SOIL SURVEY OF LINCOLN PARISH, LOUISIANA.

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DESCRIPTION OF THE AREA.

Lincoln Parish lies in the shortleaf pine uplands of north-central Louisiana between parallels 32° 26′ and 32° 45′ north latitude. The Louisiana meridian 92° 24′ 15″ west from Greenwich, to which the range of all lands in the State west of the Mississippi River is referred, constitutes the extreme eastern boundary. The parish, which is of

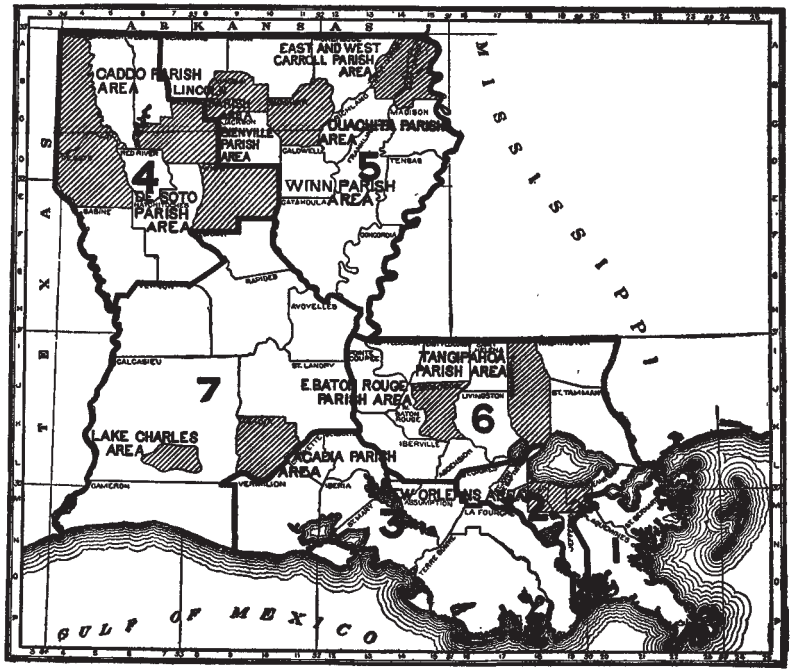

FIG. 30.—Sketch map showing location of the Lincoln Parish area, Louisiana.

irregular shape, extends 27 miles west from this line and has a maximum width north and south of 21 miles. Claiborne and Union parishes separate it from Arkansas on the north, while on the east it is bounded by Union, Ouachita, and Jackson, on the south by Jackson and Bienville, and on the west by Bienville and Claiborne parishes. Each of these parishes except Ouachita contributed terri-

tory to the formation of Lincoln in 1873. In area it comprises about 302,080 acres, or 472 square miles. The base map for this survey was made by actual traverse in the field.

The parish has thorough natural drainage through its many stream courses, which usually have their origin in springs or seepy spots. The main divide winds across the southern part of the parish, sending off a prong southward at about its middle point. The Bayou D'Arbonne flows across the northern part of the parish from west to east and receives the waters of Sugar, Big, and Cypress creeks, tributaries from the southwest. Its main northern branch is Middle Fork, which forms the upper northeast boundary of the parish. About 250 square miles of the parish is drained by this system. Stowe Creek to the east belongs essentially to the D'Arbonne system and drains about 50 square miles. To the south of the main divide and west of its southern prong, about 90 square miles are drained by the headwaters of the Dugdemona River, the streams having a general southeasterly direction. About 75 square miles in the southeastern part of the parish are drained by the Little Choudrant Creek, which flows eastward nearly to the parish line, there joining the Big Choudrant Creek from the south, which soon passes out of the parish. All of the drainage water eventually reaches the Gulf of Mexico through Ouachita River.

As there has been no faulting or folding of the geological formations in this region the topography is due entirely to erosion along the present drainage lines and is similar to that of any much-dissected plain. The divides are comparatively narrow and the level areas small, their topography being undulating to gently rolling, especially in the southwestern and eastern parts of the parish. Though rising in shallow depressed areas the streams rapidly form valleys with rather abrupt and steep slopes and gently sloping floors. This rolling to hilly topography occurs in different parts of the parish, being particularly developed in the northwestern part. Long gentle slopes, having the appearance of second bottoms, frequently occur between the larger stream bottoms and the prominent breaks. Small yet distinct escarpments due to ironstone form a conspicuous feature of the hilly regions. The elevation of the main watershed at Ruston and westward on the Vicksburg, Shreveport and Pacific Railway is something over 300 feet above sea level, and Big Choudrant Creek and Bayou D'Arbonne leave the parish at about the 100-foot level, giving a range of over 200 feet elevation in the parish.

No French settlements were ever made within the limits of Lincoln Parish, a fact probably due to its distance from constantly navigable waters. Neither did the area receive many accessions from the tide of immigration which turned to Texas in the early days, for the routes of travel to that country lay outside the limits of the parish.

