U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE LOUISIANA AGRICULTURAL EXPERIMENT STATION; W. R. DODSON, DIRECTOR.

SOIL SURVEY OF SABINE PARISH, LOUISIANA.

BY

E. H. SMIES, IN CHARGE, W. E. THARP, AND A. C. ANDERSON, OF THE U. S. DEPARTMENT OF AGRICULTURE, AND F. V. EMERSON, OF THE LOUISIANA AGRICULTURAL EXPERIMENT STATION.

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1919.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1922

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., March 29, 1921.

SIR: Under the cooperative agreement with the Louisiana Agricultural Experiment Station, W. R. Dodson, Director, a soil survey of Sabine Parish was carried to completion during the field season of 1919.

I have the honor to transmit herewith the manuscript and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1919, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. H. C. WALLACE,
Secretary of Agriculture.

CONTENTS.

ILLUSTRATIONS.

PLATES.

FIGURE.

MAP.

Soil map, Sabine Parish sheet, Louisiana.

SOIL SURVEY OF SABINE PARISH, LOUISIANA.

By E. H. SMIES, In Charge, W. E. THARP, and A. C. ANDERSON, of the U. S. Department of Agriculture, and F. V. EMERSON, of the Louisiana Agricultural Experiment Station.—Area Inspected by HUGH H. BENNETT.

DESCRIPTION OF THE AREA.

Sabine Parish lies on the western boundary of the State of Louisiana, about half way between the northern and southern boundaries of the State. The northern parish boundary is about 50 miles south of Shreveport, the second largest city in the State. The parish is separated from the State of Texas by the Sabine River. It is about 47 miles long, north and south, at its place of greatest length, and about 33 miles in maximum width. It has an area of 1,002 square miles, or 641,280 acres.

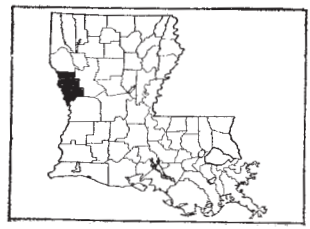

FIG. 1.—Sketch map showing location of the Sabine Parish area, Louisiana.

There are no striking variations in the physiography. The upland is dominantly gently rolling to rolling. The most rolling country occurs west of Fort Jesup, south of Bayou Lenann, and in the southeast part of the parish. Even in these areas there are few slopes too steep to cultivate. There are no very conspicuous ridges or hills. The largest valley is that of the Sabine River. In the more rolling parts of the parish the divides are narrow and the slopes rather steep, but elsewhere the divides are rather broad and dissected by valleys with gradual, well-rounded slopes. As a rule, the north and east slopes to the larger streams are more gradual than the south and west slopes.

Considerable alluvial land occurs along the larger creeks and along the Sabine River. Terraces occur in large, continuous areas along the river and in disconnected remnants along the larger creeks. The first bottom, or "swamp," as it is locally known, is practically all subject to frequent overflow, while the terraces or second bottoms, locally styled "hammock" lands, stand above the level of probable overflow. The surface of the first bottoms is in general level, but relieved by occasional stream channels, abandoned channels, low

hummocks, and swales. The terrace land varies from level to undulating and is broken only where cut by streams issuing from the upland. On many of these areas there are a considerable number of dome-shaped mounds, which give the surface a billowy appearance.

In elevation above sea level the greater part of Sabine Parish varies from about 175 feet in the vicinity of the river to about 300 feet on some of the highest divides. The elevation of the railroad tracks at Converse is 214 feet, at Zwolle 200, at Loring 283, at Many 242, at Fisher 337, at Sodus 291, and at a point 3.5 miles south of Sandel, 338 feet. The elevation of the railroad tracks at the crossing of Bayou San Patricio is 192 feet, and of Bayou Toro, 206 feet.

All the parish, except a belt a few miles wide along the eastern border, is drained by the Sabine River, which enters the Gulf of Mexico southwest of Beaumont, Tex. The river flows in a channel 150 to 200 feet in width, and the current is rather rapid. When at flood stage it is navigable as far north as Logansport, a few miles north of the northwest corner of the parish. Considerable freighting was done previously to the building of the railroads. The present flood plain along the river lies from 75 to 150 feet below the general level of the uplands 1 to 3 miles inland. The alluvial land along the river ranges in width from 1 to 4 miles.

The principal tributaries of the Sabine River include Bayous San Patricio, San Miguel, Lenann, Negreet, and Toro. Each of these streams has a moderately swift current, but they are not actively deepening their channels. The bottom land along each varies in width from a few feet near the heads of the numerous tributary waterways, to 1 mile or $1\frac{1}{4}$ miles farther down the main streams. The drainage of the eastern part of the parish is effected by tributaries of Cane River.

A large number of branches reach out from all the main streams, and there are very few areas in the upland of any size that do not have adequate surface drainage. A few small inadequately drained areas are scattered over the northeastern part of the parish, to the north of Bayou Toro, and in the southeastern part of the parish. The drainage of most of the first-bottom lands and of the more marshy level parts of the terraces is rather slow. All the first-bottom land is subject to rather deep and frequent inundations, and some of the lower terraces are overflowed at times of exceptionally high water. Overflows are most frequent in the spring, but may occur at any time of the year. Some small depressed areas in the larger first bottoms have water on the surface most of the year.

Sabine Parish was created from Natchitoches Parish in 1843. Many was made the parish seat. The first settlers took up lands along the larger creeks. Soon after the garrisoning of Fort Jesup,

in 1824, many traders and settlers came to this parish by way of Natchitoches. Most of the land was acquired by private individuals after 1871 through the homestead act, though many claims granted by the Spanish Government prior to 1803 were acknowledged by the United States. The early settlers in Sabine Parish came chiefly from Mississippi, Alabama, Georgia, and the Carolinas, though a large number of Mexican or Spanish people were already there when the territory was acquired by the United States. Many of their descendants still reside in the vicinity of Zwolle.

The population of Sabine Parish is reported in the census of 1850 as 3,347 white and 1,168 colored. By 1910 the total had increased to 19,874, and to 20,713 in 1920. All this is classed as rural, giving a density of 20.3 persons per square mile. There are few negro farmers; most of the negroes live in the sawmill towns and camps.

Many, situated near the center of the parish, is the parish seat and the second largest town. It had a population of 683 in 1910 and 663 in 1920. Other trading points with railroad facilities include Converse, Noble, and Sodus, in the northern part of the parish, with populations in 1920 of 200, 316, and 442, respectively; Zwolle, in the central part, with 909 inhabitants in 1920; and Fisher and Florien, in the south-central part, with 500 and 200, respectively, in 1910. Pleasant Hill had a population of 442 in 1910 and 554 in 1920. Each of these towns has a cotton gin and grist mill. Several gins and mills are located inland from the railroads. The more thickly settled parts of the parish lie adjacent to the larger bayous.

Prior to the building of the Texas & Pacific Railroad through the parish in 1881, freighting was done chiefly with oxen. The principal markets were Natchitoches and Grand Ecore, on the Red River. Some freighting was done on the Sabine River during flood seasons. The Texas & Pacific Railroad made available the markets of New Orleans and Dallas. The chief trading point until the building of the Kansas City Southern Railroad, in 1896, was Robeline. The Kansas City Southern traverses the central part of the parish from north to south, and gives an outlet south to the coast and north to Kansas City. Shreveport and Beaumont receive most of the agricultural products shipped from the parish.

Sabine Parish is well supplied with public roads, but little attention has been given construction and maintenance. As a result the main highways are in poor condition a great part of the year. Recently considerable interest has been taken in a good-roads movement, and scientifically constructed sand-clay roads have been built between the larger towns. These have proved to be good roads most of the year.

Telephone systems extend to every corner of the parish. Where farmers are not served by rural mail routes, distribution to the inland post offices is effected by star routes.

CLIMATE.

The climate of Sabine Parish is characterized by long, warm summers; short, mild winters, with a gradual transition from one season to the other; and abundant rainfall.

The summer temperatures as recorded at Robeline in Natchitoches Parish range from a maximum of 110° F. to a minimum of 48° F., the mean being 80.4° F. Hot weather usually begins about the last of April or early in May and continues until October. The winter temperatures vary from a maximum of 89° to a minimum of 6°, with a mean of 47.3°. During the winter the temperature is very changeable, and freezing temperatures may be expected at intervals from December to February, inclusive. On the other hand, long warm spells often occur.

The mean annual precipitation is 45.45 inches. The rainfall has ranged from 71.09 inches in the wettest year on record (1913) to 30.02 inches in the driest year (1907). As a rule, the rainfall is well distributed throughout the year, but is lightest in September, October, and November, when most of the harvesting is done. The precipitation in the summer is local and frequently torrential in character. At times a rainfall of 4 or 6 inches occurs within a few hours, causing considerable damage by gullying the slope fields and by flooding the bottom lands. A very small percentage of the precipitation occurs in the form of snow, and hail and sleet rarely occur.

The average date of the last killing frost in the spring is March 23 and that of the first in the fall November 3. This gives a normal growing season for tender vegetation of 225 days, while many of the forage plants thrive throughout the greater part of the year. The latest killing frost in the spring recorded at the Robeline station occurred April 30, and the earliest in the fall on October 19.

The climate is favorable for a widely diversified system of agriculture. The freedom from extremely cold temperatures and the long grazing season are favorable for dairying and stock raising. Live stock do not require expensive housing, but merely a shelter from the cold rains. Tillage operations can be carried on during every month in the year. With an intensive system of farming two or more crops frequently can be grown on the same field in one season.

The following table, giving the normal monthly, seasonal, and annual temperature and precipitation, is compiled from the records of the Weather Bureau station at Robeline in Natchitoches Parish, which is situated about 2 miles east of the east Sabine Parish line:

Normal monthly, seasonal, and annual temperature and precipitation at Robeline, Natchitoches Parish.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1907).	Total amount for the wettest year (1913).	Snow, average depth.
	° *F.*	° *F.*	° *F.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	46.6	85	12	3.87	1.34	3.75	0.1
January	47.0	88	10	2.32	.55	5.25	.5
February	48.3	89	6	4.63	2.45	5.88	.5
Winter	47.3	89	6	10.82	4.34	14.88	1.1
March	59.7	91	21	4.39	1.32	10.00	.....
April	64.6	92	26	4.69	2.86	11.00	.....
May	72.1	99	34	4.81	10.15	3.73	.....
Spring	65.5	99	21	13.89	14.33	24.73	.....
June	78.8	104	48	3.62	1.47	4.78	.....
July	81.1	107	53	4.63	3.00	1.80	.....
August	81.4	110	49	3.42	.44	4.91	.....
Summer	80.4	110	48	11.67	4.91	11.49	.....
September	75.6	103	32	2.85	1.51	15.90	.....
October	64.3	96	24	2.72	1.68	1.77	.....
November	56.3	95	15	3.50	3.25	2.32	T.
Fall	65.4	103	15	9.07	6.44	19.99	T.
Year	64.7	110	6	45.45	30.02	71.09	1.1

AGRICULTURE.

All the area of Sabine Parish, both upland and bottoms, was originally forested, mainly with a heavy growth of longleaf, shortleaf, and loblolly pine. Much of the upland is still covered with a heavy growth of merchantable pine; open woods of longleaf pine are very extensive in the southeastern part of the parish, while shortleaf pine with occasional stands of longleaf pine are found in smaller tracts in other parts of the parish. In the bottoms the forest growth consists chiefly of water oak, willow oak, post oak, live oak, black gum, sweet gum, magnolia, bay, ironwood, elm, sycamore, ash, tupelo, cypress, beech, maple, and shortleaf pine. Some small oak, gum, and hickory trees are sparsely intermingled with the upland pine. Blackjack oak comes up thickly in many places after the pine is removed.

The pine is being cut at a rapid rate. It is estimated that the greater part of the splendid pine forests will be cut within a period

of 10 or 15 years and that all the large pine will be exhausted in 20 years. Large sawmills of the most modern type are in operation throughout the parish, some of them cutting as much as 150,000 feet of lumber daily. Very few small trees are left standing. Fires generally follow, and the land is thus left with an appearance of desolation. Subsequent fires, together with the rooting of hogs, keep down any important reproduction of the pine, but blackjack oak comes in thickly. This scrubby oak is valueless, except as firewood and as browsing for goats while the trees are young. Goats eat off the leaves and sprouts and improve the pasture for sheep and cattle by a reduction of the shade.

Some turpentining is carried on in the longleaf-pine forests in the southeastern part of the parish, but this industry will, of course, pass with the cutting of the trees. At the present time the value of the forest products amounts to more than that of the agricultural products. The sawmills employ large forces of labor, and their present annual capacity is estimated at about 130,000,000 feet. There is an increasingly large area of cut-over land, very much more than can be farmed without a large increase in the population. This cut-over land makes good pasture and will produce abundantly such supplemental forage as velvet beans, cowpeas, peanuts, and sorghum. Bermuda grass and lespedeza can be seeded for pasturage and hay and the growth of wild carpet grass and lespedeza be improved by the prevention of fires and by grazing. At present only a few widely scattered farms are operated in the larger pine forests.

Agriculture was the leading industry of the early settlers of Sabine Parish. The principal crops grown were corn, tobacco, sugar cane, rice, sweet potatoes, and other vegetables. Cattle and hogs were raised on the open or common range, as is done at present. The early immigrants settled chiefly on the second-bottom soils, the Kalmia and Cahaba, and on the "red lands" (Greenville soils) in the south-central part of the parish. It was not until a later date that farming in the first bottoms was undertaken.

With the exception of tobacco, crops were grown for subsistence rather than for sale. Tobacco and the surplus cattle were the chief products disposed of, and the markets of Natchitoches and Grand Ecore were reached only after a tedious journey. Some cotton was grown as early as 1850, but it did not become an important crop until after the Civil War. Then it soon became the leading money crop, and by 1880 tobacco had practically ceased to be grown, except in very small fields for home use. From 1880 until the coming of the boll weevil, in 1903–4, approximately the same acreage was devoted to cotton and corn each year, but since that time the cotton acreage has gradually decreased. Other crops grown on a small

scale since 1880 are oats, rice, white potatoes, sweet potatoes, and sugar cane. Cowpeas, soy beans, and peanuts have been increasing in importance since 1900, but have never been grown on any large scale.

Under the early system of agriculture fields were planted continuously until the yields became unsatisfactory. New land was then brought under cultivation and the old fields allowed to lie idle for a period of years, growing up to scrub oak and pine. Ridge culture was the general practice, and light implements with one-horse draft were used for plowing and cultivating. These early methods still prevail on most farms. After the Civil War, when cotton became the chief money crop, a system of financing came into operation whereby supplies were sold on credit to the farmers who would grow cotton and a mortgage was given on this crop. Although conditions have changed considerably since the invasion of the boll weevil, the one-crop credit system still prevails, especially among the tenant farmers. However, there is at present a tendency toward the diversification of crops, as the more progressive farmers have come to recognize that the production of more feed and foodstuffs, such as corn, cowpeas, soy beans, and forage crops, will not only give larger profits but at the same time build up the soils.

The census of 1880 reports 14.33 per cent of the area of the parish in farms and 22.16 per cent of the farm land as improved. These percentages have steadily increased, and in 1920, 34.6 per cent of the parish was included in farms, of whose total area 43.1 per cent was improved land. Between 1900 and 1910 there was some improved land abandoned on account of the ravages of the boll weevil, but since the latter year it is believed the loss has more than been made up.

In the table below statistics of acreage and production of the principal crops for the census years 1880 to 1920 are given:

Acreage and production of the principal crops in Sabine Parish, 1879–1919.

Year.	Corn.		Cotton.		Oats.		Sweet potatoes.		Sugar cane.		Hay and forage.	
	Acres.	*Bush.*	*Acres.*	*Bales.*	*Acres.*	*Bush.*	*Acres.*	*Bush.*	*Acres.*	*Galls.*	*Acres.*	*Tons.*
1879	7,971	60,897	5,952	2,313	487	4,355	191	19,821	85	9,539	.....	.....
1889	12,473	194,644	13,888	6,136	938	9,956	392	44,941	316	42,764	.....	.....
1899	25,446	364,810	23,967	10,229	1,054	10,360	503	39,533	100	14,841	28	29
1909	20,280	358,400	11,601	3,533	[1] 60	1,460	514	60,060	311	44,959	381	480
1919	31,573	392,694	26,310	3,170	898	10,383	1,416	159,270	561	68,582	1,458	1,534

[1] The large reduction in acreage is partly accounted for by its inclusion under the hay and forage crops as grains cut green.

In 1918 the parish produced 9,476 bales and in 1919, 3,170 bales of cotton. The yield of cotton in good years ranges from one-fourth to

one-half bale per acre, according to the soil and the treatment. As much as one bale to the acre is sometimes produced on the better soils, such as the Greenville gravelly loam, Cahaba very fine sandy loam, Kalmia very fine sandy loam and very fine sand, and Ochlockonee silt loam and very fine sandy loam, where manure or fertilizer is used and good cultivation is given. The boll weevil has reduced the average yield considerably. The chief varieties of purebred cotton grown are the Triumph, Mebane, and Mebane Triumph. Half and Half cotton has been produced quite extensively until recent years, but its production is being discouraged because of its short lint.

