better yields are obtained after a heavy application of barnyard manure. As a rule, the plowing is shallow and the soil is not sufficiently tilled and pulverized for best results.

Land of this type sells at \$5 to \$25 an acre, depending largely upon the standing timber or the farm improvements.

The productiveness of the Muskogee clay loam can be increased by the incorporation of cowpeas and other vegetable matter in connection with deep plowing, thorough cultivation, and artificial drainage.

#### SUMMARY.

Hempstead County is situated in the southwestern corner of Arkansas, and has an area of 727 square miles, or 465,280 acres. In general it has an undulating to gently rolling surface and is well drained, but there are extensive level and poorly drained areas, consisting of

the broad flood plains and terraces of the Red, Saline, Little, and Little Missouri Rivers. The average elevation of the county above sea level is about 318 feet. The principal watershed extends south-eastward from the northwestern part of the county near Bingen, passing into Nevada County 2 miles southeast of Rocky Mound Hill. West of this divide the streams flow south and southwest to the Red River, and east of it the drainage is eastward and northeastward to the Little Missouri River.

Hempstead County was organized December 15, 1818, being one of the four original counties of Arkansas. The present white population consists mainly of descendants of the early Anglo-Saxon settlers. The total population as reported in the 1910 census was 28,285. Hope, the largest town, had a population at that time of 3,639.

The county has good transportation facilities, being traversed by five railroads. Public roads extend into all parts of the county, and the more important ones are kept in fair condition.

The climate is characterized by long summers and short, mild winters. The mean annual temperature as reported by the Weather Bureau station at Hope is 62.5° F., and the precipitation 52.71 inches. There is a normal growing season of 234 days.

Cotton is the main money crop of the county. About an equal area is devoted to corn. Hay, cowpeas, sorghum, oats, and peanuts are extensively grown. Irish potatoes, sweet potatoes, cantaloupes, early radishes, and watermelons are important special crops. Peaches, apples, pears, plums, grapes, and all the garden crops common to the region are grown to some extent.

The 1910 census reports 4,186 farms in the county, of an average size of 72.7 acres, of which 40.5 acres, or about 56 per cent, are improved. About 47.9 per cent of the farms are operated by the owners and practically all the remainder by tenants. The prevailing method of renting is on the share basis. The average value of land in 1910 is reported by the census as \$11.95 an acre. The selling price of the better farming land at present ranges from \$20 to \$60 an acre. Farm labor is plentiful. Monthly wages range from \$10 to \$20, and daily wages from 75 cents to \$1.

There are 33 types and one phase of soil mapped in Hempstead County. These are grouped in 20 series. About 75 per cent of the soil material is residual in origin and the remainder alluvial. The fine sandy loam and clay types predominate. The residual or upland soils are classed with the Houston, Oktibbeha, Sumter, Susquehanna, Lufkin, Ruston, Orangeburg, Norfolk, and Caddo series; the soils of the first bottoms or flood plains with the Trinity, Miller, Yahola, Portland, Bibb, and Ochlockonee series, and those of the second bottoms or stream terraces with the Kalmia, Amite, Leaf, Myatt, and Muskoguee series.

The Houston clay is the most productive upland type of Hempstead County, and practically all of it is under cultivation. It is especially well suited to the production of long and short staple cotton, corn, cowpeas, peanuts, and alfalfa.

The soils of the Oktibbeha series—an upland series—are of moderate extent. They are underlain by calcareous deposits at shallow depths and are productive. Between 50 and 75 per cent of their area is under cultivation.

The Sumter clay has a rolling to hilly topography and is very much washed and dissected by gullies. General farming is carried on to a small extent on this soil, but yields are below the average for the county.

The Susquehanna very fine sandy loam is one of the most extensive and important soils of the county. Cotton, corn, cowpeas, sorghum, and oats do very well on this type and on the better drained portions of the Susquehanna silt loam and clay. The Susquehanna gravelly loam has a rolling to hilly topography. The rougher areas are best suited to pasturage, but the smoother areas are fairly suitable for cultivation.

The Lufkin clay is a poorly drained soil of low agricultural value. Cotton, corn, oats, sorghum, and Bermuda grass are grown, but the yields are low.