Squatters who followed hunting and trapping and preferred to move on as the line of civilization advanced were numerous as late as 1855. It is said that few permanent settlements were made prior to 1832, and during the next three years about fifty entries were made in different parts of the area. The red gravelly uplands were the sites of the early settlements. Up to 1850 most of the land remained vacant, but during the next decade about three-fourths of it was entered.

Native-born Americans from the States to the east, with their slaves, formed the bulk of the early settlers, and the present population is made up largely of their descendants. No rush of immigration to the area has occurred since the civil war, though at times a considerable number of people have moved in from the eastern Gulf States. The population of the parish in 1900 was 15,898, about 57 per cent being white and the remainder colored. Of the entire number over 80 per cent lived on farms. The present rural population is centered chiefly on the higher land of the divides and on the gentle slopes adjacent to stream bottoms, the rougher stretches being but sparsely settled.

In 1883 the Vicksburg, Shreveport and Pacific Railway was continued westward through the southern part of this parish to Shreveport. The Tremont and Gulf Railway, begun as a tramroad about twelve years ago, now extends from the southeastern part of the parish to Winnfield, a distance of more than 40 miles. During the years 1898 and 1899 the Arkansas Southern, since bought by the Rock Island, was built through the middle of the parish from north to south, and a line between Ruston and Farmersville is being projected.

Ruston, at the intersection of the Chicago, Rock Island and Pacific with the Vicksburg, Shreveport and Pacific, is the parish seat and chief town, with a population of about 4,500. Dubach, in the northern part of the parish, on the Chicago, Rock Island and Pacific, and Simsboro and Tremont, on the Vicksburg, Shreveport and Pacific, in the western and eastern parts, respectively, are important sawmill towns. Tremont is also the terminus of the Tremont and Gulf Railway. There are a number of other shipping points, among them being Choudrant, Vienna, and Grambling, which give the area ready access over the lines mentioned and their connections to Monroe and Shreveport, important ports on the Ouachita and Red rivers, to the east and west, respectively, and to New Orleans and the markets of the north. No part of the parish is 12 miles distant from a railroad.

At certain seasons the lower course of the D'Arbonne is navigable to flatboats. In former years much timber was floated out of its adjacent swamps and sent downstream in rafts. About 1874 the channel was cleared of snags as far up as Unionville by federal aid, and steam packets with a capacity of 150 to 200 bales of cotton came

for a brief period each spring up to this point to take cotton, cottonseed stores, and other products to Monroe. This service ceased about ten years ago and there is now little water traffic of any kind within the parish.

The public roads and their connecting settlement roads are sufficiently numerous, and though in fair condition during the summer they would be greatly improved by the use of the drag or other road machinery.

Rural free delivery routes radiating from a half dozen points give excellent service, and rural telephone lines are numerous. Good public schools for both white and colored are conveniently located throughout the parish. A steady effort is being made to improve these schools each year and to increase the length of the school session until a school year of nine months is established. The Louisiana Industrial Institute, a well-equipped state institution for whites, is located at Ruston. It has an enrollment above 500 and is an important factor in the educational facilities of the parish.

CLIMATE.

The climate of the area is warm temperate, the mean annual temperature being about 65° F. The average temperature at Ruston for June, July, and August is 80.8°, and for December, January, and February 47.4°.

Spring may be said to open about the latter part of March. Many peach and plum trees blossom in February and some vegetables are planted before the 20th of that month. Damaging cold snaps sometimes occur in April. According to records kept at Liberty Hill, in Bienville Parish, the average date of the last killing frost in the spring is March 22 and of the first in the fall November 2. For Lincoln Parish, March 25 and October 30 are probably close to the average dates, making the growing season for general crops more than seven months.

Three inches of snowfall is rare and some years there is but a trace; freezing weather lasts but a few days at most. Occasionally there are damaging hailstorms. The high relative humidity emphasizes both extremes of temperature.

The rainfall is ample and is fairly well distributed throughout the year. According to records kept at Ruston the average annual rainfall is about 53 inches. It is seldom less than 2 inches during any month of the growing season, and the total from March to October, inclusive, varies from 31 to 41 inches. Serious droughts are rare, the danger being rather from an excess of rainfall. The overflowing of bottom lands during the heavy spring rains sometimes damages crops badly.

Heavy dews and severe thunderstorms are common in the area.

The data given in the appended tables represent fairly well the climatic conditions over the area. The figures for the Liberty Hill station, which lies outside the parish, are inserted because they are based upon records covering a longer period of years than the Ruston records.

Normal monthly and annual temperature and precipitation.

Month.	Ruston.		Liberty Hill.	
	Temperature.	Precipitation.	Temperature.	Precipitation.
	°F.	Inches.	°F.	Inches.
January	46.1	4.50	48.2	4.69
February	48.0	4.70	49.7	4.02
March	59.5	6.20	58.4	5.64
April	63.7	4.77	65.7	4.61
May	72.2	3.43	73.0	3.65
June	79.3	3.70	79.8	4.87
July	82.0	5.52	82.3	5.01
August	81.1	5.85	82.3	2.72
September	78.6	3.22	76.8	3.01
October	66.4	3.01	66.1	3.03
November	56.7	4.37	56.2	4.46
December	48.0	4.42	49.5	4.85
Year	65.1	53.69	65.7	50.56

Dates of first and last killing frosts.