Other farm crops of importance are cowpeas, velvet beans, lespedeza, Bermuda grass, carpet grass, and other hay and forage crops. Small patches are devoted to rice, peanuts, sugar cane, melons, and vegetables, all of which do well on the proper soils. Peanuts give good results on all the well-drained very fine sandy loams and fine sandy loams, and especially on the Ruston and Orangeburg soils.

At present the agriculture of Sabine Parish consists chiefly of growing cotton and corn, combined with the raising of some cattle and hogs. Cotton is the principal money crop. Some corn is sold, but the greater part of the crop is fed to work stock and other animals on the farm. The second most important sale product of the farm is live stock, mainly hogs and cattle, with some sheep and goats. In 1910 animals sold or slaughtered were valued at $177,818. Of these 640 were calves, 4,762 were other cattle, 12,491 hogs, and 604 sheep and goats.

The census reports the average yield of corn as 15.5 bushels per acre in 1889, 14.3 bushels in 1899, 17.6 bushels in 1909, and 12.4 bushels in 1919. In good years the yield, as reported by farmers, ranges from about 15 to 40 bushels per acre, according to the soil and the treatment. Some exceptionally good bottom land, such as the Ochlockonee silt loam and very fine sandy loam, and good second-bottom land, such as the Cahaba and Kalmia soils, and the best upland soils, such as the Greenville, Orangeburg, and Ruston, will give yields as high as 60 bushels. Most of the farmers produce all the corn required for feeding stock, when the season is favorable. The principal varieties of purebred corn grown are the Hastings Prolific and Calhoun Red Cob.

Stock raising has increased in importance in recent years. Some farmers who have herds of 100 to 800 head of cattle have brought in blooded bulls for improving the native stock, much of which is small and unsatisfactory. Nearly every farmer keeps a few head of cattle and hogs, the latter chiefly to supply home needs. Herds of goats are numerous. The animals roam the woods in herds ranging from a dozen to 40 or 50, and thrive without much attention. They are sold for their meat. Several small herds of purebred cattle and

hogs are to be found in the northern and central parts of the parish. The Shorthorn and Red Poll are the leading breeds of cattle and the Duroc-Jersey and Poland-China of hogs.

According to a long-established custom, all kinds of live stock run at large, and the pastures of the great areas of wooded land are common property. Plate I, figure 1, shows a herd of cattle on the range near Peason. Formerly the range was much better in nearly all parts of the parish than it is now. The original forest consisted chiefly of large trees and was comparatively open, with little brushy undergrowth. There was much grass on all the uplands, and switch cane on most of the lowlands. In many places this wild cane extended well up the slopes and dense brakes flourished on the Ochlockonee soils. Much of the cane has succumbed to excessive pasturing and to the frequent fires. While the summer grazing is yet of great value, the winter grazing is often uncertain; following dry seasons, like those of 1917 or 1918, it is almost valueless except on the bottom lands, where there is some cane.

In a few instances farmers owning bottom lands not too densely forested have inclosed such lands and protect the cane during the spring and summer. Under such a condition it rapidly improves and has a high value for winter pasturage. During December, January, and February there is usually much inclement weather and cattle need more feed than is obtainable on the range. As a rule, the profitable grazing on the open range lasts from about the 1st of April to the 1st of December. Considerable alfalfa hay at present is shipped in annually for winter feeding.

The removal of large amounts of mature hardwood timber from the bottom lands has decreased the supply of mast upon which the hogs feed during the fall and winter months. The value of the mast crop also varies widely with the seasons. In 1916 there was an abundant crop of this feed, but in 1917–18 very little. It is only in the largest tracts of deciduous forests in the Sabine River bottoms that the present range for mast-fed hogs is dependable.

The present State law requires cattle to be dipped for the eradication of the Texas fever tick. Some farmers have objected to this law, but the better cattlemen are decidedly in favor of the practice, having learned its value through experience and through observation of its effects on the cattle industry of the South in other areas that have been rid of the tick by this means.

The farmers of this parish recognize soil adaptation to certain crops to the extent that they generally avoid the wet lands and intractable clays, selecting for cultivation the better drained and more easily worked very fine sandy loams, fine sandy loams, and gravelly loams, and the brown bottom soils, such as the Ruston, Orangeburg, Greenville, and Kirvin types in the uplands, and the

Ochlockonee silt loam, very fine sandy loam, and fine sandy loam in the bottoms. The gravelly uplands are considered especially good cotton soils and are frequently selected for that crop, while there is a tendency to avoid the Susquehanna soils, particularly the clay, where other soils are available. Considerable Susquehanna very fine sandy loam and fine sandy loam are used here and there, but types with a more friable subsoil are preferred. The gray bottom lands, the Bibb soils, are considered well suited to grasses, but poor cotton and corn soils. These "crawfishy" soils and the imperfectly drained Montrose fine sandy loam and the poorly drained portions of the Caddo very fine sandy loam, Kalmia very fine sandy loam, and the Myatt soils are little used for any purpose except grazing and the occasional cutting of hay. Most of the hay harvested is cut from the bottom-land types. It is recognized that rice succeeds on these soils, and it is grown here and there in patches.

A larger proportion of the second-bottom soils is cultivated than of either the uplands or first bottoms. More and more of the bottom land is being put under cultivation each year, however, and farms with the larger areas of first-bottom and second-bottom (terrace) land are considered the most valuable. In some parts of the upland the surface is so rolling that only scattered patches are susceptible of easy tillage; such is also the case where there are large bodies of Susquehanna clay.

Light plows, drawn by a single mule, are used in most of the plowing. Hand hoes are used in thinning out cotton and in removing grass from between the stalks in the drill. Hoes are also used to some extent in the cultivation of corn and other intertilled crops. The depth of plowing as a rule is only 3 or 4 inches. It is said that when the deep subsurface material is plowed to the top, much of the land fails to produce satisfactorily for a few years, unless heavily manured or fertilized. The depth of plowing, it would seem from this, should be increased gradually, and if lime could be obtained cheaply it could be used to advantage where much new subsurface material is turned up.

Cotton, corn, and other intertilled crops are planted on ridges or beds. This probably is a good practice on flat lands where overflows occur or standing surface water accumulates, as it sometimes does, where there is a heavy clay subsoil near the surface. In some of the most highly developed sections of the South, where the soils are mainly the sandy types with sandy clay subsoils, it is a common practice to plant corn in the water furrow. Cotton is sometimes planted in this way, and also on the level. These have been found good practices, especially on such soils as the sandy types of the Ruston, Orangeburg, Cahaba, and Kalmia series. Planting in this way permits the soil to be worked gradually toward the young plants, filling

up the furrow as the stalk grows up, preserving moisture, and protecting the roots of the plants. Corn is usually planted in March or May. Most of the seed is dropped by hand. In harvesting the ear is pulled and stored unhusked. At present not as much fodder is pulled as in former years.

Oats are seeded broadcast, often on land that is insufficiently harrowed and left cloddy and rough. The crop is usually cut by hand and fed in the sheaf. The principal varieties grown are the Texas Rustproof and Louisiana Rustproof.

Velvet beans are not extensively grown, although they are well adapted to most of the well-drained soils of the parish and are one of the best forage crops grown in this region. In many parts of the South, on the same soils, this crop is grown on a large and increasing scale. Its culture is aiding greatly in building up the live-stock industry in those sections. Besides its value as a forage crop it adds much organic matter and nitrogen to the soil. The crop produces a large amount of forage and fruits heavily. The beans are ground in the pod in many localities for stock feed. The seed is planted with corn, whose stalks serve as a support to the vines. After the corn is harvested live stock is allowed to forage in the fields. The vines afford good pasturage through the winter. Cowpeas are more extensively grown than velvet beans. They also make an excellent forage crop.

Lespedeza is another crop which in the Southern States, particularly in Mississippi and Louisiana, has recently taken a prominent place as a source of hay and forage. It has long been a valuable grazing crop, having spread naturally through a large part of the South. On soils such as those of the stream bottoms it makes a tall, thick growth, yielding 1 or 1½ tons of good hay to the acre in two cuttings.

Carpet grass grows wild, especially in clearings in the bottoms and on moist low slope areas. It is sometimes cut for hay, producing a better feed, it is said, than such wild grasses as broom sedge. It is a very valuable grazing grass. Lespedeza and carpet grass tend to spread with grazing and the prevention of ground fires, whereas broom sedge, it is reported, tends to improve and spread after these fires. Most of the range is burned over annually in order to remove dead grass and permit early grazing.

Bermuda grass thrives, especially on the bottom soils, where it can be cut for hay. It makes a very nutritious hay. It tends to grow shorter on the upland soils and does not do very well on deep sandy soils, such as the Norfolk fine sand, but it can be successfully grown on the upland for pasturage, and probably, with proper attention, for hay. It is objected to by some farmers on account of its tenacity of growth, but it can be killed out by shading with a thick cover crop

of cowpeas, velvet beans, or sorghum, and also by plowing in cold weather.[1]

Bermuda grass, lespedeza, and carpet grass are not injured by the ordinary overflows of the small streams. These overflows seldom continue more than 24 hours. There are, however, longer inundations in the Sabine River bottoms that might do damage to any hay crop. These grasses thrive even on the poorly drained bottom soils, such as the Bibb soils.

Sweet potatoes are grown on practically every farm. They are planted for home use chiefly, but a few bushels are sold on the local markets. This crop does best on the well-drained, deeper sandy soils, but good results are obtained also on the shallower soils. Covered with pine needles and then with soil, the crop is kept in "banks" or "hills" through the winter, but usually many of the tubers rot. A better method of keeping them is the use of the potato-drying house.[2] where they can be cured with regulated heat. The principal varieties of sweet potatoes grown are the Porto Rico, Nancy Hall, and Dooley Yam. They are planted on beds and cultivated with light plows and hoes in much the same manner as the other clean-cultivated crops. There seems to be no reason why sweet potatoes should not be grown extensively for shipment. Most farms include more or less soil well suited to the crop. It nearly always succeeds and is comparatively easy to grow. Moderate applications of manure or commercial fertilizers easily bring the yields to 200 or more bushels per acre on such soils as the Ruston and Orangeburg fine sandy loams, the Cahaba very fine sandy loam, and the deeper Susquehanna very fine sandy loam and fine sandy loam. For 1919 the census reports an average yield of 112.5 bushels to the acre.

Sugar cane is grown for home use on a large number of farms. Moist ground, not permanently soggy, gives the best results. The best quality of sirup is obtained from moderately deep or even deep sandy soils. Manure or commercial fertilizer is needed here to insure good yields, whereas on rich alluvial soils fairly good yields can be obtained without fertilizer. In 1919 the average production of sirup in the parish, according to the census, was 122 gallons per acre. Yields as high as 450 gallons are reported as having been obtained on well-fertilized and exceptionally rich land.

Most garden vegetables do well on the sandy soils if manured or fertilized. Very early crops of vegetables and strawberries can be grown on such soils as the Ruston very fine sandy loam and fine sandy loam, Greenville gravelly loam, and Cahaba very fine sandy loam. This year (1919), with a rather late spring, radishes, lettuce,

[1] See Farmers' Bulletin No. 374 on the eradication of Bermuda Grass.
[2] See Farmers' Bulletin No. 324 on the growing and storing of sweet potatoes.

onions, and peas were gathered by the 1st of April from open gardens. With the selection of the proper soils and with good facilities for transportation, there is no reason why vegetables, strawberries, and melons could not be grown commercially.

Fruit growing is of little importance at the present time. On some farms there are no fruit trees at all, except the wild-plum trees and blackberry bushes, which flourish on uncultivated ground in all clearings. Many farms have a few peach trees, some a few apple trees, and nearly all several fig trees. The apples are summer varieties, most of which are locally known as May apples. Several small orchards of peach trees were planted in the eighties and nineties, but these have nearly all died out from lack of attention. There are a few peach orchards scattered through the northern and eastern parts of the parish, and excellent yields are obtained when the orchards are properly cared for. The principal variety of peach is the Elberta. The Greenville and Orangeburg soils, such as occur in this parish, are noted for the commercial production of peaches in a number of localities in East Texas and elsewhere in the South.

The value of the commercial fertilizer used in the parish in 1919 is reported by the census as $135,822, an average of $189.96 per farm for the 715 farms reporting its use. This number is 27 per cent of the total number of farms. Fertilizer is used on the terrace and upland soils, chiefly in growing cotton and corn. On strong upland soils, such as the Greenville gravelly loam, only about one-half as much fertilizer is used as on the other upland soils. The most common commercial fertilizer contains about 10 per cent phosphoric acid and 1.65 per cent nitrogen, and the application averages about 200 pounds to the acre. The fertilizer is usually distributed by hand. The present supply of barnyard manure is inadequate to maintain the supply of organic matter in the soils.

A large part of the work on the farms is performed by the farmer and his family. Farm laborers at the present time are rather scarce, on account of the high wages paid by the sawmills, and it is much easier to obtain a tenant than hired help. The monthly wage commonly offered is $25 to $30 a month.

The 1920 census reports a total of 2,650 farms in Sabine Parish, and 34.6 per cent of the area in the parish is reported as in farms. The average size of the farms is given as 85.2 acres.[3] Of all the farm land, 43.1 per cent, or an average of 36.7 acres per farm, is reported as improved. There are a few holdings of a thousand acres or more under fence.

[3] Each tenancy is tabulated as a "farm" by the census. The average holding is thus larger than the figure stated.

In 1919, 70.3 per cent of the farms were operated by owners and 29.5 per cent by tenants. Farms are rented for one year, and the usual terms give one-half the products to the landlord if he furnishes everything, i. e., stock, seed, and tools. One-fourth the cotton and one-third of the corn is commonly paid for the use of the land where the tenant furnishes the stock and tools.

The selling value of farm land in this parish seems to be little influenced by the location or the soil type. The principal factors appear to be the topography and the state of cultivation. The average price of improved farms in the uplands or on the terraces at the present time ranges from about $15 to $20 an acre. Land supporting a good growth of merchantable timber will range as high or higher Cut-over land can be purchased in large tracts from the lumber companies for about $6 to $12 an acre. Bottom land sells for $5 to $8 an acre where in a condition to be used only for pasturage.

Farm residences and buildings are mostly small. Large barns are not needed for the prevailing type of agriculture, but large barns would be a good investment on farms where live-stock raising is important in order to store feed for winter use. There are some very good barns on the better farms. There is much barb-wire fencing throughout the parish, but rail fences are still common.

While the more progressive farmers of the parish are practicing a more diversified system of agriculture than at the time of the boll-weevil invasion, their example is not being followed as generally as the results warrant. More corn, hay, and forage crops, including lespedeza, Bermuda grass, cowpeas, and velvet beans should be grown more extensively to increase the supply of winter feed for cattle and hogs. Rotations suited to the needs of the soil and to the choice of the farmer would be very beneficial. One of the principal requisites of a good crop rotation in this region is to include at intervals, depending on the character of the soil, a legume crop, such as velvet beans, cowpeas, or lespedeza to keep up the humus supply and to furnish nitrogen.

In view of the present scarcity of labor, which is likely to continue until the sawmills finish their operations, labor-saving machinery should be more generally adopted. Stumps and trees should be removed from the fields as fast as practicable in order to facilitate the use of such implements as two-horse plows, harrows, two-horse cultivators, and mowing machines, which can be used to advantage on the greater part of the uplands and on all the terraces and bottom lands when the land has been properly cleared.

SOILS.

The soils of Sabine Parish fall into three principal divisions: Upland soils; first-bottom soils, locally called "swamp lands," though

usually not of an extremely swampy nature; and second-bottom, or terrace, soils, locally called "hammock lands." The parish lies in the Coastal Plain, a region of low elevation and of predominantly smooth topography, extending from the vicinity of New York City southward around the Piedmont and Appalachian regions, then westward across the Mississippi River and south of the Ozarks to merge with the Great Plains region in central Texas and southern Oklahoma.

The upland soils are derived from sedimentary materials which in prehistoric periods were washed down from the older and higher interior land areas and deposited on the bed of the sea. It is not necessary here to go into the geology of these formations. It is sufficient to state that they consist of beds of sandy, friable clay, locally containing gravel of chert and quartz; beds of heavy, plastic clay; and beds of sandstone, argillaceous (clayey) rock, and limestone. Locally there are deep deposits of fine sand, which may represent beach or wind-blown sand.

These materials, acted upon by the various agencies of weathering, by erosion, and by plant growth, have given rise to the different soils. The sandy clay beds have produced the sandy types with friable, sandy clay subsoils, classed in the Ruston, Orangeburg, Greenville, and Caddo series; the heavy clays, argillaceous rock, and limestone have given the sand and clay soils with clay subsoils, classed in the Susquehanna, Kirvin, Montrose, and Sumter series, while the deep sand beds have given rise to the Norfolk fine sand. In the southeastern part of the parish a light-colored sandstone is associated with the argillaceous rock occurring in the Montrose fine sandy loam. In this parish fine and very fine sandy loams, having a high content of quartzose and probably chert particles in the surface soil and a high content of clay particles in the subsoil, are largely predominant in the uplands. There are also frequent exposures of clay.