The Ruston very fine sandy loam and fine sandy loam are the predominating types of the county. They are well suited to general farming and to the production of cantaloupes and early radishes. The Ruston gravelly sandy loam is a very inextensive type, cultivated in conjunction with the fine sandy loam. Yields are somewhat lower than on the latter type.

The Orangeburg fine sandy loam, although comparatively inextensive, is a productive soil. Cotton, corn, cowpeas, sorghum, peanuts, oats, cantaloupes, early radishes, and a variety of other crops are grown. The soil is well suited to peaches and other fruits. The Orangeburg gravelly fine sandy loam is somewhat less productive than the fine sandy loam.

The Norfolk fine sand is especially well suited to peaches, cantaloupes, early radishes, and truck crops. Fair yields of cotton and corn are obtained.

The Caddo very fine sandy loam and silt loam are poorly drained and unimportant, only a relatively small proportion of their area being suitable for cultivation. Cotton, corn, and grasses are the principal crops.

The Trinity clay, where drained, is one of the strongest soils of the county. Corn, cotton, alfalfa, and Bermuda grass do especially well.

The Miller very fine sand and clay are well suited to cotton, corn, alfalfa, and Bermuda grass. The poorly drained areas are not in cultivation.

The Yahola silty clay loam, while comparatively inextensive, is an important soil. It is well suited to cotton, corn, alfalfa, and Bermuda grass.

The Portland clay is very poorly drained and probably less than 5 per cent of it is under cultivation. It is naturally a strong, productive soil.

The Bibb very fine sandy loam and clay are very poorly drained and are subject to inundations. They are used almost exclusively for grazing.

The Ochlockonee very fine sandy loam, silt loam, and clay, where properly drained, are very well adapted to the production of cotton and corn. The poorly drained areas are used for pastures.

Most of the Kalmia very fine sandy loam, on account of poor drainage, is used only for grazing, but where fair drainage has been established moderate yields of cotton, corn, cantaloupes, and early radishes are obtained.

The Amite loam, although inextensive, is one of the best general-farming and trucking soils in the county. Nearly all of it is under cultivation.

The Leaf silt loam, where properly drained, gives good yields of cotton, corn, cowpeas, and oats. The Leaf clay is used largely for grazing.

The Myatt very fine sandy loam and clay are poorly drained and unimportant. Only about 5 per cent of the former and none of the latter is cultivated.

The Muskogee clay loam is a poorly drained soil, used mainly for grazing. A few small fields are devoted to the production of cotton and corn, and fair yields are obtained.



[PUBLIC RESOLUTION--No. 9.]

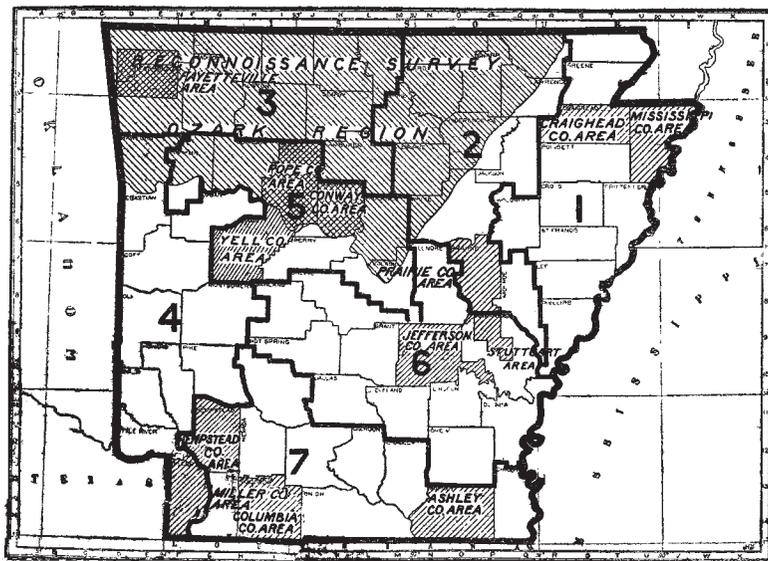
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture "

*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.]



Areas surveyed in Arkansas.

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