Year.	Liberty Hill.		Ruston.		Year.	Liberty Hill.		Ruston.	
	Last in spring.	First in fall.	Last in spring.	First in fall.		Last in spring.	First in fall.	Last in spring.	First in fall.
1898	Apr. 7	Oct. 27	.....	.....	1904	Mar. 28	Nov. 11	.....	.....
1899	Mar. 29	Nov. 3	.....	.....	1906	Apr. 1	Oct. 29	.....	Nov. 13
1900	Apr. 1	Nov. 10	.....	.....	1907	Feb. 16	Oct. 14	Feb. 15	Nov. 12
1901	Apr. 3	Nov. 6	.....	.....	1908	Feb. 27	Oct. 24	Feb. 27	Oct. 24
1902	Mar. 6	Nov. 27	.....	.....	Average	Mar. 22	Nov. 2	.....	.....
1903	Mar. 25	Oct. 19	.....	.....					

AGRICULTURE.

The ridges of "red gravelly land" to the south of Bayou D'Arbonne were the first to be brought under cultivation by the early settlers about 1835, but prior to this the Indians had crudely tilled small patches of low-lying land.

The land supported a forest growth of pine and hardwood and a dense undergrowth of wild pea vines and grass. Switch cane abounded in the bottoms and on the adjacent high sides. The early planters coming from the East with their slaves erected log houses and out-

buildings, deadened the timber, and prepared the land for crops. Cotton from the first was the main crop. Corn, tobacco, fruit, and vegetables were raised for home use. The cultivated fields were fenced and the large number of cattle and hogs were allowed the full use of cane pastures and abundant mast.

Cotton, the main money crop and only product for which there was a ready market, was hauled by oxen to Trenton, 45 miles east, near the present town of Monroe, on the Ouachita River. The surplus stock were driven to Trenton for sale. Ten days or more were usually required to make the trip, which made marketing costly and tedious. Sheep were raised and the wool utilized for homespun clothing. Cowpeas, pumpkins, and watermelons were grown in the corn in the early days and the hogs when brought off the mast were finished on the cornstalks and cowpeas. Each plantation was self-supporting and considerable wealth was accumulated by many of the planters.

It is estimated that one-third of the parish was cleared prior to the civil war and that three-fourths of the land had been taken up between 1850 and 1860. Some of the land was held under certificates of entry and bore no taxes. There is no public land at present in the parish, and fewer than 1,000 acres are held under certificates.

During the war, owing to lack of markets, the production of cotton declined greatly. The corn acreage was much increased and wheat was grown and utilized largely in the parish. At the close of the war and under changed conditions cotton production again assumed first importance, wheat was abandoned, and within a few years oats and cane became general farm crops. The tenant system became firmly established and still exists to a considerable extent.

The value of extensive pine and oak forests was not realized until much timber had been deadened and destroyed to make room for the plow. Twenty years ago lumbering began near some of the streams and about ten years ago outside interests began to purchase the standing timber and in many cases the land itself. Much of the cleared land has remained idle and now supports a good second growth of pine. This has been the case particularly with the land abandoned after the war. The coming of the Vicksburg, Shreveport and Pacific Railway in 1884 gave new life to all agricultural pursuits.

The King and Triumph are the varieties of cotton commonly grown, but the former is perhaps more popular, particularly for the red soils. Land is broken to a depth of 3 to 6 inches for cotton about March 1 and about March 20 the rows are laid off from 4 to 5 feet apart with the turning plow, or preferably with a double plow just coming into use, known as a "middle-buster," which opens up a furrow to the plow level. Rows are seldom laid out straight across a field, but run with the contour of the land. Into the open furrow the fertilizer is placed either by hand or small implements. Then the land is "bedded

up" by running two or three furrows on each side of the original one with the small turning shovel, throwing the dirt each time into the original furrow. The leveling is done by dragging a board or other implement over the top which is 4 or 5 inches above the middle and from 18 to 24 inches wide. Between April 5 and May 1 the seed, which is obtained without special selection, is thickly planted to a depth of 1 to 2 inches. Cotton planters which do this whole process are in common use among landowners. Shortly after the plants appear the rows are "barred off" with a half shovel, which throws the dirt away from the row, leaving a narrow ridge. The cotton is then "chopped" or thinned with the ordinary hoe, leaving the plants at the distance desired, usually about 8 to 10 inches apart. Cultivation then begins with the heel sweep, a sharp-pointed implement with wings of various lengths. This throws the dirt both into the cotton row and into the middle, covering up weeds. It is customary to give the crop three such cultivations, using 8-inch, 16-inch, and 24-inch sweeps, respectively. By this process dirt is thrown in the middle as well as in the rows, so that it is necessary to use the "middle-buster" before repeating the operation. The crop is usually "laid by" about the middle of July and needs no further attention unless weeds appear. Very clean cultivation is practiced with this crop. Cotton picking begins in August and lasts throughout the fall. The cotton is usually ginned as fast as picked.