Topography has little influence on the soils of this area aside from the indirect effects of drainage. The more important of the upland types are associated with all variations of topography from very rolling to flat. The character of the underlying material has influenced soil characteristics to a very important degree, and varying degrees of oxidation have caused differences in color otherwise similar subsoils, as, for example, between the light-red color of the Ruston subsoil, the brick-red color of the Orangeburg, and the yellow of the Caddo, all of these series having friable subsoils of sandy clay.

The soils of the first bottoms, locally known as "swamp land," are alluvial, being composed of material washed down from upland areas and deposited by streams over their flood plains. These bottoms are periodically overflowed, and receive at each overflow a

layer of fine sediments. The second bottoms, locally called "hammock land," on the other hand, represent old flood plains that were overflowed long ago, before the streams had cut their channels to their present low levels, and which are now above the reach of floods. The first bottom soils consist chiefly of very fine sandy loams, silt loams, silty clay loams, and clay, and are classed in the Ochlockonee and Bibb series. The second bottom soils consist chiefly of very fine sandy loams, and are classed in the Cahaba, Kalmia, Bienville, Leaf, and Myatt series.

A brief description of the several series occurring in the county follows:

The Ruston soils are characterized by the grayish to grayish-brown color of the surface material, the pale-yellow color of the subsurface layer, and the light-red or reddish-yellow color and friable nature of the sandy clay subsoil. Frequently the lower subsoil shows mottlings of reddish yellow and yellow, with some gray mottling in places. In some areas the lower subsoil is more sandy than the upper subsoil, while in others it may be heavier and more compact, representing an approach toward the Susquehanna soils. Scattered areas contain small gravel, chiefly of chert, which has been rounded by abrasion resulting from transportation by running water. A rolling topography gives the soils of this series good drainage.

The Orangeburg soils differ from the Ruston chiefly in the deeper red, brick-red color of the sandy clay subsoil. Usually the surface color is a little more brownish than that of the Ruston. There is seldom any mottling in the subsoil. The soils of this series have a rolling surface and good drainage.

The members of the Greenville series have subsoils very similar to the Orangeburg, but the surface material is reddish, usually reddish brown instead of grayish brown, as in the Orangeburg. Also concretions or fragments of brown or reddish-brown rock of high iron content are commonly present, while light-yellow, friable material, high in iron, is frequently present in the subsoil. The subsoil is a little stiffer than that of the Orangeburg as a rule. The topography is rolling and the drainage good.

The Caddo soils have clay subsoils which contain enough sand or silt to be friable and permeable, but they occur on flats and gentle slopes which do not have good surface drainage or, owing to seepage from the higher slopes, are wet for considerable periods following wet seasons. The drainage is also impeded by the lower subsoil, which is frequently compact and somewhat impervious. These soils are grayish at the surface, pale yellow in the subsurface layer, and yellow or pale yellow in the upper subsoil. The last is friable to

moderately friable. The lower subsoil is mottled yellow and grayish yellow.

The types included in the Norfolk series have gray surface soils and yellow, friable subsoils without gray mottlings.

The types included in the Susquehanna series have grayish to light-brownish surface soils in the sandy types and reddish soils in the clay types, which are erosional developments. The subsoil consists of a dense red plastic, heavy clay, mottled in the lower part with yellow or gray, the mottling increasing and the basic red color decreasing with depth. The lower subsoil as a rule consists of mottled gray or bluish-gray and pale-yellow or greenish-yellow clay, similar to the upper subsoil in structure. The surface is rolling or undulating, with the exception of occasional small, rather flat areas, and the run-off is rapid. Internal drainage is less satisfactory, as water moves slowly through the dense subsoil.

The Kirvin series differs from the Susquehanna in having a more reddish soil, a more brownish red or brick red upper subsoil, and in containing a much larger number of concretions and fragments of iron-bearing rock, which give the subsoil a somewhat more friable structure. These soils appear to represent highly oxidized Susquehanna material.

The Montrose soils differ from the Susquehanna chiefly in having a gray, pale-yellow, or mottled gray and yellow subsoil, and a more ashy gray surface soil. Drainage is poorer than that of the Susquehanna soils, the land being soggy through much of the year. The subsoil typically is very plastic, sticky, and impervious. Outcrops and fragments of gray sandstone and a whitish argillaceous rock are common, and frequently these rocks are encountered within the 3-foot section. The surface is flat, gently undulating, or sloping.

The Sumter soils are derived from limestone and are calcareous. They are brown at the surface and grayish yellow in the subsoil. These are well-drained soils. Outcrops and fragments of limestone are common throughout their extent.

The Cahaba series includes the best drained of the second-bottom soils. The surface soil is grayish brown to brown, and the subsoil consists of a friable, light-red to yellowish-red sandy clay or fine sandy silty clay. The areas are marked by dome-shaped mounds, on which the layer of sandy soil is deeper and browner.

The Bienville series includes types with brown surface soils and yellowish-brown, friable subsoils. The series occupies well-drained second-bottom areas.

The Kalmia series includes soils with a gray surface layer and yellow friable subsoil layer, mottled in the more poorly drained areas with gray in the lower part of the 3-foot section. Drainage

is fairly well established, but is less adequate than in the Cahaba soils.

The Myatt series includes very poorly drained, second-bottom areas. The surface soil is gray and the subsoil light gray or bluish gray, with yellow and rusty-brown mottlings. Dark-colored iron concretions are common from the surface downward. The lower subsoil in many places has the character of a hardpan. In this parish the areas are marked with numerous dome-shaped mounds of deep very fine sandy loam resembling the Cahaba, Kalmia, and Bienville soils. The Myatt soils are much like the Bibb, but lying on second terraces they are not subject to overflows.

The Leaf series is composed of second-bottom types with grayish to brownish surface soils and mottled red and yellow, or red, yellow, and bluish-gray, plastic, heavy clay subsoils. In some places dome-shaped mounds of deep very fine sandy loam like those on the Cahaba, Kalmia, and Bienville soils are abundant. Drainage is better than in the case of the Myatt soils.

The types in the Ochlockonee series characteristically have brown surface soils and light-brown, yellowish-brown, or yellow, friable subsoils. In many places the lower subsoil is mottled with gray and contains rusty-brown and dark-colored concretions and concretionary material. A mottled-subsoil variation is found where underdrainage is not so well established, usually some distance back from the streams. This variation represents a gradation between the better drained or typical Ochlockonee soil and the poorly drained Bibb soils.

The Bibb soils are gray or mottled gray and rusty brown at the surface, and light gray or bluish gray in the subsoil, with mottlings of rusty brown or yellow, or both. They usually contain dark-colored concretions from the surface downward. In many places the lower subsoil contains an abundance of these concretions and is compact, having the nature of hardpan. The typical Ochlockonee soils are well drained between overflows, whereas the Bibb soils are poorly drained.

In the following chapters of this report the various soils mapped in Sabine Parish are described in detail and their agricultural value and crop adaptations discussed.

The following table gives the name and the actual and relative extent of each soil type mapped:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Susquehanna very fine sandy loam	261,568	41.4	Kalmia very fine sandy loam	9,728	1.5
Flat phase	3,968		Susquehanna silt loam	8,512	1.3
Susquehanna clay	54,656	8.5	Leaf very fine sandy loam	3,840	1.3
Ochlockonee silt loam	52,544	8.2	Mound phase	4,352	
Ruston very fine sandy loam	30,016	4.7	Kalmia very fine sand	7,232	1.1
Ochlockonee very fine sandy loam	27,456	4.3	Caddo very fine sandy loam	6,784	1.1
Susquehanna fine sandy loam	25,984	4.0	Ochlockonee fine sandy loam	3,968	.6
Ochlockonee clay	20,672	3.2	Sumter clay	3,712	.6
Montrose fine sandy loam	18,496	2.9	Myatt very fine sandy loam, Mound phase	3,392	.5
Kirvin very fine sandy loam	17,216	2.7	Kirvin clay	3,136	.5
Cahaba very fine sandy loam	15,232	2.4	Bienville fine sand	3,072	.5
Bibb silt loam	7,872	2.3	Greenville gravelly loam	2,880	.4
Mound phase	6,144		Bibb very fine sandy loam	1,024	.2
Heavy phase	576		Prairie phase	448	
Norfolk fine sand	13,568	2.2	Orangeburg fine sandy loam	704	.1
Ochlockonee silty clay loam	12,160	1.9	Total	641,280	
Ruston fine sandy loam	10,368	1.6			

RUSTON FINE SANDY LOAM.

The Ruston fine sandy loam differs from the very fine sandy loam in having a noticeably looser surface soil. The typical soil is a gray fine sand or loamy fine sand, passing at about 6 inches into pale-yellow loamy fine sand to light fine sandy loam, which is underlain at 12 to 24 inches by a light yellowish red or reddish-yellow, friable fine sandy clay. In many places the lower subsoil is mottled with yellow and red and in some places is quite compact between the depths of 30 to 40 inches, resembling somewhat in this lower part the Susquehanna clay. Relatively more of the type seems to have a heavy lower subsoil than is the case in the Ruston very fine sandy loam. There are some included patches of Norfolk fine sandy loam, in which the soil is like the Ruston, but the subsoil is a yellow, friable fine sandy clay without mottling.

In places there is an abundance of brown concretions of a highly ferruginous character in both soil and subsoil. These areas resemble the Tifton fine sandy loam as found in southern Georgia and Alabama, except in the reddish color of the subsoil. The larger areas of this variation are shown on the map by gravel symbols, Nearly all of them are cultivated and productive.

The Ruston fine sandy loam occurs on divides and slopes in the southeastern part of the parish, in which section there is little very fine sandy loam. Patches occur in other parts of the parish, but they are of such small extent that they are included with the very fine sandy loam.

The surface is gently rolling. Some small areas represent low hillocks and ridges surrounded by Susquehanna or Montrose fine sandy loam. The type has good drainage.

Much of the Ruston fine sandy loam is still covered with longleaf pine, although there are some well-improved farms on the type. (Pl. I, fig. 2.) The forest is rapidly being removed by lumbermen. The natural woods are open, with little undergrowth. Broom sedge furnishes some grazing and a few cattle, hogs, and goats are raised. Plate II, figure 1, shows the longleaf-pine forest typical of the Ruston fine sandy loam, with the characteristic growth of native grasses in the foreground.

A considerable part of the type is under cultivation, principally to cotton and corn. With the same treatment it may be expected to give somewhat lighter yields than the Ruston very fine sandy loam. Manure or commercial fertilizer in fairly liberal quantities is needed for the production of good yields.

The great need of the soil is organic matter to assist it in retaining moisture for use of crops in dry seasons. Much improvement would result from growing velvet beans occasionally. This crop will do well, and will supply much valuable organic matter and nitrogen, even where grazed off by cattle or hogs. Peanuts could be successfully grown, and would make a good field forage crop for hogs. Such crops as sweet potatoes, sugar cane, and oats also should do well on this soil.

There are some well-improved farms on the Ruston fine sandy loam. A typical farm of the better class is shown in Plate I, figure 2.

RUSTON VERY FINE SANDY LOAM.

The soil of the typical Ruston very fine sandy loam consists of a gray or grayish-brown loamy very fine sand to very fine sandy loam, from 3 to 5 inches deep, underlain by a pale-yellow loamy very fine sand to very fine sandy loam. The subsoil, encountered normally at 8 to 14 inches, is a reddish-yellow, yellowish-red, or buff-colored, friable fine sandy clay extending to a depth of 3 feet or more. In many places mottlings of dull yellow and pale yellow occur in the lower subsoil. The upper subsoil is in many places stiffer than the lower subsoil, which commonly contains more sand. The lower subsoil may be mottled somewhat with shades of yellow and red or even gray. On the other hand, especially near areas of Susquehanna soils, the lower subsoil is somewhat stiff and may be mottled with red, yellow, and gray, though typically it is much more sandy and friable than the lower subsoil of the Susquehanna. In the vicinity of the Kirvin or Greenville soils there are numerous small, soft,

dark-brown or reddish-brown iron concretions throughout the soil section.

In areas adjacent to the Norfolk fine sand and in those areas between Bayou San Miguel and the river southwest of Zwolle the surface soil contains a relatively high percentage of fine sand and is deeper than in the typical areas. The agricultural value of these deeper areas seems to approximate that of the very fine sandy loam rather than that of the fine sandy loam in the southeastern part of the parish. They are intermingled with areas of the typical very fine sandy loam. On the higher divides in the areas southwest of Zwolle considerable rounded chert gravel occurs throughout the soil section. These areas are indicated on the map by gravel symbols. In places some patches of Susquehanna very fine sandy loam are included with this soil because of their small extent.

The Ruston very fine sandy loam occurs in relatively small areas scattered over the less rolling sections of the parish, but its main occurrence is on the gentle north and west slopes to the larger creeks and on the tops of smooth divides within areas of the Susquehanna very fine sandy loam.

The surface is gently rolling to sloping or undulating and drainage is good. A few of the flatter areas have a mound-covered surface. There is, in general, more relief on this type than in the Caddo very fine sandy loam. The type practically everywhere can be cultivated without danger of serious erosion, but contour cultivation and terracing have proved wise on some of the steeper slopes. With proper cultivation the soil holds sufficient moisture for maturing crops in the average season. It is an early and easily cultivated soil, in many places earlier than the Norfolk fine sand.

This type was originally forested with a mixed growth of shortleaf pine, red oak, post oak, white oak, hickory, beech, sweet gum, dogwood, and sparkle-berry, with considerable longleaf pine in places. In the cut-over areas most of the second growth consists of blackjack oak. Native grasses do not seem to be as abundant in many places as on the Susquehanna very fine sandy loam.

This is one of the most important upland soils. It was one of the first soils in this division to be put under cultivation, and it is highly esteemed, farmers often picking out the small areas of this soil in the Susquehanna very fine sandy loam for the location of their farmsteads and first fields.

Cotton is the main crop, but ordinarily enough corn is grown to supply the home demands. Cotton yields an average of one-fourth to one-third bale to the acre, with returns as high as 1 bale to the acre on the newer land. Corn yields average between 10 and 14 bushels per acre. Of the minor crops, sweet potatoes do well, yielding 100 to 150 bushels per acre. Strawberries and peaches succeed if properly

cared for. Oats give good results and mature early in the spring. Sugar cane does well on some of the lower lying areas, yielding 200 to 300 gallons of good-quality sirup in average seasons. Peanuts are grown, but not on a large scale. Bermuda grass and lespedeza are grown in small fields, chiefly for pasturage, but yields of 1 to 1¼ tons of Bermuda-grass hay to the acre have been cut in the vicinity of Sodus. Yields of all these crops vary with the season, the cultivation given, and the quantity of fertilizer used.

In the preparation of the seed bed, light 1-horse turning plows are in general use, plowing commonly to the depth of 3 or 4 inches. Cultivation of the growing crops, which is generally shallow, is performed with a shovel plow, drawn by a single horse or mule. Corn and cotton are thinned and some of the subsequent cultivation performed with the hoe. These crops are grown on ridges. Oats are generally sown broadcast on ground that is rarely harrowed after plowing. Commercial fertilizer is usually distributed by hand though a few 1-horse distributors are in use. Little attention is given to the rotation of crops. Cowpeas or velvet beans are sometimes planted in corn at the last cultivation. Corn is harvested by pulling the ears and storing them in the crib with the husks on; little or none of the fodder is stored for winter feed.

Fertilizer is used in growing crops, especially on the older fields. The most common mixture analyzes 10 per cent phosphoric acid and 1.65 per cent nitrogen. It is usually applied to the bed at the time of planting corn or cotton. A few farmers in growing corn scatter the fertilizer near the base of the stalks and plow it under when the corn is about 6 inches high, with good results. A few farmers use home-mixed fertilizers. Most of these mixtures contain a smaller percentage of phosphoric acid than the average commercial brand. They contain 3 to 4 per cent of nitrogen for potatoes and corn and 2 to 3 per cent of nitrogen where applied to cotton. More phosphoric acid is put in the fertilizers used for cotton than in those intended for corn.

The Ruston very fine sandy loam ordinarily sells for $10 to $20 an acre, depending upon the state of cultivation, the location, the improvements, and the topography.

This type can be improved by adding organic matter in the form of barn-lot manure or green-manuring crops, such as oats, cowpeas, and velvet beans. More attention should be paid to the production of winter forage, for which Bermuda grass and lespedeza are well suited. Deep plowing is needed; it has been found to give good results where practiced. The production of peanuts, velvet beans, sweet potatoes, and possibly strawberries on a larger scale and curtailment of the acreage of cotton would seem advisable.

ORANGEBURG FINE SANDY LOAM.

The surface soil of the Orangeburg fine sandy loam is a gray loamy fine sand to grayish-brown fine sandy loam passing at about 6 inches into a heavier, yellowish-brown to reddish-yellow fine sandy loam. The subsoil, beginning at a depth of 10 to 15 inches, is a red, friable fine sandy clay, which normally becomes more sandy and friable at or near the 3-foot depth. The surface soil in the shallower areas has a reddish cast when plowed deeply.