Corn is cultivated quite similarly to cotton. When it follows cotton the dried stalks are broken usually in February and the "middle-buster" is run in the old cotton row. The fertilizer is put in the furrow and a list formed by plowing two furrows into the opening. Corn is planted in the lists, which are about 4 to 5 feet apart, and it is dropped either by hand or with a planter 18 to 24 inches apart in the row. The check system is unknown. After the plants are up the rows are "barred off" deeply and the subsequent cultivation is much like that given to cotton. It is claimed that 10 furrows are required to each row of corn. At the last cultivation of corn it is the general custom to plant cowpeas in the middle or near the row. Pulling the leaves for fodder has been almost abandoned. Corn is always pulled and stored unhusked. The corn weevil destroys an enormous amount of grain. This pest can be exterminated by the use of carbon bisulphid. The Rogers corn seems to be the most popular variety grown, usually producing two ears to the stalk. The ear is small and the grain smooth, creamy, and somewhat flinty. The vitality of seed corn is never a problem here and germination can always be depended on. Strange to say, there has been but little work done in corn breeding in this parish or in the State.

There seems to be a great variation in the number of ears on the stalks of the native corn, ranging in the same field from barren

stalks to stalks starting 8 ears, none of which would probably be worth pulling. This is due to inherent tendencies in the plant and to nutrition, and as a supply of plant food is controlled to some extent at least by the farmer, it seems entirely practicable to improve both the individual ear and the yield by actual breeding from selections on the farm. When the rainfall is well distributed throughout the growing season the highest yields are made, but usually there is an excess during the growing months which damages the crop considerably, and a short drought in midsummer is likely also to curtail the production seriously. Enough corn for home consumption should always be produced on the farms. Proper methods of drainage and conservation of moisture in corn culture will do much to increase the supply.

The oat crop could be made a most profitable one in this parish. The following method of culture is that used by Mr. J. C. Calhoun, who is a recognized authority on oat production in this part of the State. He follows corn with oats, as is the general practice. As soon as the corn is gathered in September the stalks are cut and a fertilizer compound of 1,250 pounds of cotton-seed meal and 1,000 pounds of acid phosphate is sown broadcast at the rate of 400 pounds to the acre. About the 15th of October, 2 bushels of oats to the acre are sown by hand and plowed in with small turning plows, after which the field is leveled with a drag. In about one month the oats are up sufficiently for pasture, which can be used without injury until the last of February. On heavy land, however, the tramping of stock in wet times is likely to impair the physical condition of the soil. A top dressing of 50 pounds of nitrate of soda to the acre is given in the spring and the crop is harvested in June.

Mr. Calhoun owns the only thrasher in the parish, and though he sells most of his crop for seed, he can not begin to satisfy the demand. His yields average 40 bushels to the acre and frequently reach 50 bushels. He has kept his own seed of Texas red rustproof oats for fifteen years, but selects it by the vigorous use of the fanning mill. It is customary throughout the area to feed this crop in the bundle. One of the salient points in successful oat production is early sowing.

The disk drill with fertilizer attachment is seldom used, but it is believed that this as well as deeper plowing would aid materially in increasing the average yield throughout the parish.

Cowpeas have been grown since the early days, but as a soil renovator only for about ten years. They are quite commonly grown now in corn. As a hay crop they most frequently follow oats. The oat stubble is plowed up and the peas sown broadcast with 150 pounds of meal to the acre. The Whippoorwill variety is invariably grown. The crop can be cut in August or September and yields about 1½ tons of hay per acre. Occasionally the peas are planted in rows

and cultivated, but none are planted with the drill, which method is urgently advised. It has been noticed in a great many fields of cowpeas that the surface of the ground was very cloddy. A good crop can not be expected under such circumstances. A roller or suitable drag would be very effective in breaking up surface clods. Peas for seed are usually picked by hand in the cornfield catch crops, but now that there is a successful pea and oat thrasher combined it seems that these two crops should be more extensively grown than formerly. Cowpeas grown after oats, however, can hardly be depended on to mature a seed crop. Cowpeas are without doubt a valuable legume in this region and should be an important crop on every farm.

The crops above described complete the best rotation for all soils of this locality. Cotton followed by corn, with peas planted at last cultivation of the corn, and then oats followed by cowpeas gives four harvest crops, and also some pasture crops, in a period of three years. This rotation can be varied in many respects. The acreage of cotton may be reduced and potatoes planted on part of the land. Other crops, such as sugar cane, peanuts, lespedeza, clover, and rye, may be included, but in general the rotation mentioned will give very satisfactory results.

Irish potato production for market is rapidly assuming importance. Potatoes of the Triumph variety are planted about the middle of February and are ready for market in May. The potato beetle has worked but little injury so far, and the plants seem to be free from blight. In 1909 the yields ranged from 40 to 75 bushels of marketable potatoes, and, including the smaller tubers, from 80 to 125 bushels to the acre. St. Louis is usually the outside market. In May the potato land may be replanted to sweet potatoes or corn, or in June to cowpeas, or to another crop of Irish potatoes in July. The second crop of Irish potatoes is dug in late October, and the land can then be sown to rye or oats for winter pasture.