The Orangeburg fine sandy loam is not an extensive soil in this parish. Small areas occur along the western border of the upland. The type commonly has a smooth surface, but it occupies well-rounded divides and has good drainage. It is an early, easily cultivated soil, and responds readily to good treatment.

About three-fourths of the Orangeburg fine sandy loam is under cultivation. It is devoted to practically the same crops as the Ruston very fine sandy loam, but yields average slightly higher. Similar cultural practices are employed, though commercial fertilizers are not as commonly used.

GREENVILLE GRAVELLY LOAM.

The Greenville gravelly loam to the depth of about 14 inches is a reddish-brown to browish-red or dull-red gravelly loam to gravelly very fine sandy loam. This is underlain by a deep-red, friable fine sandy clay, which becomes lighter red with depth, and may contain a number of fragments of ironstone, for the most part reddish brown, but containing yellowish spots of limonite. This ferruginous material is quite conspicuous in the lower subsoil and is very friable, giving the red clay a more friable structure than it would otherwise have. Small spots occur where the lower subsoil is heavier than typical, but it is more friable than the red subsoil of the Kirvin soils. The subsoil in its typical occurrence resembles that of the Orangeburg fine sandy loam except for the rock fragments. The fragments in the surface soil vary in diameter from one-sixteenth of an inch to 3 or 4 inches, but in few areas are they numerous enough to interfere with cultivation. A few patches of the type on hill crests carry practically no fragmentary material.

Practically all of the Greenville gravelly loam occurs in a discontinous belt, from one-fourth mile to 1 mile wide, extending from near Fisher to Columbus on the Sabine River. This belt is known locally as the "red lands." Other very small areas lie in the eastern half of the parish. The type occupies gently rolling areas on the tops of well-rounded divides or smooth slopes. Water is readily absorbed and stored for the use of crops. Any excess drains off effectively, yet not fast enough to cause erosion.

This soil is easily cultivated and one of the earliest in the parish to warm up in the spring. It can be handled under a wide range of moisture conditions, and is easily maintained in good tilth. It is very responsive to good cultural treatment. The type occupies an important place in the agriculture of the parish. It is highly esteemed and was one of the first types to be put under cultivation. At present over 75 per cent of it is in crops, and much of the remainder is devoted to Bermuda-grass pasture. The rest supports a growth of timber, chiefly shortleaf pine, post oak, white oak, red oak, and hickory. The most important crops grown are corn and cotton. Enough corn is grown to feed the work stock, and there is occasionally a surplus for sale, which is absorbed by the local markets. Probably a more diversified cropping system is followed than on any other upland soil in the parish; relatively less cotton is grown, and more corn, oats, velvet beans, and cowpeas.

Corn ordinarily yields 15 to 20 bushels to the acre. Yields as high as 60 bushels have been obtained in favorable years, with careful cultivation. Cotton produced three-fourths to 1 bale per acre before the boll-weevil invasion, but the average now is about one-half bale, though yields of 1 bale or more are obtained under the most favorable conditions. Oats yield well, but are often cut for forage. Velvet beans and cowpeas grow luxuriantly. On the lower-lying areas of the type sugar cane produces from 250 to 400 gallons of sirup per acre. Fruit, especially figs, peaches, and plums, do well if properly cared for. Sweet potatoes yield 200 bushels or more per acre. Spanish peanuts, while not generally grown for stock feeding, are often grown in small patches, and fruit well.

Practically no fertilizer is used on the newer fields, but much of the type has been under cultivation 50 to 70 years, and it has been found very profitable to use some fertilizer on these older fields. The usual application is less than 100 pounds to the acre, about half that commonly used on the lighter-colored soils of the parish. Fertilizers high in nitrogen are said to produce the best results. All of the barn-lot manure produced is put back on the land, but the supply is scant.

The Greenville gravelly loam is handled in much the same way as the best farms on the Ruston very fine sandy loam, except that more two-horse teams are used and deeper plowing is practiced. Such modern machinery as two-horse cultivators, weeders, and disks are slowly coming into common use. An occasional crop of cowpeas or velvet beans is turned under to supply nitrogen and add organic matter to the soil, but the more common practice is to use these crops as pasturage.

Farms on the Greenville gravelly loam are well stocked, well fenced, and kept in good repair, and present a general appearance of pros-

perity. Improved land ordinarily sells for $20 to $30 an acre, depending upon the location and state of cultivation.

A more general diversification of crops, deeper plowing, and the plowing under of green manures would prove highly beneficial to this soil.

CADDO VERY FINE SANDY LOAM.

The surface soil of the Caddo very fine sandy loam is a gray to light-gray very fine sandy loam which grades into a pale yellowish gray very fine sandy loam. The subsoil, beginning at 12 to 18 inches, is a pale-yellow, friable to moderately friable fine sandy clay or heavy very fine sandy loam, which in the lower part of the 3-foo section shows mottlings of gray and, in places, red, and is more compact than the upper subsoil. A substratum of heavy clay, resembling the Susquehanna clay, normally underlies the type at a depth of 3 feet or more, and here and there comes within the 3-foot section. In some of the more poorly drained areas the upper subsoil contains mottlings of gray, and the lower subsoil is a very compact, gray and pale-yellow mottled clay. Such very mottled areas represent an approach toward the Plummer very fine sandy loam, as mapped in parts of the lower Coastal Plain of the Southern States. The type as a whole seems to contain a higher percentage of silt than the other very fine sandy loams of the uplands. The pale or grayish color of the soil section is the result of insufficient drainage and poor aeration. Some reddish-brown to brown soft iron concretions occur throughout the soil section in places.

A characteristic feature of the Caddo very fine sandy loam is the presence of deep sandy dome-shaped mounds, from 2 to 4 feet in height and from 20 to about 40 feet in diameter. They consist of a gray or yellow, rather loose very fine sandy loam which becomes more coherent with depth and grades below 18 or 24 inches into a reddish-yellow or yellow friable fine sandy clay containing in most places very few spots or mottlings of gray, but more or less of brownish red. The soil on the mounds closely resembles the Ruston very fine sandy loam. In other places spots of poorly drained Ruston and Susquehanna very fine sandy loam are mapped with this soil because of their small extent.

The Caddo very fine sandy loam occurs in rather small areas scattered over the wider divides and gentler slopes in the northern three-fourths of the parish. The type is most extensive in the northeastern portion. It generally occurs about the heads of or on very gradual slopes to minor drainage ways. On account of its flat or very gently sloping or undulating topography, together with the rather impervious nature of the lower subsoil and substratum, it drains slowly. The lower areas receive considerable surface and seepage

water from the adjacent types, but the greater part of the type is sufficiently well drained for cultivation. It is late in warming up in the spring, and yields over most of the type are not satisfactory in wet seasons. Open ditches are used in a few places, with good results. A thorough system of drainage ditches would put most of the soil in good condition.

The greater part of the Caddo very fine sandy loam supports a growth consisting chiefly of post oak, water oak, red oak, sweet gum, dogwood, and hickory. Considerable shortleaf pine is found on the mounds. There is a good stand of the native grasses in most places, especially on the intermound areas.

This soil is not as widely used for cultivation and is not as productive as the better drained parts of the Kalmia very fine sandy loam, which it resembles, except in topographic position. Only the better drained areas are farmed. Cotton and corn, the principal crops, give fairly good yields in the average year. Sugar cane is grown in small patches for home consumption and yields an average of about 175 gallons of sirup to the acre. Other crops are grown to a very limited extent for home use. Bermuda grass, the most common pasture grass, does best on the intermound areas.

The Caddo very fine sandy loam is handled in much the same way as the adjacent upland soils. It is usually included in farms with those soils.

Ditch or tile drainage would improve the physical condition of the soil, promote aeration, decrease the injury to crops by reason of excessive moisture, and allow earlier planting in wet springs. In its virgin state the soil has a fairly high organic content, but this rapidly decreases with cultivation, and green manuring crops should be plowed under.

NORFOLK FINE SAND.

The Norfolk fine sand consists of a grayish, loose fine sand passing at 5 or 6 inches into a yellowish-gray, loose fine sand which continues to a depth of 3 feet or more without much change. Areas of virgin soil with an accumulation of organic matter in the surface few inches have a slightly darker color, but under cultivation the color rapidly becomes lighter gray. In places here and there, especially in the vicinity of Fisher and Siloam Church, a reddish or light-red loamy fine sand is encountered at about 30 inches, such areas representing an inclusion of Orangeburg fine sand. Exposures in deep cuts indicate that much of the type is underlain at 4 to 5 feet by a reddish or yellowish-red sandy clay. In the southeastern corner of the parish considerable coarse and medium sand is present throughout the soil section, and it is probable that much of the heavier substratum material in this section is like the Susquehanna subsoil.

The Norfolk fine sand occurs most extensively to the north of Fisher, in the southeastern corner of the parish, and near the mouth of Bayou Negreet. Smaller areas are scattered over the southern half of the parish. The type usually occurs on well-rounded divides and on gentle slopes, and has a smooth and even surface.

The open, porous nature of this soil allows of good to excessive internal drainage, and there is little run-off. It can be worked under a wide range of moisture conditions.

The forest growth consists chiefly of longleaf pine, blackjack oak, and stunted post oak. There is little undergrowth in most places, and the type is referred to as "open pine land." Grass does not do nearly so well as on the associated heavier soils, and the grazing is usually poor; no sod is formed.

Very little of this soil is under cultivation. The principal crops grown are cotton and corn, the yields of which vary considerably with the season. In the better areas cotton ordinarily yields one-fourth to one-third bale per acre. Sugar cane, grown in small patches, yields at the rate of 200 to 250 gallons of sirup per acre. Peanuts do well.

Ordinarily this land is valued at $6 to $15 an acre, depending chiefly upon the location and state of cultivation.

This soil needs the addition of manure, the plowing under of green vegetation, and the maintenance of a dust mulch during the summer months by frequent shallow tillage. It is profitably used for fruit growing and trucking in many parts of Louisiana and eastern Texas, and melons and cucumbers are successfully grown on it in some parts of the South.

SUSQUEHANNA FINE SANDY LOAM.

Although the Susquehanna fine sandy loam is markedly different from the very fine sandy loam in surface soil characteristics, its subsoil is typical except that in the greater part of the type it grades at lower depths into a grayish-yellow to whitish sticky clay, resembling the lower subsoil of the Montrose series. Also, the upper subsoil is in many areas a mottled red and yellow or red and ashy gray instead of a solid red color. In other words, the subsoil in places resembles that of the Montrose series, but is different in that the upper part, at least, is predominantly red, while there is no red whatever in the typical Montrose subsoil.

The surface soil of the Susquehanna fine sandy loam is not only coarser and less loamy than that of the Susquehanna very fine sandy loam, but, as a rule, it is deeper. It consists of gray fine sand or loamy fine sand, 3 to 5 inches deep, grading into pale-yellow or gray fine sand, or loamy fine sand, which normally grades into pale-yellow fine sandy loam and at about 18 inches into a dense

red or dark-red, plastic, heavy clay mottled with yellow, and in some places with gray or ashy gray. The yellow or gray color increases with depth, nearly everywhere predominating in the lower subsoil, and in many places displacing the red color entirely. The surface soil normally contains considerable coarse and medium sand. A few areas of Montrose fine sandy loam are mapped with this type, because of their small extent.

The Susquehanna fine sandy loam occurs in the region of coarser or looser soils in the southeastern portion of the parish. Small areas are found in other parts, in association with very fine sandy loam, but those are not mapped.

The topography is gently rolling, like that of the Ruston fine sandy loam, and the surface drainage is usually good. There are some rather flat areas, especially where the type occurs in close association with the Montrose fine sandy loam.

Most of this soil is covered with longleaf pine, but this is being rapidly removed. A few small farms here and there are used for the production of cotton and corn, with fair returns. Manuring or the use of commercial fertilizers in liberal amounts is needed for good results, unless velvet beans and other legumes are grown.

Probably a profitable use of this land would be to seed it to Bermuda grass and use it for pasture. The native grasses, such as broom sedge, afford fair pasturage, and small numbers of cattle and goats are grazed in the open forest and cut-over areas. The turning under of green-manuring crops would undoubtedly be beneficial in assisting the soil to retain moisture.

SUSQUEHANNA VERY FINE SANDY LOAM.

The surface soil of the Susquehanna very fine sandy loam consists of a gray to grayish-brown loamy very fine sand to very fine sandy loam, with darker colored material in local spots where organic matter has accumulated. The lower part of the surface soil is a pale-yellow or brownish-red very fine sandy loam. The subsoil, beginning at 8 to 18 inches, with an average of about 10 inches, is a red, plastic, heavy clay, mottled with yellow or gray or both. This mottling increases with depth until near the bottom of the 3-foot section, where the color is gray or pale yellowish gray with very few or no mottlings of red. The substratum clay is in many places of a laminated or shaly character, and of a gray or bluish-gray color. Some thin beds of argillaceous shale are present in places through the deposits giving rise to this soil. Soft fragments of iron crust and pieces of gray sandstone are present in places.

The surface soil of virgin areas is normally darker colored than the soil under cultivation, owing to the higher percentage of or-

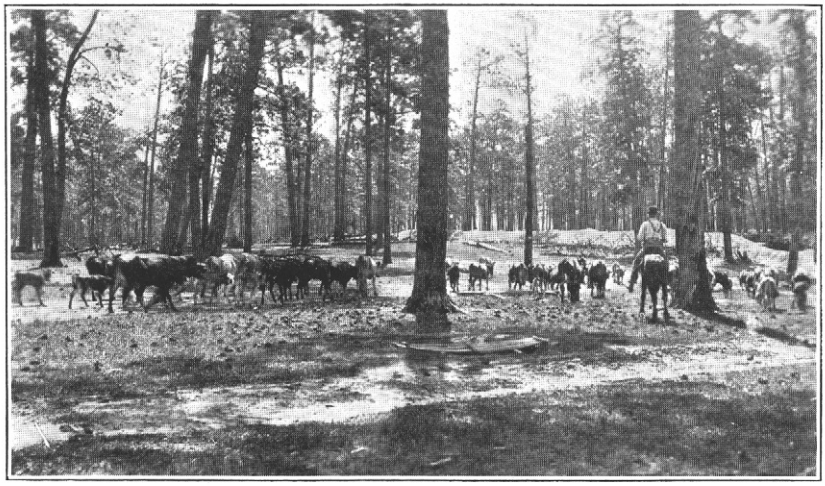

FIG. 1.—HERD OF CATTLE ON RANGE NEAR PEASON.

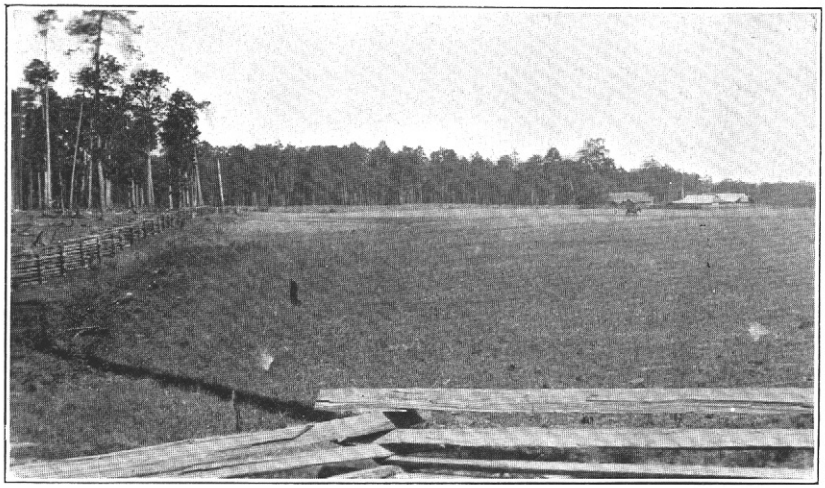

FIG. 2.—FARM ON THE RUSTON FINE SANDY LOAM 1½ MILES NORTH OF PEASON.

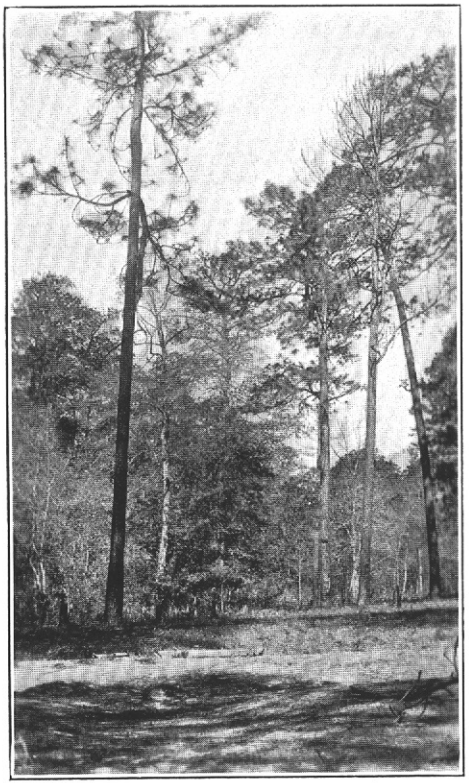

FIG. 1.—NATIVE GROWTH ON RUSTON FINE SANDY LOAM, 1½ MILES NORTH OF PEASON.