At present prices the potato crops bid fair to become more general and should be encouraged as a money crop in properly arranged rotations. Of sweet potatoes the vineless yam seems to be the most generally grown. This variety yields approximately 200 bushels to the acre. It is not grown for shipment, however, and no effort seems to have been made to discover the best early potato to suit the northern market. The potato industry can no doubt be made very profitable on the sandy land.

Ribbon sugar cane is one of the first crops planted in the spring. Bottom land is most frequently used for this crop, as it requires more moisture in the soil for its successful culture than is generally found in the sandy uplands. A yield of 200 gallons of sirup per acre, the standard price of which is 50 cents a gallon, is usually obtained. On

2 acres, fertilized with 1,000 pounds of cotton-seed meal to the acre, a yield of 550 gallons was reported. A sirup of better quality, though not commanding a higher price, is produced on the upland. The yields, however, are usually smaller and more or less uncertain. Some sorghum is grown, and this crop could be utilized much more extensively as a source of forage.

Peanuts have been raised for hog feed for a considerable time, and at present there is a movement to grow the Spanish variety as a money crop. The success of this movement will depend more upon the number who become interested than upon the soils, several of which are well adapted to the crop.

Market gardening was tried a few years ago, but through lack of knowledge of the requirements of the market it was not a success. All garden truck, however, does exceedingly well, and its production on a commercial scale should prove profitable if market conditions be well understood.

Fruit is not raised for shipment to any extent. Peaches are grown on nearly every upland type of soil in the parish and seem to do well, particularly on ridges of the red land. The Elberta and Greensboro are the varieties commonly grown. It is said that the trees are comparatively short lived and that a crop is secured about every third year. Apples are produced to some extent, but the yields are not sufficiently encouraging to warrant commercial production. Some of the red gravelly lands seem exceptionally well adapted to the culture of grapes. The pear suffers severely from blight. One orchard of pecans has been set out in the parish. The few large trees seen yield a very profitable crop of nuts. Figs are grown extensively for home use. Excepting blackberries, which grow wild in abundance, and strawberries, small fruits are not grown to any extent. There are no canning factories in the parish, though the canning of vegetables and fruits as a home industry is firmly established. Tomatoes, peas, beans, okra, blackberries, peaches, pears, and plums are put up by individuals to be consumed at home and sold in local markets. A ready market could no doubt be found also for jelly made from the mayhaw berries, which grow abundantly in the swamps, and for fig conserve, which could be put on the market cheaply and at a fair profit.

Of grasses suitable for hay and pasture the most important are Bermuda grass, Louisiana or carpet grass, and lespedeza. For permanent pasture in this region Bermuda grass is unequaled, and on the best lands it can be cut for hay with a yield of 1 ton to the acre. The Louisiana grass, which seldom grows high enough to cut, is also highly prized for pasture, and can be much more easily killed out in fields than can the Bermuda, and it is said will crowd out that grass.

Very little Johnson grass was observed in the parish, it being shunned on account of the difficulty of ridding the fields of it when desired.

Wild grasses are the worst weed pests the farmers have to contend with. Crab grass is the most common and the most difficult to destroy. Cocoa or nut grass occurs only in patches and is seldom killed.

Of the clovers lespedeza is the most common. It covers abandoned fields in a short time and grows along the roads and fence rows. In the branch bottoms it grows luxuriantly and from 1½ to 2 tons of hay per acre can be cut in a season, making a very valuable and palatable feed. Red clover and white clover were seen growing in spots, but as yet no effort seems to have been made to secure crops or pasture of either. Burr clover is being grown to some extent for winter pasture. In Texas this crop is sown with the Bermuda grass and gives a rich pasture, the clover being available in winter when the Bermuda dies down. Alfalfa has been tried repeatedly, but as often has met with failure because the grass kills it out.

With the grasses and forage crops that are available the prospects for stock raising are most flattering. The presence of the Texas fever tick has so far frustrated all attempts to introduce the better grades of cattle, but through the effective work now being done by the U. S. Department of Agriculture and the state crop pest commission to rid the parish of these ticks it is expected that within a few years pure-bred stock will be introduced and feeding will become more extensive. A Polled Durham herd thrives on the experiment station farm at Calhoun, and this will probably be found to be one of the best breeds for this region. At present most of the blooded cattle are Jerseys or grades of this breed, but the dairy industry has never received attention, aside from supplying the local towns with butter and buttermilk. Milk can be produced very cheaply.

Of hogs the Poland China is the most popular. The cheapness with which pork can be produced would seem to encourage its production for shipment. But few sheep are raised, though conditions in some sections are well suited to grazing. Dogs are more or less troublesome, but this alone should not deter planters from keeping sheep. Poultry raising could be very greatly extended, as there are great possibilities in this industry.

The boll weevil made its first appearance in the parish in 1907, but did little damage until this year (1909), the prospects for a cotton crop being very slight, indeed.[a] Unless the weevil is checked the cotton acreage will be greatly decreased, and this will necessitate the

[a] Information relating to the control and destruction of the boll weevil may be had by addressing the U. S. Department of Agriculture at Washington, D. C., or the State Crop Pest Commission.

cultivation of some other crops. The farmers should, however, have no difficulty in growing other money crops besides cotton.