Background shows typical growth of longleaf pine, with dogwood in blossom in center. Native grasses in foreground.

FIG. 2.—NATIVE FOREST ON UPLAND AND STREAM-BOTTOM SOILS.

On the right is seen the typical forest growth of the upland, an open forest of longleaf pine. The soil is the Ruston fine sandy loam. On the left is the dense growth typical of the stream bottoms, including such trees as bay, gum, and holly. The soil is the Ochlockonee silt loam.

ganic matter in the forest areas. It is deeper on the divides and shallower on the steeper slopes or in the vicinity of the Susquehanna clay. Many of the flatter areas contain a higher percentage of silt than typical. Soft, reddish-brown iron concretions may occur in the surface soil, especially where the subsurface layers of iron rock come close to the surface. The average depth of the surface soil is not as great as in the case of the Susquehanna fine sandy loam.

As mapped, especially on the breaks from the high divides, this soil contains small patches in which the subsoil is more friable than typical and resembles the Orangeburg or Ruston subsoils. These patches, however, are too small to map separately on a map of the scale used in the present survey. In other places, in any topographic position, the dominant color of the upper subsoil may be yellow instead of red. In small eroded areas a few acres in extent along the deeply cut drainage ways the subsoil is exposed. On the other hand, areas on some of the ridges along the river and in the south-central part of the parish are more sandy and deeper than typical. The agricultural characteristics of this variation, however, more closely resemble the very fine sandy loam than the typical Susquehanna fine sandy loam as mapped in the southeastern part of the area.

The Susquehanna very fine sandy loam is the most extensive soil in the parish and is the dominant soil of the uplands in all parts, except in the southeastern corner. It usually occurs on the divides and slopes, and has a gently rolling to rolling topography. Where the surface is strongly rolling and the surface soil is less than 4 or 5 inches in depth, the soil is mapped with the Susquehanna clay; this is the case to the south and east of Bayou Lenann and to the east of Fort Jesup. Where the divides are flat and the drainage rather slow the soil is mapped separately as a flat phase.

Drainage is good over most of this soil, and is inclined to be excessive on the slopes to the deeper drainage ways, owing to the dense nature of the subsoil. There the rapid run-off may cause the removal of much of the looser surface material. In a few of the less rolling areas, where the run-off is slower, the underdrainage may be deficient owing to the rather impervious nature of the subsurface layers.

The native vegetation on this soil consists chiefly of shortleaf pine, red oak, post oak, white oak, hickory, black gum and sweet gum. Some longleaf pine occurs in places. Native grasses are quite abundant on most of the uncultivated areas.

Probably not over 15 per cent of the Susquehanna very fine sandy loam is under cultivation. Most of the rest is lying idle as cut-over land or is included in common range. Scrub oak is taking possession of cut-over areas. Farming is chiefly done on newly cleared land, the yields declining rapidly as the supply of organic matter is depleted

through clean cultivation. Cotton and corn are the leading crops. Velvet beans and cowpeas are grown with the corn on a small acreage. Cotton yields one-fourth to one-third bale to the acre, and corn ordinarily from 8 to 12 bushels per acre. Small patches of winter oats are sown on a few farms for forage. A few small fields of Bermuda grass and a considerable acreage of lespedeza are grown here and there over the type. These crops give good grazing.

The cultural methods on this soil are much the same as those employed on the Ruston very fine sandy loam. Practically no attention is paid to crop rotation. Most fields are cropped to cotton and corn continuously for a number of years. Contour cultivation and terracing, to prevent erosion, have come into more general practice in recent years.

The use of commercial fertilizers is increasing. Cotton seed and cottonseed meal are not as commonly used as in the past, because of the higher prices obtained for these products as feeds. Corn and cotton, where fertilized, receive an acreage application of about 200 pounds of a mixture analyzing 10 per cent phosphoric acid and 1.65 per cent nitrogen. The more progressive farmers carefully husband and apply barn-lot manure, but the supply is entirely inadequate to the need of organic manures. Cowpeas, velvet beans, and winter oats are sometimes turned under as a green manure, but where grown these crops are more often cut for hay or fed in the field.

Cut-over land of the Susquehanna very fine sandy loam can be purchased from the lumber companies in large tracts for $8 to $10 an acre. Improved farms sell for $12 to $20 an acre, the price depending upon the location, the topography, and the condition of the land.

The shallower areas of this type are probably better suited to the grazing of live stock than to the growing of intertilled crops. Pastures of Bermuda grass and lespedeza are successfully established on this type in eastern Texas, southern Arkansas, and in other parts of Louisiana. Lespedeza, being a legume, not only gives a good quality of pasturage, but also adds nitrogen to the soil and increases the yields of other crops which may follow it. Contour cultivation and terracing on the slopes, which as noted has increased, should be extended to all areas where erosion takes place. The plowing under of an occasional green crop would add organic matter to the soil and increase its productiveness also by increasing its power to hold water. Deeper plowing and frequent shallow summer cultivations, as suggested for the Ruston very fine sandy loam, would tend to decrease the tendency to droughtiness of the soil in dry seasons.

Susquehanna very fine sandy loam, flat phase.—The flat phase differs from the typical Susquehanna very fine sandy loam chiefly in topography. It lies on the broader divides or very gentle slopes where

the surface is nearly level, but ordinarily slopes enough to give fair drainage except in depressions, in which the soil approaches the characteristics of the Lufkin series, a Coastal Plain soil not mapped in this parish. It differs from the Caddo very fine sandy loam chiefly in the very plastic nature of the subsoil.

The phase occurs mainly in small, irregular bodies within areas of the typical soil, scattered over the northern three-fourths of the parish.

The surface soil is usually a grayish-brown, very fine sandy loam, grading into a pale-yellow or yellowish-brown very fine sandy loam at 6 or 8 inches. The subsoil, beginning at depths ranging from 10 to 18 inches, is in the upper part a heavy, plastic, red clay, mottled with yellow and gray, and in the lower part a gray or yellowish-gray clay, mottled with red. Where the subsoil lies relatively near the surface it is often free from mottlings in the upper or red horizon. A few places occur where the subsurface layer is a rather friable clay, but in all cases the lower subsoil is very dense and plastic. Dome-shaped mounds of small diameter occur near the center of some of the larger areas. They have a deep surface soil and often resemble the Caddo very fine sandy loam in the upper subsoil.

Very little of the flat phase of the Susquehanna very fine sandy loam is under cultivation; most of it supports a dense forest, consisting chiefly of oak, hickory, and shortleaf pine. Where it is cultivated, it is said to produce as well as, or better than, the typical soil, owing to the freedom from erosion and its slightly greater capacity for moisture. Cotton and corn are the chief crops grown.

This land ordinarily sells for about the same prices as the typical soil, depending chiefly upon the character of the forest growth or the state of cultivation. A few cleared areas in the vicinity of Sodus are held at $20 to $30 an acre.

SUSQUEHANNA SILT LOAM.

The Susquehanna silt loam, to a depth of 5 to 8 inches, is a gray or dark-gray to yellowish-gray silt loam. This is underlain abruptly by a stiff, plastic, heavy red clay, mottled with yellow or gray, or both. The lower subsoil may be without red, and gray, bluish gray, or mottled bluish gray and yellow in color. The subsoil clay is decidedly sticky when wet.

This soil occurs only on the more gradual slopes and flatter divides to the north and west of Bayou Toro, and along its northern tributaries. In its heavier variations it is closely associated with the Susquehanna clay, and in its lighter ones with the Susquehanna very fine sandy loam.

The Susquehanna silt loam has a flat to gently undulating surface, and on the more nearly level areas the drainage is very slow. The

surface in such areas is billowy, the land being known locally as "hog-wallow" land. During the rainy season water collects in the shallow depressions.

About 95 per cent of the type is old cut-over land which now supports a rather dense second growth of shortleaf pine, white oak, post oak, beech, sweet gum, haw, dogwood, and some magnolia and other hardwoods.

The native grasses make a fairly good growth, and the chief use of the type at present is grazing.

Only a very few small fields are cultivated. Unless the cultivation is very shallow the underlying clay is brought to the surface in spots and the soil bakes upon drying after rains. Almost constant shallow cultivation is necessary throughout the growing season to keep the land in good tilth. The leading crops are cotton and corn. They yield about the same as on the Susquehanna very fine sandy loam.

Land of this type has about the same value as the very fine sandy loam.

The flatter areas of the Susquehanna silt loam can not be farmed successfully until sufficient ditching has been done to remove the excess rain water. The type seems to be well adapted to the growing of Bermuda grass and lespedeza as hay and pasturage crops.

SUSQUEHANNA CLAY.

The Susquehanna clay consists of a plastic, heavy red clay, which at depths ranging from a few inches to about 18 inches becomes mottled with gray or with gray and yellow, the gray mottling increasing with depth. The material throughout the soil section is sticky when wet. Usually there is a thin surface layer of 1 to 4 inches of variable material, in many places a brownish-gray very fine sandy loam, but in others a brownish-red to reddish-brown loam or clay loam. The substratum consists of a shaly, gray or yellowish-gray, dense clay. In areas having the grayish very fine sandy loam surface layer small quantities of fragments of reddish-brown iron crusts are present.

In the more nearly level areas of the soil north of Bayou Toro the thin surface covering is usually a dark-brownish gray silt loam or clay loam and here the upper part of the clay stratum may be yellowish in color. Very small, narrow strips of Susquehanna very fine sandy loam are included with this type on the narrower divides and slopes.

The greater part of the Susquehanna clay occurs in long, irregular areas on the slopes and narrow divides in the strongly rolling section south and east of Bayou Lenann and east of Fort Jesup. In these areas the relief varies from 50 to 150 feet. Much of the type occurs in smaller areas on rather steep slopes scattered over the whole parish.

A few areas north of Bayou Toro are flat to gently undulating and in detail have a billowy surface. The surface drainage of the type as a whole is excessive. The flatter parts north of Bayou Toro are well, but not excessively, drained, and in some other places the drainage is rather slow. In general the surface is dissected by numerous gullies or ravines, and what little sandy material there is on the surface soon washes off after the land is cleared and put under cultivation.

Very little of the Susquehanna clay has been cropped. In some of the less rolling areas a few acres are farmed in conjunction with the adjoining soils. Most of the type is cut-over land. The native forest consists of shortleaf pine, red oak, post oak, white oak, blackjack oak, beech, and hickory. In many places the growth is very scrubby. This soil is included in the open range with the other unfenced soils.

Owing to its intractable character, the Susquehanna clay is difficult to cultivate. It bakes hard in dry seasons, and usually does not retain sufficient moisture for the best growth of crops. Practically the only crop grown is cotton, and the yields are rather unsatisfactory, especially where the shallow sandy surface layer is lacking.

The chief value of the Susquehanna clay lies in its forest growth and its use for pasture. In large tracts it sells for about $8 to $10 an acre.

Essential steps in the improvement of this soil are deeper plowing and the incorporation of organic matter. It is very unproductive when first plowed, and it is necessary to allow time for weathering and aeration before crops can be grown with much success.

KIRVIN VERY FINE SANDY LOAM.

The Kirvin very fine sandy loam differs from the Susquehanna chiefly in its deeper red upper subsoil, less plastic lower subsoil, and larger content of concretions and rock fragments. The surface soil varies from a grayish-brown to brownish-gray loamy very fine sand to very fine sandy loam. It becomes more coherent below, passing into a heavy very fine sandy loam before the subsoil is reached. In places where the depth to the clay is shallower the surface soil is reddish brown. The subsoil, beginning at 8 or 10 inches, is a deep-red clay, a little more friable than the upper subsoil of the Susquehanna very fine sandy loam but more plastic than the subsoil of the Ruston, Orangeburg, or Greenville soils. This red clay passes at depths ranging from about 18 to 24 inches into a mottled red, yellow, and gray, plastic, crumbly clay, in which the gray mottlings become more abundant with depth. There are numerous reddish-brown to brownish-red, small fragments of iron crust and ferruginous concretions throughout the soil section in most places, though they may be absent in the lower subsoil. They usually vary in diameter from

one-sixteenth to one-half inch. The upper subsoil is highly oxidized and the whole subsoil often contains considerable deep-red, soft, oxidized material, which gives it a rather friable structure. In a few places the surface soil contains considerable fine sand. In others small areas of Susquehanna very fine sandy loam are included, because of their small extent.

The Kirvin very fine sandy loam in this parish is most extensive in the central part, though areas are mapped in all sections of the uplands. A large total area is mapped in close association with the "red-land" belt, from a point near Fisher to the river.

The surface of this soil is smooth, and varies from gently rolling to undulating. Most of the type occurs on rather broad divides, but in many places it extends well down the slopes. It everywhere has good drainage.

As the subsoil is not as dense or as plastic as that of the Susquehanna very fine sandy loam it absorbs water quite readily, and retains it for crop use in the drier seasons. The type warms up early in the spring, is easily cultivated, and is naturally productive. It is quite highly esteemed by the farmers, and when it occurs in areas within the Susquehanna very fine sandy loam it is usually chosen for the location of the homestead and is one of the first soils to be put under cultivation.

Probably over half of this type is cropped; the rest is covered with a growth of red oak, post oak, white oak, blackjack oak, shortleaf pine, sweet gum, hickory, dogwood, and sparkleberry. There is in many places a bushy undergrowth.

The same crops are grown on this soil as on the Ruston very fine sandy loam and the cultural methods are much the same. Yields probably average lower than on the Greenville gravelly loam and higher than on the Susquehanna very fine sandy loam. Little commercial fertilizer is used, except on some of the older fields.

Where improved the Kirvin very fine sandy loam ordinarily sells for a slightly higher price than the Susquehanna very fine sandy loam.

The suggestions made for the improvement of the Greenville gravelly loam will apply equally well to this type.

The following table gives the results of mechanical analyses of samples of the soil, subsurface, and subsoil of the Kirvin very fine sandy loam:

Mechanical analyses of Kirvin very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
432119	Soil	1.2	1.4	0.7	34.8	36.2	19.6	6.1
432120	Subsurface	.6	1.0	.9	19.5	12.4	16.3	49.5
432121	Subsoil	1.0	1.6	1.2	24.5	12.4	16.4	43.3

KIRVIN CLAY.

The Kirvin clay consists of a deep-red clay which is often slightly friable in the upper few inches, owing to a shallow surface covering of reddish-brown very fine sandy loam, loam, or clay loam. The red clay at depths ranging from about 18 to 28 inches is mottled with yellow and gray, the yellow mottlings usually disappearing near the 3-foot depth. The clay throughout the entire soil section, while plastic, is not as plastic as that of the Susquehanna clay. Brownish-red, angular fragments of ironstone, varying in diameter from a fraction of an inch to 6 or 8 inches, and small iron concretions are present on the surface and through the upper subsoil. They are numerous enough in places to interfere with cultivation, but not seriously. As mapped, the type includes occasional patches of Kirvin very fine sandy loam, which are too small to separate.

The Kirvin clay is closely associated with the Greenville gravelly loam and most of it occurs in the "red-land" belt extending from near Fisher southwest to the Sabine River. The surface is rolling. The drainage is good, and inclined to be excessive on the steeper slopes. Here the looser surface material has been washed away and the deep red clay is exposed. It normally contains an abundance of relatively large rock fragments.

The forest growth on this soil consists largely of shortleaf pine, red oak, post oak, blackjack oak, and hickory. About one-fourth of the type is under cultivation, devoted chiefly to the production of cotton and corn. It is preferred by most of the farmers to the Susquehanna clay, as it is easier to cultivate, is more drought resistant, and ordinarily produces larger yields. A few farmers in the vicinity of Fisher have excellent pastures of Bermunda grass on this soil.

The Kirvin clay is handled in much the same way as the Greenville gravelly loam, with which it is commonly associated. Heavier implements and heavier draft power are required than on the lighter textured soils of the upland.

Some commercial fertilizer is used on the older fields. Great benefit would be realized from the turning under of green-manuring crops, which would add organic matter, improve the physical condition, and promote the water-holding capacity.

The Kirvin clay is usually sold in farms with the Greenville gravelly loam or Kirvin very fine sandy loam and commands nearly as high a price as these last-named soils.

Below are given the results of mechanical analyses of samples of the soil, subsurface, and subsoil of the Kirvin clay:

Mechanical analyses of Kirvin clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
432135	Soil	2.3	3.0	1.5	8.7	26.0	26.9	31.4
432136	Subsurface	2.9	1.7	.5	2.7	14.7	15.3	62.4
432137	Subsoil	.6	1.3	.9	12.1	22.8	21.1	41.0

MONTROSE FINE SANDY LOAM.

The typical Montrose fine sandy loam is a gray to ashy-gray fine sand or loamy fine sand, passing at about 3 to 5 inches into a pale-yellow, gray, or ashy-gray loamy fine sand to fine sandy loam, which usually becomes heavier with depth. This is underlain, at depths ranging from 6 to 20 inches, by a pale-yellow, ashy-gray, or mottled yellow and gray, sticky, heavy clay, which quickly grades downward into a grayish-yellow, whitish, or mottled pale-yellow and whitish very sticky clay. The average depth to clay is about 10 or 12 inches. The typical heavy clay when moist is very adhesive, even more so than the Susquehanna clay or than the Lufkin clay, mapped in other parts of the South. In places the subsoil contains a noticeable amount of sand, but even in such cases is plastic and sticky.

Where the bedrock comes within 3 feet of the surface the subsoil is often a yellow, or mottled yellow and gray, sandy loam or sandy clay. Small patches of clay with only a surface covering of an inch or two of sandy material are included with this soil. When the clay comes to the surface it consists of an ashy-gray or mottled ashy-gray and yellow, stiff clay that passes abruptly into grayish-yellow, whitish, or mottled, sticky clay. On the other hand, there are places where a loamy fine sand to fine sandy loam, 20 to 30 inches deep, occurs over the clay, and still other areas where no clay is reached within the 3-foot section. Some patches show mottlings of red in the upper subsoil, which resembles the subsoil of the Susquehanna fine sandy loam. Near the heads of some of the drainage ways there are frequently included small bodies of Plummer fine sand and fine sandy loam, consisting of wet, gray fine sand passing downward into a light-gray to white fine sand or fine sandy loam. Many rather unproductive areas having an almost white stiff clay, of a somewhat friable or chalky (not limy) nature, might be separated as being similar to the Lauderdale soils of Alabama and Mississippi, but most of such areas are more poorly drained than the Lauderdale. Some small areas of Montrose fine sandy loam are included with the Susquehanna fine sandy loam because of their small extent.

Outcrops and fragments of the underlying rocks are usually found on the slopes in many places occurring as ledges along the breaks. These rocks consist either of a gray to white, noncalcareous sandstone or else of a hard, whitish to bluish-white, fine-grained, argillaceous formation. Along the Christie & Eastern Railway, west of Peason, this rock has been quarried for use in the construction of jetties on the Gulf coast.

The Montrose fine sandy loam is confined to the southeastern part of the parish. One of the largest areas lies near Peason. The surface ranges from nearly level to sloping, with gentle undulations in a few places. As a rule the drainage is poor, owing to the imperviousness of the clay subsoil and many slopes remain soggy from seepage throughout much of the year. Locally the soil is styled "sobbed land" or "white clay land."

Most of the Montrose fine sandy loam is covered with longleaf-pine forest, in which the trees average somewhat smaller than in the forests on the Ruston and Susquehanna soils. There is very little underbrush, but considerable broom sedge, devils club, and fern. Water grass, or large paspalum (*Paspalum dilatatum*), is plentiful over the more poorly drained flats.

This is not an important soil agriculturally. It is considered of low productiveness, and only a very few patches are farmed. Fair results in growing corn and cotton have been obtained in a few instances on the better-drained ridge crests, but it is said that yields are low on the wet, seepy slopes, or more nearly level areas.

Probably the best use of this land is for the pasturing of cattle, goats, and sheep, and it is used to some extent at present for the grazing of cattle. There is a good growth of grass, especially in the spring, and the pine timber will soon be removed by the large sawmills.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Montrose fine sandy loam:

Mechanical analyses of Montrose fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
432169	Soil	1.4	7.9	10.1	39.1	18.4	16.0	7.2
432170	Subsoil	.5	3.2	3.5	12.6	11.6	20.7	47.9

SUMTER CLAY.

The soil of the typical Sumter clay consists of a brown to dark-brown, crumbly clay loam to clay, 2 to 6 inches deep. This is underlain by a yellowish-brown to brownish-yellow plastic clay which in the lower part of the 3-foot section becomes very heavy and yellow,

pale yellow, or greenish yellow in color. The entire soil section is calcareous, and very sticky when wet. Small lime concretions and chalky material of a calcareous nature are present through the subsoil, being more abundant in the lower than in the upper part. Outcrops and bowlders of a gray to bluish-gray limestone[4] occur on slopes, and the bedrock is encountered at varying depths beneath the surface. Outcrops and fragments of limestone, ranging in diameter up to 8 or 10 feet, are found here and there in the northern part of the parish. Areas where they occur are indicated on the map with outcrop symbols.

While this soil is known locally as "black land," the amount of organic matter in the surface soil, and consequently the color, varies considerably even in a single area. In the flatter areas the content is relatively high and the soil is dark colored; on the slopes little organic matter has accumulated and the color is largely light brown or yellowish brown. The darker colored patches would have been mapped as Houston clay (an extensive soil in the "black prairie" regions of Alabama, Mississippi, and Texas), if they had been developed in larger areas.

Many small areas included with this soil resemble the Oktibbeha clay, mapped in other areas of the South, in that the surface clay is red or brownish red in color and the subsoil is mottled yellowish brown and yellow or pale yellow. The clay in one of the fairly large areas 3 miles southeast of Sandel is dark brown to dark yellowish brown in the surface 6 inches, and underlain by a subsoil of brownish-red or yellowish-red to red clay in the upper part and a yellow to grayish-yellow clay in the lower part.

The Sumter clay is not an extensive soil. The largest areas are mapped on low divides and on northern slopes of the "red-land" belt north of Middle Creek and to the southwest of Rattan. With the exception of these areas and the one southeast of Sandel, the individual areas cover only a few acres. The surface is nearly flat to gently rolling and is favorable to the use of improved farm machinery. Surface drainage is good, but internal drainage is slow, on account of the dense structure of the soil material.

Owing to its small extent, this type is unimportant agriculturally. Not more than 25 per cent of it is cropped chiefly with cotton and corn. The greater part of the type is pastured; where the forest is not too thick or has been removed grasses make a good growth. The forest consists chiefly of oak, haw, and some other hardwoods.

Cotton yields from one-third to two-thirds bale per acre, with an average of about one-half bale. Corn ordinarily yields about 25 bushels where thoroughly cultivated.

[4] Analyses of two representative samples of this rock show it to contain approximately 60 per cent of carbonate of lime and a small quantity of magnesium carbonate.

To obtain best results, this soil needs heavier implements and teams than are commonly used. Care must be taken not to work it when too wet. Frequent cultivation to maintain a soil mulch will help prevent baking and cracking in dry seasons. Some of the better farmers, by means of judicious and thorough working of the soil under proper moisture conditions, obtain excellent yields. Owing to its heavy texture this soil is difficult to work, but where it contains enough organic matter it is one of the most productive soils in the parish. It is well supplied with lime, and as a result legumes do well. With the removal of the tree stumps, the growing of alfalfa or some of the clovers for hay should prove profitable.

CAHABA VERY FINE SANDY LOAM.

The soil of the Cahaba very fine sandy loam is a grayish-brown to light-brown loamy very fine sand to very fine sandy loam, 6 to 10 inches deep. The subsoil is a yellowish or reddish-yellow very fine sandy loam, grading downward into a yellowish-red to dull-red friable heavy fine sandy loam or fine sandy clay loam to fine sandy clay. In places there are some dome-shaped mounds in which the heavier lower subsoil lies at greater depths. Some of the areas contain small depressed areas of Kalmia very fine sandy loam. In the southeastern part of the parish the surface soil usually contains considerable fine sand.

The Cahaba very fine sandy loam occupies distinct benchlike areas, the second bottoms of streams, known locally as "hammock land." It stands 15 to 30 feet above the first bottoms along both the large and small streams, and is almost entirely above overflow. Along the river the type occurs in rather narrow strips on the outer margin of the terraces, while along the creeks it is usually developed in small disconnected areas. The surface is nearly flat or very gently undulating, but in places is slightly dissected by small drainage ways issuing from the upland. As a rule, the type has good drainage, but in a few of the larger areas there may be depressions in which water stands for short periods after heavy rains, such areas usually consisting of Kalmia soil.

The native vegetation consists chiefly of oak, shortleaf pine, hickory, and sweet gum. Where the forest growth is thin the native grasses afford good pasturage.

The Cahaba very fine sandy loam is highly esteemed by the farmers. It was one of the first soils to be extensively farmed. At present nearly 90 per cent of it is under cultivation. The same crops are grown as on the Ruston very fine sandy loam, namely, cotton and corn, with small patches of cowpeas, velvet beans, oats, sweet potatoes, and sugar cane. Probably a larger proportion of this

soil is devoted to corn than of the Ruston. Cotton yields from one-third to one-half bale per acre, ordinarily, and corn 15 to 20 bushels. Yields of the minor crops average about the same as on the Ruston very fine sandy loam. Much higher yields are obtained in favorable years with careful treatment.

The Cahaba very fine sandy loam is farmed in much the same way as the Ruston, and the same suggestions for improvement can be applied. It has a slightly higher range in selling price.

Peanuts, melons, vegetables, berries, and sorghum are among the crops that will succeed on this soil, as has been proved elsewhere in the Southern States. Alfalfa probably could be successfully grown if lime is used.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Cahaba very fine sandy loam:

Mechanical analyses of Cahaba very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
432164	Soil	0.0	0.0	0.7	18.3	47.5	24.9	8.6
432165	Subsoil	.0	.0	.3	11.4	35.5	29.7	23.1

BIENVILLE FINE SAND.

The Bienville fine sand consists of a brown to dark-brown, rather loamy fine sand passing at about 6 to 10 inches into a light-brown or yellowish-brown loamy fine sand or fine sand, in most places slightly coherent. The surface 5 or 6 inches contains considerable humus, and the soil differs from the Kalmia chiefly in its browner color.

The Bienville fine sand occurs only in the Sabine River bottoms, where it occupies islandlike areas of second bottoms known as "hammock land," standing 5 to 8 feet above the first bottoms and nearly all above overflow. The largest areas lie near Pendleton Ferry. The surface is nearly level, but good drainage is insured by the porous structure of the soil and subsoil. The type warms up early in the spring and is easily cultivated.

The greater part of this soil is forested with shortleaf pine, live oak, red oak, white oak, water oak, pin or willow oak, hickory, holly, haw, and sweet gum, with an abundance of wild grapevine. Some longleaf pine occurs in places. Pasturage is obtainable in thinly forested spots.

A few small farms are located on the Bienville fine sand, and yields exceed those obtained on the Kalmia very fine sand. Cotton and corn are the principal crops. Yields decrease after the type has been under cultivation several years, probably owing to loss of

organic matter. This could be supplied by turning under an occasional green-manuring crop, such as cowpeas, or by growing velvet beans occasionally.

The heavy forest growth, together with the isolated location of most of this type, has retarded its development.

KALMIA VERY FINE SAND.

The Kalmia very fine sand consists of a loose, brownish-gray to grayish-brown very fine sand, overlying at about 6 inches a pale-yellow or mottled pale-yellow and gray very fine sand, which in many places becomes loamy at about 36 inches. The soil in places is reddish yellow in color below 18 to 24 inches. In some of the depressions the lower subsoil is quite coherent, and is pale yellow in color mottled with gray. Considerable fine sand is present throughout the soil section in many of the areas, especially in the southern part of the parish. Besides being finer textured, this soil differs from the Bienville fine sand in having a lighter color. The surface soil is quite loamy in places.

This type occurs on stream terraces or so-called "hammock areas" standing 5 to 15 feet above the first bottoms. It is developed in rather long, discontinuous, narrow strips and is mapped mainly along Bayous San Miguel, Scie, Lenann, and Negreet, and their tributaries. The surface varies from hummocky or billowy to flat, the former in some places being due to the occurrence of mounds and in others to dissection by numerous small streams issuing from the uplands. Drainage is good except in some of the depressions on the lower lying areas. The forest consists of shortleaf pine, oak, holly, dogwood, and haw. Broom sedge and native grasses furnish considerable pasturage where the forest growth is sparse.

About one-half of the Kalmia very fine sand is under cultivation. Corn and cotton are the principal crops. Newly cleared land is quite productive, but yields decline with continued cultivation unless considerable organic matter is added to the soil. Cotton yields at least as well as on the Kalmia very fine sandy loam, especially where the layer of buff-colored material is present in the lower part of the soil section. Corn ordinarily yields from 12 to 18 bushels per acre. Cowpeas are grown to some extent. They are planted between corn rows at the last cultivation, and usually pastured in the field. Farmers state that the growing of cowpeas or velvet beans increases the yields of subsequent crops for several years, especially when a crop is plowed under. On the lower-lying areas of the type sugar cane yields an average of 175 to 250 gallons of sirup per acre. Yields of all the common crops are highest in years of plentiful rainfall.

Improved land of the Kalmia very fine sand sells for $8 to $20 an acre, depending chiefly upon the location.

KALMIA VERY FINE SANDY LOAM.

The Kalmia very fine sandy loam is quite variable on account of the occurrence of numerous mounds over the surface, the material on the mounds being usually loose and that of the intermound areas silty and more coherent. In most places the surface soil on the mounds consists of rather loose, gray or brownish-gray very fine sand or loamy very fine sand. This gradually becomes heavier and more coherent with depth, and at 18 or 24 inches passes into a yellow, pale-yellow, or brownish-yellow very fine sandy loam, which in many places grades into a grayish-yellow, heavy, very fine sandy loam or fine sandy clay in the lower part of the 3-foot section. Some of the mounds have a light-reddish subsoil, such areas representing the Cahaba very fine sandy loam. Some soft, brownish concretionary material is found in the lower depths, and small concretions are present in places from the surface down.

In the intermound areas the surface soil is a gray to brownish-gray or yellowish-gray very fine sandy loam, grading downward through a mottled gray and pale-yellow very fine sandy loam into a rather compact, yellow, yellowish-gray, or mottled yellow and gray, heavy very fine sandy loam to fine sandy clay. In some places the lower subsoil is rather plastic, and in others it shows a few red mottlings. Concretions of a brown or dark-brown color may be present in the soil throughout the section. The more mottled, wetter areas represent inclusions of Myatt very fine sandy loam.

In some areas the mounds cover 60 to 80 per cent of the surface. In many of the older fields they are not conspicuous, the surface as a result of continued cultivation being nearly flat. In this case the soil more closely resembles that found elsewhere on the mounds, and is rather loose.

The Kalmia very fine sandy loam occupies the lower second-bottom areas, known locally as "hammock land," standing about 4 to 10 feet above the first bottoms along both the large and small streams. The surface is nearly flat to billowy. The mounds are well drained, but water often stands for long periods in the intermound depressions.

Most of the depressed areas support a growth of white oak, post oak, water oak, shortleaf pine, and red haw; while oak, shortleaf pine, the evergreen yeopen, and sparkleberry are characteristic growths on the mounds. Considerable pasturage is found where the forest is not too thick.

Only the better drained parts of this type are under cultivation. Cotton yields an average of about one-third bale per acre, and corn 14 to 16 bushels. Much higher yields are obtained in very favorable seasons. Sugar cane is grown in small patches for home use and ordinarily yields about 200 gallons of sirup per acre.

The Kalmia very fine sandy loam is usually farmed with light-running one-horse implements, and the tillage is shallow. Very little attention is directed toward the production of forage crops for winter use, the general practice being to grow enough corn for home use and to buy winter forage with part of the cotton money.

Cut-over land of the Kalmia very fine sandy loam can be purchased at the present time for $8 to $12 an acre. Improved farms on the better drained parts of the type sell for $14 to $20 an acre, depending upon the location and improvements.

The best use for much of the more poorly drained soil of this type, in the existing system of agriculture, is forestry and grazing, but it is likely that much of it will be devoted to the production of pasture and hay grasses with a more complete settlement of the county. Much of the better drained part could be further improved by ditching. More organic matter and deeper cultivation are needed over all the type.

MYATT VERY FINE SANDY LOAM, MOUND PHASE.

The areas mapped as Myatt very fine sandy loam, mound phase, consist of Myatt very fine sandy loam in the intermound flats and deep, very fine sandy loam, mostly Kalmia or Bienville very fine sandy loam, on the mounds. The Myatt soil dominates over most of area, but in some places the mounds cover nearly as much ground.

The Myatt very fine sandy loam is a light-gray to ashy-gray very fine sandy loam, underlain at 5 or 6 inches by a compact, light-gray or bluish-gray, heavy, very fine sandy loam to light silty clay loam (floury when dry), which shows some pale-yellow mottling with increasing depth. At about 30 inches the subsoil becomes a light-gray or mottled bluish-gray and yellow, compact, stiff, impervious silty clay or clay. Some faint-yellowish stains are present in the surface soil in places. Dark-brown to black, soft concretions occur in many places in the upper soil section. On the lower lying areas of the type, especially next to areas of the Leaf very fine sandy loam, bright-red mottlings occur here and there in the lower subsoil.

The soil on the mounds varies considerably in color. Most of them have a brown to light-brown very fine sand to very fine sandy loam soil, 5 to 15 inches deep, grading into a pale-yellow, yellow, or yellowish-brown very fine sandy loam, which in places has gray mottlings in the lower part of the 3-foot section. Some of the mounds have a reddish or yellowish-red very fine sandy loam in the subsoil. The material throughout the 3-foot section is highly acid to litmus paper.