The use of commercial fertilizers has become quite extensive within the last fifteen years. A great many farmers make their own mixtures, using cotton-seed meal and acid phosphate principally. Some raw cotton seed is also used as fertilizer. The commercial fertilizer generally sold is a 10–2–2 grade, which costs $23 a ton. By practicing more scientific methods of farm management a great saving in the expenditure for fertilizers could be made. So far as known, no one in the parish has run test plots to determine the amounts of the different fertilizers which give the most economical gains. It is recognized, however, that barnyard manure gives the greatest increases in yield and that its effects are more lasting. The supply is, however, entirely inadequate.

The clean tillage given cotton year after year on the same land has caused much waste in the soil by erosion and the loss of humus. The growing of more legume crops and the plowing under of more organic matter will greatly increase the productiveness of the soils. All manure should be carefully saved. Oat straw and cornstalks can be advantageously used as absorbents, the coarser material being better because it does not rot as rapidly. But manure alone puts very little humus in the soil. Crops of cowpeas, oats, rye, or clover, plowed in green, are necessary to increase the organic-matter content, and these should be used whenever possible.

With sufficient organic matter in the soil washing and erosion will be much lessened, more water will be absorbed and retained by the soil, and there will be less injury from drought. The success of agriculture in Lincoln Parish hinges principally upon the maintenance of humus in the soil.

Deep fall plowing and the use of cover crops is also advised in most cases. The disk plow and drills could be used to great advantage. Putting the small branch bottoms and the lower part of the adjacent hills in permanent pasture will check the tendency to wash and gully. Underdrainage is also required in many of the low-lying areas.

The value of farm lands ranges from $5 to $30 an acre. Just now land prices are somewhat unsettled because of the appearance of the boll weevil.

About 75 per cent of the hired laborers employed on farms are colored, the remainder being native whites. Laborers are commonly engaged for six or twelve months. Current wages range from $10 to $18 a month with board, an exceptionally good man receiving sometimes $20 or more. Married men are furnished cabins and fuel. Day wages range from 75 cents to $1 with board. In normal cotton years there has been a demand for labor at least 25 per cent in excess

of the supply. This condition has been intensified by the competition of the sawmills, where wages reach $2 a day. At present there is no scarcity of farm help, the number of wage hands being considerably reduced on account of the damage done by the boll weevil.

Two tenant systems are followed. The share tenant is commonly furnished stock, seed, tools, a house, and a garden patch. All crops except garden truck are divided equally and each party to the agreement pays for half the fertilizer. Under this system the landlord frequently extends the tenant credit for necessaries to a stipulated amount, or he advances him so much cash at 8 or 10 per cent per annum with which to buy his supplies. Usually the cash advanced or store account is settled with cotton proceeds.

Under the renting system, which is the more common, the landlord gets one-third of the corn and one-fourth of the cotton. The renter furnishes his entire equipment except land and house. The fertilizer bill is borne in proportion to the share of the crops each party receives. In 1900, according to the Twelfth Census, the number of farms in this parish was 2,213, and the average size of farms 111[a] acres.

SOILS.

Lincoln Parish lies wholly within the Gulf Coastal Plain, which during the Mississippi embayment formed the floor of the Gulf of Mexico and received extensive sedimentary deposits. Upon withdrawal of the sea these have remained largely unconsolidated and consist of interbedded fine sands, fine sandy clays, and clays which make up the Lower Claiborne formation of Middle Eocene Tertiary age. Iron concretions and ironstone of different kinds have been formed in this material and have contributed to the soil formation. More recent but somewhat similar material has been deposited as the Port Hudson formation, Cockfield beds, and Lafayette sands.

Except for the wide alluvial bottoms the soils of the parish are sedimentary, being derived by direct weathering of the above-named formations. Subsequent washing and the removal in suspension of finer earth particles has greatly influenced the texture of the surface soil. Drainage and oxidation have exerted a powerful influence upon the characteristics of the soils, and erosion has been the chief factor in exposing the various strata of material and determining the location of each distinct soil type.

As might be expected, fine sand and clay are the chief soil components. These have been so arranged and so influenced by coloration and other characteristics that thirteen types besides Meadow have been recognized and mapped in this parish. Except as to texture,

[a] The census classified each tenancy as a farm. The average size of individual holdings is probably considerably larger than 111 acres.

some of these have characteristics in common and accordingly are grouped into series.

There are four such series the soils of which are common to the Coastal Plain province. The Norfolk, with gray soil and yellow subsoil, the Orangeburg, with gray soil and reddish subsoil, the Susquehanna, with gray soil and red heavy subsoil, and the Greenville, with red soil and subsoil, are all found on the uplands.

In addition to the soils grouped in series the map shows the Ruston fine sandy loam, which has some of the characteristics of several series and therefore can not be included in any one; the Caddo fine sandy loam, a type found in limited areas on the lowlands between the flood plains and hills, and Meadow, which includes variable material found in the stream bottoms.