Most of the mounds are circular and dome shaped, ranging from 25 to 100 feet in diameter and from 2 to 4 feet in height above the intervening flats. Near the outer margin of the type some of the

mounds are elongated, and vary in length from 100 to as much as 800 feet, and in width from 25 to 100 feet. They are very irregularly distributed.

The Myatt very fine sandy loam, mound phase, occurs on the high, flat benches along the Sabine River from the mouth of San Miguel Bayou north. These benches lie 20 to 30 feet above the first bottoms along the river.

Drainage is very poor, owing not only to the numerous mounds but also to the impervious substratum. Water often stands on the surface for long periods during the rainy season. When dry the soil bakes to a hard condition.

None of this soil is under cultivation. It was originally covered by a rather open forest, but nearly all the large trees have been removed. The principal growth on the mounds at present consists of longleaf pine, shortleaf pine, and some hickory, and on the flats, shortleaf pine, post oak, water oak, scrub oak, and sweet gum. A sparse growth of bunch grass furnishes some grazing.

Most of this land is too poorly drained to be profitably cultivated under present conditions. It is probable that Bermuda grass and Lespedeza could be established if provision were made for the removal of the surface waters.

LEAF VERY FINE SANDY LOAM.

The Leaf very fine sandy loam consists of a light-brown to gray or pale-yellowish very fine sandy loam, underlain at 10 to 15 inches by a mottled red, yellow, and gray, plastic clay. In many places the change from surface soil to subsoil is very abrupt, but in others it is gradual, the clay content of the lower surface soil gradually increasing with depth. In some places there are dome-shaped mounds on the surface, in which the plastic, mottled clay lies at lower depths. In the flatter areas of the type the lower portion of the 3-foot section may become quite gray and contain only a small percentage of red mottlings. Considerable fine sand is present in the surface soil in some of the areas, especially in those along the river in the southern part of the parish, and those to the south of Bayou Toro. This type is very similar to the upland Susquehanna very fine sandy loam in both character and color of the subsoil material.

The Leaf very fine sandy loam is a stream-terrace soil, occurring on the distinct benchlike areas, known as "hammock land," which lie 10 to 20 feet above the first bottoms along the Sabine River and along Bayou Toro and its tributaries. It lies above all probable overflows of the streams. The surface characteristically is flat or gently sloping toward the streams. Surface drainage is fairly good except near the center of some of the larger areas, where, on account

of the more nearly level surface and the plastic nature of the subsoil, the type may remain water-logged for some time following heavy rains. In these places some areas of Myatt very fine sandy loam might be separated if they were large enough to show on a map of the scale used.

The Leaf very fine sandy loam is not an important soil in the agriculture of the parish. It is not extensive, and probably less than 15 per cent of it is under cultivation. The uncultivated portion supports a rather dense growth of the hardwoods common to the region, and also considerable shortleaf pine. Fairly good grazing is available where the forest growth is not dense.

The cultivated portion of this soil is devoted chiefly to cotton and corn. Yields average about one-fourth to one-third bale of cotton or 8 to 15 bushels of corn to the acre. This land is valued at $8 to $15 an acre.

Most of this land could profitably be used for the production of Bermuda grass and lespedeza hay. Ditching would benefit the more nearly level areas.

Leaf very fine sandy loam, mound phase.—The mound phase of the Leaf very fine sandy loam is quite variable. Most of it has the typical Leaf subsoil, a mottled red, yellow, and gray, plastic clay, but in many places the subsoil is yellowish and grayish, and more sandy and less plastic, resembling that of the Kalmia soils. However, the whole phase contains the mottled Leaf subsoil clay at depths ranging from 18 inches to 4 feet, the lower subsoil in the deeper areas having a grayish cast. This gray color indicates obstructed drainage, which is due not only to the rather impervious nature of the substratum but also to the numerous mounds and minor elevations on the surface.

Most of the intermound material consists of a gray or brownish-gray (when wet) loamy very fine sand to very fine sandy loam, 3 to 6 inches deep, passing into a pale-yellow or grayish-yellow loamy very fine sand to very fine sand, which becomes more yellowish with depth. This is underlain at depths ranging from about 15 to 30 inches by a stiff, compact, fine sandy clay to clay highly mottled with gray, bright red, and various shades of yellowish brown and reddish yellow. In a few places the red mottling is lacking. Many patches occur in which the surface soil contains little organic matter, and the color here is very light.

On most of the minor elevations and mounds and in the intermound portion of the type adjacent to the upland, the surface soil is a gray to brownish-gray or grayish-brown very fine sand, which passes at 6 to 15 inches into a lighter colored very fine sandy loam, usually pale yellow or brownish yellow in color. The lower portion

of the 3-foot section is a yellowish-red to reddish-yellow, friable very fine sandy loam to fine sandy clay, often mottled with various shades of yellowish brown and in many places having a grayish cast. Frequently the plastic, mottled red, yellow, and gray clay comes within the 3-foot section, but usually it occurs at depths of 3 to 5 feet. Small brown concretions frequently occur in the lower subsoil.

The flattish mounds, ranging in diameter from 50 to 150 feet, are most typically developed in that portion of the phase adjacent to the uplands. Near the outer margin of the phase the mounds often coalesce and have the appearance of elongated, low ridges. This gives the nearly level bench, upon which this soil occurs, an undulating to billowy appearance. This bench lies about 40 feet above the overflow stream bottoms.

The Leaf very fine sandy loam, mound phase, occurs mainly in a continuous area near Blue Lake, cut only by small streams issuing from the upland. The only other areas, small in size, are situated about 3 miles north of the mouth of Bayou San Miguel.

Drainage of most of the mounds is fairly good, but that of the intervening land is quite imperfect and the soil is often water-logged for long periods after heavy rains.

None of this soil is under cultivation. The forest growth consists of longleaf pine with oak and sweet gum. Some grazing is afforded by native grasses, which consist chiefly of broom sedge.

OCHLOCKONEE FINE SANDY LOAM.

The typical Ochlockonee fine sandy loam consists of a light-brown to brown, friable fine sandy loam, passing at 8 or 10 inches into a lighter brown or yellowish-brown fine sandy loam. The lower part of the 3-foot section is a yellowish, heavy fine sandy loam to fine sandy clay, with some gray mottlings in the more poorly drained areas. In the southeastern part of the parish the entire soil section is often lighter colored than typical. Here the surface soil varies from a brown to brownish-gray fine sand to fine sandy loam. The lower subsoil is often a pale-yellow or mottled yellow and gray fine sandy clay, rather compact in many places.

This type occupies the slightly higher areas within the overflow bottoms along the Sabine River and along the smaller creeks in the southeastern part of the parish. The surface is nearly flat, but between the frequent short periods of overflow the drainage is fairly good, except in the depressions.

A large part of the Ochlockonee fine sandy loam is forested with post oak, red oak, willow oak, water oak, sweet gum, and shortleaf pine. The native grass, which is mostly bunch grass, affords considerable pasturage.

A few fields are cultivated on this type, both in the Sabine River bottoms, where overflow seldom occurs, and along the small creeks. The most important crops grown are corn and cotton. Sugar cane is grown to supply sirup for home use. All crops give good yields in the average year.

OCHLOCKONEE VERY FINE SANDY LOAM.

The typical Ochlockonee very fine sandy loam is a brown very fine sandy loam, 8 to 10 inches deep, overlying a yellowish-brown to yellow, heavy very fine sandy loam to fine sandy clay loam or fine sandy clay, which usually passes, in the lower subsoil, into a lighter colored fine sandy clay. The latter is pale yellow, or mottled yellow, bluish gray, and yellowish brown. This mottled lower subsoil is often somewhat compact, and it frequently contains some brown or dark-brown concretions. Along the outer edges of the stream bottoms there is, in places, considerable wash from the adjacent slopes. Here the surface is often very gently sloping from the foot of the upland toward the streams; there is little gray mottling in the subsoil and the soil is deeper and lighter textured. This is also true of the soil adjacent to the stream channels, where sediments are added with each general overflow. On the other hand, in the lower-lying portions of the type the surface soil is quite silty. Thin strata and pockets of very fine sand or loamy fine sand frequently occur through the subsoil, and small mounds of lighter colored, loose, very fine sand occasionally occur on the surface.

This type is most extensive along the smaller creeks. It occurs in nearly all parts of the parish in strips ranging from a few feet to about a quarter of a mile in width. A few isolated areas occur in the larger stream bottoms.

The surface in places is uneven or very gently undulating, owing to the presence of hummocks and of depressions representing abandoned stream channels. Most of the type, however, is nearly flat and admirably suited to cultivation. It is easy to plow and keep in good tilth, and between periods of overflow the drainage is good enough for cultivation. Much of the type, however, would be benefited by ditching. The areas are subject to frequent short periods of overflow after hard showers.

About one-third of this type is in cultivation. The remainder is forested and is used to some extent for pasturing hogs and cattle. A number of native grasses afford pasturage from early spring to late fall. In uncultivated clearings lespedeza and carpet grass flourish, affording good pasturage and making good hay land. Bermuda grass could be easily established as a pasture and hay grass.

The principal forest growth on this soil consists of willow oak, water oak, post oak, sweet gum, black gum, ironwood, elm, holly,

shortleaf pine, red haw, magnolia, bay, sycamore, beech, dogwood, buttercup bush, poison-ivy vine, cross vine (*Bignonia capreolata*), and yellow jasmine. Along some of the smaller drainage ways, where narrow strips of very wet, soggy land occur, there is a dense swampy growth of bay, magnolia, shortleaf pine, black gum, sweet gum, dogwood, azalea, "graybeard," beech, yellow jasmine, cross vine, poison ivy, ferns, and various grasses.

Relatively more of this type is under cultivation than of the Ochlockonee silt loam. The principal crops grown are corn and cotton. On many farms enough corn is grown to give a surplus for sale on the local markets. Corn does especially well on the better drained portions of the type, as does also cotton when the boll weevil is not too destructive. Without fertilizer or manure, corn yields 25 to 40 or 50 bushels per acre in good years, averaging about 28 bushels. Reports of 60 bushels to the acre have been made. Cotton averages about one-third bale to the acre, but much larger yields are obtained when the soil is properly handled. Small patches of sugar cane are grown on the better drained portions of the type and yield an average of about 250 gallons of sirup to the acre. A small amount of Bermuda grass is cut for hay, and yields about 1¼ tons to the acre.

Farming methods are similar to those on the Ochlockonee silt loam. On some of the better farms considerable attention has been given to the straightening of the creeks and the construction of lateral ditches where needed to carry off excess water. This has decreased the loss caused by overflow. This soil is highly esteemed and is known as one of the most dependable corn soils in the parish. Cleared land usually sells for $15 to $20 an acre.

Owing to its adaptation to forage crops and grass, this soil could be successfully used for raising cattle. More of it should be devoted to the production of grasses suitable for cutting for winter hay, such as Bermuda grass and lespedeza.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Ochlockonee very fine sandy loam:

Mechanical analyses of Ochlockonee very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
432138	Soil	0.0	0.6	0.1	28.3	36.4	26.4	8.1
432139	Subsoil	.0	.2	.2	21.2	33.3	32.0	12.9

OCHLOCKONEE SILT LOAM.

The typical Ochlockonee silt loam consists of 6 or 8 inches of brown or dull-brown, mellow silt loam, underlain by a light-brown

to light yellowish brown silt loam, which grades downward into a silty clay loam. The subsoil at about 20 inches passes into a brownish-yellow or light-brown silty clay loam, often mottled with gray and rusty brown in the lower portion of the 3-foot section. Soft, rusty-brown or dark-brown concretions and concretionary material are common in the lower subsoil.

Occasional patches of Ochlockonee very fine sandy loam occurring near the stream banks and adjacent to the uplands are included with the type. The gray mottling in the lower subsoil is quite conspicuous in the lower and more poorly drained areas, while near the stream channels and on the higher lying portions of the type this mottling is entirely absent. Small strips of silty clay loam frequently occur along old sloughs and in depressional areas.

The Ochlockonee silt loam is widely distributed throughout the parish. It is one of the most extensive first-bottom types, occupying nearly all the overflow land along Bayous San Patricio, Scie, Lenann, Negreet, Toro, Adois, and Dupont, and many of their larger tributaries.

The surface of the type is nearly flat, though occasionally dissected by old stream channels and sloughs. It lies 4 to 15 feet above the normal water level of the streams and is subject to frequent overflow during the rainy season except near Robertson Ferry, where it is seldom overflowed. Except in the lower situations, as along old sloughs and back from the channels in the wider bottoms, the land remains covered with water for only a few hours at a time. This type does not have as poor drainage as the Bibb silt loam. Considerable damage, however, is done to plowed land by the swift currents of floods, and occasionally considerable areas of cotton and corn are injured by late spring rains, which in some cases necessitate replanting of the crop.

The Ochlockonee silt loam is quite important in the agriculture of Sabine Parish. Much of it is farmed in conjunction with adjacent upland or second-bottom soils. The uncleared areas support a dense forest growth similar to that on the Ochlockonee very fine sandy loam, and considerable pasturage is obtained from the native grasses and the small patches of switch cane that grow in the woods. The type was at one time extensively covered with cane, which supplied the main winter feed of thousands of cattle, but most of the cane has been killed out. Practically all the abandoned fields are well seeded to lespedeza, Bermuda grass, and carpet grass, and ordinarily furnish excellent pasturage for eight months of the year. The dense growth of the native forest on this soil, in contrast to the openness of the growth on the Ruston fine sandy loam, is shown in Plate II, figure 2.

Corn occupies a larger acreage than any other crop. This is known as one of the most dependable corn soils in the parish. Many farmers grow a surplus of this crop for sale on the local markets. Cotton has been the second most important crop since the invasion of the boll weevil. It is reported to do very well on this type when given very thorough, clean cultivation. There are many small patches of sugar cane, but the crop is not grown on any large scale. Some beef cattle are pastured on this type, and more Bermuda grass and lespedeza hay is cut than from any other soil in the parish.

Corn yields an average of 20 to 25 bushels to the acre, but as much as 50 bushels is not an uncommon yield on the better areas in favorable seasons. Cotton, with careful cultivation, yields from one-third to three-fourths bale to the acre in the average year, and yields of one bale or more have been reported. Sugar cane ordinarily yields 300 to 350 gallons of sirup. Bermuda grass and lespedeza usually give two cuttings of hay, 1 ton the first cutting and from one-fourth to one-half the second.

Fields for corn and cotton are prepared in the spring. Plowing begins later than in the uplands on account of the likelihood of floods and the wet nature of the soil in the early part of the season. A common practice is to use light one-horse turning plows, shovel plows, and weeders, but many of the more progressive farmers use two-horse teams and correspondingly heavier implements, many using two-wheel shovel cultivators, disk cultivators, disk weeders, harrows, and disks. Both corn and cotton are planted on rather high ridges or beds, which usually are made by throwing several furrows together. In case the season is wet, the land is reridged before planting, as the soil has a tendency to become slightly compact after being saturated for several days. This compacted condition of the surface soil is frequently corrected by smoothing off the crests of the ridges with a cultivator or spike-toothed harrow immediately before the crop is planted. The cotton planters are single-row, walking implements, drawn by one mule. Corn is planted by hand and covered with a light turning plow. Thinning is done with the hoe and subsequent cultivations are shallow. In a wet fall the lower cotton bolls are liable to be stained to some extent, and corn that touches the ground may turn brown or rot if not soon harvested.

No commercial fertilizers are used on this soil, and no special effort is made to maintain its natural productiveness. It is considered a strong soil, but the difficulty of clearing and the possibility of damage from overflow have retarded its development.

Land of the Ochlockonee silt loam where under cultivation is sold for $10 to $20 an acre. Land uncleared but suitable for cultivation ranges from $8 to $10, and areas suited only for woodland or pasture land from $5 to $8.

The greatest needs of this soil are thorough drainage and protection from overflow. In some cases the streams have been straightened and lateral ditches constructed to carry off the surface water more rapidly. Good drainage promotes the circulation of air throughout the soil, permitting it to warm up earlier in the spring so that crops may be planted sooner. Very little attempt has been made to protect the soil from overflow by the uses of levees. This type is well adapted to corn and such hay and pasturage crops as lespedeza and Bermuda grass, so that it is especially well suited to stock raising. More hay should be cut for winter feed, in order to save a large percentage of the cotton money that is now spent annually for shipped-in hay. There are excellent local markets for hay. The fields should be cleared of stumps as rapidly as practical, and more labor-saving machinery used.

OCHLOCKONEE SILTY CLAY LOAM.

The typical Ochlockonee silty clay loam is a brown silty clay loam to a depth of 6 to 10 inches, passing beneath into a lighter-brown to yellowish-brown silty clay loam or silty clay, which is usually compact and mottled below 18 to 30 inches with gray and rusty brown, the gray mottlings increasing with depth. The lower subsoil frequently contains numerous dark-brown, soft concretions. Occasionally yellowish iron stains are conspicuous in the surface soil. In the river areas the entire soil section is usually quite stiff and the surface material darker colored than typical. In the more poorly drained portions of the type the gray mottling occurs much closer to the surface than typical and often small strips are very light colored in the surface, resembling the Bibb soils. On the other hand, in the higher lying areas and in those close to the streams the brown color of the surface soil extends to greater depths and there is very little gray mottling in the subsoil. Some areas of Ochlockonee silt loam and very fine sandy loam are included with this type because of their small extent.