The following table gives the name and extent of each soil type mapped in Lincoln Parish:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Greenville gravelly sandy loam	116,288	38.5	Susquehanna clay	1,024	0.3
Ruston fine sandy loam	75,008	24.8	Ruston sand	1,024	.3
Meadow	46,208	15.3	Norfolk fine sand	896	.3
Orangeburg fine sand	30,208	10.0	Greenville fine sandy loam	640	.2
Susquehanna fine sandy loam	19,584	6.5	Bienville fine sandy loam	448	.2
Orangeburg fine sandy loam	3,968	1.3	Greenville loam	320	.1
Susquehanna gravelly loam	3,328	1.1	Total	302,080	.....
Caddo fine sandy loam	3,136	1.1			

RUSTON FINE SANDY LOAM.

The Ruston fine sandy loam is a rather variable type of soil. It partakes of some characteristics of both the Norfolk and Orangeburg series, though it includes material that does not conform to either. The soil is a gray fine sandy loam or loamy fine sand of a fairly uniform depth of 20 inches, though this may vary from 10 to 24 inches over small areas. The subsurface soil from 8 to 20 inches is usually lighter in color than the immediate surface and has a distinct yellowish tinge. The subsoil from 20 to 36 inches consists of buff or reddish-yellow fine sandy clay loam, which usually becomes lighter colored with depth, and at about 30 inches is often somewhat mottled with yellow and brown iron stains. Variations to a loam and rather plastic clay loam occur. The typical material is not plastic or tenacious but of rather open structure. When dry it becomes quite hard, but mellows down with a slight application of water. It is not so heavy or close structured as the Norfolk soils and more so than the Orangeburg.

This type is extensively developed over the parish. Large and continuous areas occur in the locality of Simsboro and Hico, and smaller, somewhat isolated areas occur throughout the parish. It occupies the main divides and the low-lying approaches to stream bottoms. The highlands are nearly level, except where dissected by the heads of branches which impart a gently rolling topography. From the true uplands to the bottoms there is frequently a long gentle slope somewhat broken by small draws. The surface soil in this location is a rather dark yellow color. The drainage is usually good, but on some of the more level tracts and near the depressions, which are the heads of branches, underdrainage would contribute much toward the ultimate improvement of the soil. It stands drought only fairly well, for crops are seriously injured by dry spells of three weeks' duration. In the vicinity of draws this type is subject to more or less severe erosion and the fields are scarred with gullies.

The origin and process of formation of the Ruston fine sandy loam is not definitely understood. It probably represents material of the Lafayette deposition which, though originally homogeneous, has been subjected to washing and weathering, with the result that most of the finer particles have been removed from the surface and the sand grains have been concentrated to form the soil. It has been suggested that the low-lying areas are alluvial in origin, but from the character of the material this seems highly improbable. It seems to be formed of the same kind of material as the upland areas and was probably deposited in the valleys as they existed at that time and that to-day have the appearance of second bottoms. Varying degrees of oxidation in the subsoil give rise to the different shades of color, the areas of most complete oxidation being the reddest.

The type was originally forested with shortleaf pine and oak, but owing to the ease with which it can be worked a large proportion of it has been placed under cultivation and much new land is continually being cleared. It is devoted to corn and cotton and other crops such as cane, sorghum, peanuts, cowpeas, fruits, and vegetables. Yields of corn and cotton steadily diminish after about five years of cropping, so that the land which at first produced 20 to 25 bushels of corn per acre now produces only 10 to 15 bushels. Cotton yields from one-fourth to one-half bale per acre. The yield of cane sirup seldom exceeds 175 gallons, but the quality is exceedingly good. This is not considered a safe crop, however, because of the likelihood of drought. Cowpeas yield approximately 10 bushels of peas per acre and 1 to 1½ tons of hay. The yields of peanuts and oats are seldom determined. Vegetables are grown for home consumption, and the few peach orchards seen were in a thrifty condition.

This soil is not so well adapted to corn as to cotton. It offers natural advantages in controlling the boll weevil. It is best suited

to market gardening and cowpeas. The soil can be readily improved with proper management, and every effort should be made to incorporate large amounts of organic matter in the soil. Stable manure, where available, and cowpeas offer the best means of doing this. Land of this type can be purchased at prices ranging from $5 to $20 an acre.

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

Mechanical analyses of Rustin 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.*
21098, 21100.....	Soil.....	0.1	0.4	1.7	54.4	18.3	19.7	5.3
21099, 21101.....	Subsoil.....	.0	.2	1.1	37.1	10.6	18.1	32.6

GREENVILLE GRAVELLY SANDY LOAM.

The Greenville gravelly sandy loam consists of 8 to 12 inches of red, grayish-red, or reddish-gray fine sandy loam, underlain to a depth of 36 inches by red, or occasionally yellowish-red, fine sandy clay loam. Throughout the soil and subsoil is a large quantity of ironstone, the fragments varying in size from fine gravel to large stones, with those of the size of a pea to that of a hickory nut greatly predominating. Upon a freshly plowed field the gravel is not so conspicuous on the surface, but the fine earth is rapidly removed and the gravel may then cover as much as 60 per cent of the surface. In certain localities the fragments are numerous enough to hinder cultivation and must be removed, but areas where this is the case are usually small. The soil as a rule is easily tilled, though there are areas, particularly where the surface soil is red, which are heavier than the areas with grayish soil, and here the surface is likely to become quite compact and hare after rains.