The Ochlockonee silty clay loam occurs chiefly in the bottoms of Bayou San Miguel and along the river below the mouth of that bayou. In most places it has a flat surface, but some of the areas are billowy as a result of old channels and sloughs. In general the drainage is poor. The type is subject to frequent overflows in wet seasons, and water often remains on the surface on the flatter and lower areas over considerable periods.

The greater part of this type still supports a forest of water oak, live oak, willow oak, post oak, white oak, ironwood, maple, holly, magnolia, shagbark hickory, bay, swamp red haw, elm, and black gum, with cypress and tupelo in the depressions. Such plants as poison ivy, cross vine, smilax, and buttercup bush are common. The

native grasses and switch cane afford good pasturage in places. In abandoned fields Bermuda grass, lespedeza, and carpet grass flourish. In the more poorly drained areas (as is the case also with the other Ochlockonee soils) yellow top or crawfish weed is often conspicuous. It is an early spring small yellow flowering plant. This plant is said to indicate the poorer areas of bottom land—that which has poorer underdrainage.

On account of the frequency of overflow, the relatively great difficulty of clearing, and the lateness of the soil in the spring only a few fields are located on this type. Some of the better drained portions have been selected for cultivation. Corn and cotton are the only important crops grown. Corn does fairly well, yielding 15 to 40 bushels to the acre. Cotton does best in seasons of moderate rainfall. Sugar cane is grown in small patches for home use. Several small areas are in Bermuda grass, which makes good pasturage. When cut for hay this grass yields about 1 ton to the acre.

Much of the type, especially that portion not having the gray mottled subsoil near the surface, is capable of cultivation, and could be made highly productive if protected from overflow. If cleared and planted to lespedeza or Bermuda grass it would afford excellent pasturage for cattle and hogs, and would produce good hay.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Ochlockonee silty clay loam:

Mechanical analyses of Ochlockonee silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
432140	Soil	0.2	1.0	0.6	4.5	9.4	52.3	32.1
432141	Subsoil	.1	.8	.7	4.4	11.4	45.7	36.6

OCHLOCKONEE CLAY.

The Ochlockonee clay is a brown silty clay, mottled faintly with dark brown and bluish gray, grading at 6 to 8 inches into a lighter brown or pale-yellow, sticky, plastic silty clay. The latter is mottled with bluish gray, dull brown, and rusty brown, and contains some soft, dark-brown or black concretionary material. The subsoil below 18 or 20 inches is a grayish-yellow to bluish-gray clay, stained with yellow, and containing a few small concretions. The brown color of the surface soil is deeper in the better drained areas of the type. Narrow strips of soil with fine sandy loam on the surface are not uncommon in the vicinity of the river.

In low-lying situations adjacent to the upland, 1½ miles north of Recknor are two small areas, each approximately 30 acres in extent, in which the soil is derived from wash from limestone uplands, and

resembles the Trinity clay as found farther up the Sabine River in Texas. The soil is calcareous and is a nearly black waxy, silty clay to clay, overlying a dark-drab to drab, stiff clay. It is very productive. Similar small areas occur south of Blackland Slough.

All of the typical Ochlockonee clay in this parish is situated in the heavily overflowed bottoms of the Sabine River. In the vicinity of the stream the surface is billowy owing to old channels, hammocks, and slight depressions. Farther from the channel the surface as a rule is nearly level. Some parts of this type are overflowed frequently, but the highest portions are submerged only during the highest floods. Drainage over most of the type is poor.

Owing to the probability of overflow, this type is not cultivated. It is covered chiefly with such hardwoods as white oak, willow oak, water oak, pin oak, red oak, post oak, sweet gum, ironwood, and red haw. Some shortleaf pine grows on the higher lying areas.

In its present condition the type is valued chiefly for its timber, though considerable grazing is found where the wood is not so dense. When the land is cleared, a good stand of grass soon covers the surface.

BIBB VERY FINE SANDY LOAM.

The surface soil of the Bibb very fine sandy loam is a gray to mottled gray and brown very fine sandy loam, 6 to 8 inches deep. This is underlain by a gray or bluish-gray very fine sandy loam, which usually shows some pale-yellow mottlings and contains dark-colored concretions and concretionary material, especially in the lower part of the 3-foot section. In some places the lower subsoil is heavier and quite compact, having the nature of a hardpan. Occasionally a few low, sandy mounds with brownish or brownish-gray surface material are encountered.

The Bibb very fine sandy loam is an inextensive type. It occurs in the river bottoms and in narrow strips along the Bayous San Patricio, San Miguel, and Toro. The surface is level and drainage is poor. The surface is often covered with water throughout most of the rainy season.

The chief use of the Bibb very fine sandy loam is for lumbering and grazing. The tree growth consists chiefly of willow oak, water oak, ironwood, sweet gum, red haw, May haw, and swamp palmetto. Very little of this soil, if any, is under cultivation.

Bibb very fine sandy loam, prairie phase.—The prairie phase of the Bibb very fine sandy loam is locally known as "salt lick" and "prairie." The soil contains enough sodium chloride in spots to be devoid of vegetation, but over most of the phase there is a sparse growth of grass and small weeds and a scattering of stunted elm, post oak, ironwood, honey locust, and haw.

The soil is a gray or mottled gray and pale-yellow very fine sandy loam, usually very compact and almost white when dry. The lower part of the 3-foot section is a dense, compact silty clay loam or silty clay.

In the area near the junction of McDonald and Allen Bayous the surface soil is more yellow than typical, and occasional small lime concretions occur in the subsoil. In this area and in the largest area near Saline Lake there are a few small mounds of Bienville fine sand, too small to map separately. In the area near Stone Coal Bluff the subsoil is bluish in places.

This phase is very limited in extent. It is confined to the first bottoms along Sabine River, the largest areas occurring near Round Lake Swamp and near Stone Coal Bluff. The surface is level and drainage is poor. The phase is not cultivated, and at present is of value only for the scant pasturage available in the less salty places. The salty spots are said to be underlain by a more or less extensive saline deposit.[5] Salt was obtained from shallow wells in the saline areas near Stone Coal Bluff years ago.

Below are given the results of mechanical analyses of samples of the soil and subsoil of the typical Bibb very fine sandy loam:

Mechanical analyses of Bibb very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
432156	Soil	0.0	0.4	0.1	16.4	32.4	45.5	5.3
432157	Subsoil	.0	.0	.7	15.2	30.0	43.4	10.8

BIBB SILT LOAM.

The Bibb silt loam to the depth of about 6 inches is a light-gray to mottled gray and light-brown silt loam. This is underlain by a light-gray or light bluish gray, rather compact silty clay loam, containing some yellow stains. The subsoil from 18 to 36 or 40 inches is a compact, impervious silty clay or clay, mottled bluish gray and yellow in color. Upon drying, the entire soil section is nearly white. The surface soil has a pasty, puttylike structure when wet, and is nongranular and compact when dry with a flourlike appearance when crushed. The lower subsoil is so dense and compact that aeration and water movement is very poor. Dark-brown and brown concretions frequently occur in the lower subsoil, making it compact and in places resembling hardpan.

Small areas and strips of Bibb silt loam are necessarily included with each of the Ochlockonee soils in many depressed areas, because of their small extent.

[5] See the Salines of Northern Louisiana, by the La. Geol. Survey, 1902.

The Bibb silt loam occurs along the Sabine River and in the more level portions of the larger creek bottoms. It occurs back from the streams. The surface is level, or nearly so, and drainage is very poor, both soil and subsoil often remaining in a saturated condition for considerable periods after heavy rains. In many places rain and seepage water from higher lying soils remains on the surface during much of the rainy season. The soil is known locally as "crawfish land."

Practically all of the type supports a forest without much undergrowth. The large timber consists chiefly of water oak, post oak, white oak, willow oak, and ironwood. Considerable holly, red haw, May haw, and swamp palmetto grow in places. A yellow-blossomed, early spring weed known as "yellowtop" or "crawfish weed" is found in most places, and is said by farmers to indicate a poor grade of bottom land.

But a very small portion of the Bibb silt loam is under cultivation, and this is confined to patches along the larger creeks. The type is devoted chiefly to the production of lespedeza and Bermuda grass for pasturage and hay. These grasses give two cuttings in the average year, and yield 1 to 1½ tons of hay per acre. Corn and cotton produce fair yields in favorable years, but it is said that they do not usually fruit well. It is probably that this soil could be most profitably used for growing Bermuda grass or lespedeza as a pasture and hay crop.

Bibb silt loam, heavy phase.—The few small areas mapped as a heavy phase of the Bibb silt loam are really the Bibb clay. They consist of bluish-gray or gray clay, which becomes lighter colored and more plastic with depth. Frequently light-brown mottlings or stains occur in the surface and subsurface layers. This phase occurs in a few small areas in the lower bottoms along the Sabine River, and are known locally as "cypress brakes," because of the growth of cypress and tupelo. Most of the areas are swampy and are covered with water the greater portion of the year.

Bibb silt loam, mound phase.—The mound phase differs from the typical Bibb silt loam chiefly in that it has numerous mounds of lighter textured material scattered over the surface. These mounds are about 2 to 4 feet high, and vary from round to elongated in shape. Most of them are 50 to 75 feet in diameter, and the elongated areas are from one-sixteenth to one-eighth of a mile in length.

The soil on the mounds usually consists of a brown loamy very fine sand, which becomes more yellowish or pale yellowish with increase in depth to about 3 feet, where a bluish-gray fine sandy clay to silty clay, mottled with yellow and nearly impervious in character, is encountered. The intermound soil is in most places typical Bibb

silt loam, though the surface soil may contain considerable very fine sand.

The greater part of this phase occurs in close association with the Bibb silt loam and Bibb very fine sandy loam in the Sabine River bottoms. A few small areas are found along Bayous McDonald, Negreet, and Toro.

The intermound portion of the type is nearly level and poorly drained, water often standing on the surface for the greater part of the rainy season. The surface drainage of the mounds is fairly good, but the internal drainage of the lower subsoil is very slow because of the nearly impervious substratum. The ordinary overflows of the streams do not always cover the highest mounds, but the intermound areas are inundated in all except the driest years.

Practically none of the Bibb silt loam, mound phase, is under cultivation. It supports a dense growth in which post oak, red oak, white oak, water oak, ironwood, holly, and haw are the principal trees. Considerable shortleaf pine often grows on the mounds.

It is probable that most of this soil could be profitably cleared and seeded to Bermuda grass and lespedeza.

SUMMARY.

Sabine Parish is situated on the western border of the State of Louisiana, about halfway between its northern and southern boundaries. It comprises 1,002 square miles, or 641,280 acres.

The topography is for the most part gently rolling to rolling, with surfaces ranging in elevation from 75 feet near the river to 300 feet above sea level on the highest divides.

Most of the parish is drained by the Sabine River and its tributaries. There are very few areas of any size in the upland that do not have adequate surface drainage.

Sabine Parish was created in 1843. Most of the land has come into private ownership through the homestead laws, though large areas were obtained previously by purchase from the Government or by grants from the Spanish Government prior to 1803. The early settlers came chiefly from Mississippi, Alabama, Georgia, and the Carolinas.

The population of the parish in 1920 was 20,713. The most important trading points are Zwolle, Many, Sodus, Converse, Noble, Fisher, and Florien, with populations ranging from 200 to 1,000. Many is the seat of parish government. The most thickly settled parts of the parish lie adjacent to the larger bayous and creeks.

The Kansas City Southern and the Texas & Pacific Railroads traverse the parish. The most important markets for the agricultural products are Shreveport, La., and Beaumont, Tex.

The climate of Sabine Parish is characterized by long, warm summers; short, mild winters; and abundant rainfall. The mean temperature of the summer months is 80.4° F., and of the winter months 47.3° F. The mean annual precipitation is about 46 inches. There is an average growing season of about 225 days. The climate is favorable for a widely diversified system of agriculture.

The present agriculture of the parish consists chiefly of the growing of cotton and corn, combined with the raising of cattle and hogs. Crops of considerable importance are cowpeas, velvet beans, lespedeza, Bermuda grass, sugar cane, and sweet potatoes.

Improved farm land of average quality ranges in price from $15 to $20 an acre and unimproved land from $5 to $12 an acre.

Sabine Parish lies within the Coastal Plain. Its soils are derived from sedimentary material, consisting of beds of sandy clay, clay and sandstone, and limestone.

The Ruston, Caddo, Orangeburg, and Greenville soils all have friable sandy clay subsoils and differ chiefly in the extent of oxidation of their soil material. The subsoils of the last two mentioned are red; those of the other two are more yellowish. The surface soil of the Greenville types is also red. Drainage is not so well established in the Caddo series as in the others. The Ruston, Caddo. Orangeburg, and Greenville are considered fairly good cotton and corn soil, and the Greenville especially is noted for its high productiveness. The very fine sandy loams and fine sandy loams are the dominant types of these series. The Norfolk fine sand is similar to the corresponding types of the Orangeburg and Ruston series, except in color, which is gray in the surface layers and yellowish-gray in the subsoil.

The types in Susquehanna, Kirvin, and Montrose series are characterized by plastic clay subsoils, that of the Kirvin being somewhat less plastic than those of the others. The Kirvin soils also carry numerous ferruginous concretions and rock fragments throughout the soil section, which is not true of the other two series. The Susquehanna soils prevail throughout the upland sections of the parish. The Kirvin are slightly more productive than the Susquehanna, but both are considered fairly good cotton soils. The Montrose fine sandy loam has poorer drainage than the Susquehanna or Kirvin soils.

The Sumter clay, which is derived from limestone, is known to be highly productive for all the staple crops of the region.

The Ochlockonee soils of the first bottoms differ from the Bibb in their darker color and better drainage. The Ochlockonee very fine sandy loam, fine sandy loam, and silt loam are known as three of the most dependable corn soils in the parish. Considerable lespedeza and Bermuda-grass hay is cut from these soils. The Ochlockonee silty

clay loam and clay are not cultivated extensively, chiefly because of the frequency of overflow, their remoteness from railroads, and their heavy texture. The Bibb soils are not considered very well suited to grain or cotton. Some hay is harvested from the silt loam.

Of the terrace soils, the Cahaba, Kalmia, and Bienville are characterized by sandy clay subsoils, brownish to reddish-brown or yellowish-brown subsoils in case of the Cahaba and Bienville, and lighter in case of the Kalmia, which is more poorly drained. These three terrace series are highly esteemed and were among the first soils selected by the early settlers. They give good yields of all the common crops, of which corn and cotton are the most important. The Leaf and Myatt soils, also terrace series, are not very important in the present agriculture of the parish. They are used chiefly for grazing.

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[PUBLIC RESOLUTION—No. 9.]

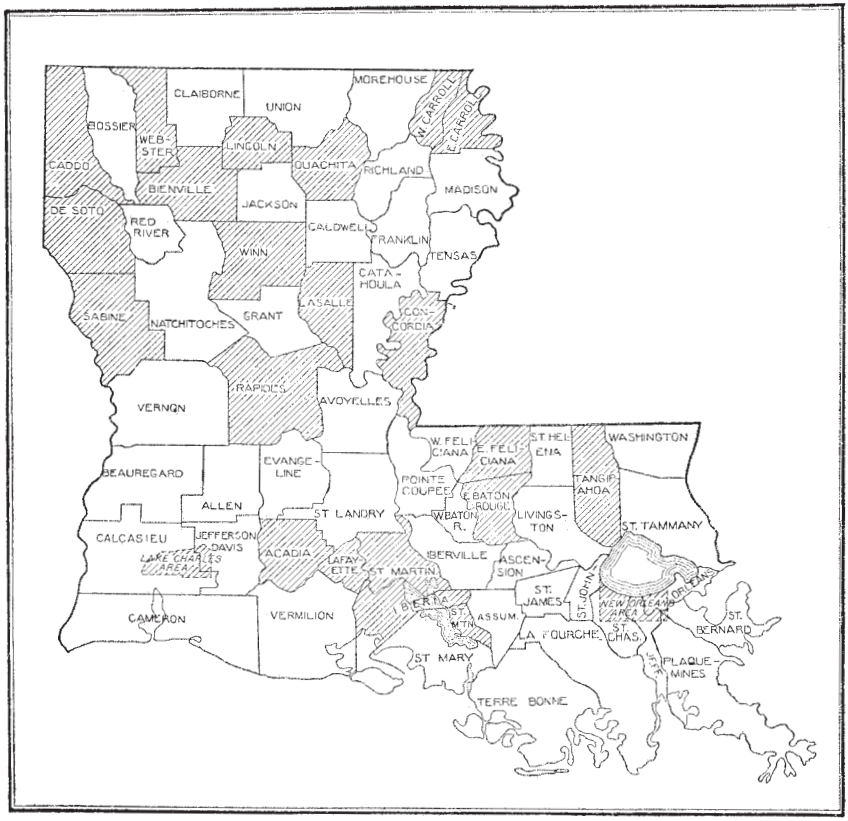
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

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 Louisiana.

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