This is the predominating soil type of the parish. The largest areas occur in the northwestern part of the parish within the drainage system of the Bayou D'Arbonne, though it is quite extensively developed along Dugdemona River and Little Choudrant Creek in the southern portion. In these areas the type is rolling to hilly, occupying narrow ridges and moderately steep-sided ravines. Drainage is therefore always well developed and in many places is excessive. As a whole the type is quite subject to erosion and where not carefully managed is seriously damaged by gullies. Drainage is sometimes effected by means of hillside ditches running parallel with the adjacent water course and emptying into a gully which joins the main outlet. This method is used in order to prevent the washing

away of soil material at times of heavy rains. Terracing is not practiced as generally as it should be.

The agricultural value of this type depends very much upon the topography. The more level tracts are very easily cultivated, the stones and gravel are not troublesome, and the soil withstands droughts well, while in hilly areas stones are sometimes a hindrance to cultivation, drainage is excessive, and much more expense is necessary to put the land in condition for economical cultivation. The soil is much less uniform in the rolling areas than in the more level sections, for narrow bands of Susquehanna gravelly loam, too small to be shown on the map, frequently occur on the slopes.

This type of soil owes its origin to the weathering of the Claiborne formation. The red color is due to the oxidation of the large amount of iron contained and the gravel represents fragments of layers of ironstone and concretions which were formed within the material after deposition. Some of these strata are visible in cuts, and are occasionally encountered in boring with a 36-inch auger.

Notwithstanding some natural disadvantages, this is one of the most important soils of this region. It is locally known as "red gravel land," and is noted throughout this section for its productiveness. It was the first land to be brought under cultivation when the region was settled. There still remains much of it uncleared which could be profitably farmed under careful management. On the more rolling sections pine and different species of oak constitute the tree growth. Corn and cotton are the principal crops grown on this soil. Much of the acreage formerly used for cotton has been given over to corn and potatoes. This soil has withstood the continuous cropping to cotton much better than most of the other types, and, though yields have somewhat decreased, fair crops can still be grown without fertilizers. Cotton formerly yielded one-half to three-fourths bale per acre without fertilizer and corn about 25 bushels. With fertilizers corn yields from 25 to 40 bushels, and yields as high as 50 to 60 bushels have been obtained. Cotton will yield from one-half to 1 bale per acre, Irish potatoes from 75 to 100 bushels, and sweet potatoes about 200 bushels. Oats form a rather important crop on much of this type and yield between 15 and 20 bushels per acre. Under proper culture 40 and 50 bushels per acre may be secured. Cowpeas do well and yield about 15 bushels of seed or 1½ tons of hay to the acre. The yield of peanuts is not accurately determined.

Besides the crops mentioned much of this type is admirably adapted to peaches and to grapes. The ridges, which give good air drainage, should always be chosen for orchards in preference to lower situations.

This soil can be readily improved, and the effect of fertilizers is more lasting than on the sandier land. Deep plowing to produce a deep seed bed and the incorporation of as much organic matter as possible are strongly urged to prevent washing as well as to increase the productiveness.

Land of this type of soil is valued at $10 to $30 an acre, depending upon improvements and location.

The average results of mechanical analyses of fine-earth samples of the Greenville gravelly sandy loam are given in the following table:

Mechanical analyses of Greenville gravelly 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.*
21078, 21080.....	Soil.....	1.1	1.3	1.1	58.2	17.6	13.1	7.2
21079, 21081.....	Subsoil.....	1.1	1.7	1.2	43.7	9.8	16.1	26.3

GREENVILLE FINE SANDY LOAM.

The Greenville fine sandy loam is uniformly a fine sandy loam or loamy fine sand of a rust-red color to the depth of 6 or 8 inches, underlying which is a darker red clay loam subsoil. The sand grains of the soil are about the finest of fine sand, but there seems to be no tendency toward baking and the material is easily worked. The subsoil though somewhat plastic is yet fairly friable and appears to contain more clay than the analyses show, owing probably to the relatively high content of iron.

A few small iron concretions occur throughout the soil profile, and at a depth of about 28 inches there is usually a thin layer of ferruginous rock which the soil auger will not penetrate. Some yellow ocherous material immediately overlies this consolidated stratum.

This type is developed in but a few small and isolated areas, those in the vicinity of Vienna being the most prominent. It occupies narrow but nearly level ridges and is usually surrounded by the Greenville gravelly sandy loam, which type is developed wherever the ironstone stratum above mentioned is exposed through erosion. The position of the Greenville fine sandy loam insures thorough natural drainage without causing much washing or gullying. It might be supposed that the ironstone stratum would act as a hardpan to hold an excessive amount of moisture in the upper part of the soil, but such seems not to be the case. The crops withstand wet and dry weather remarkably well.

Nearly all of this type of soil has been under cultivation for a considerable period and is justly considered the most desirable soil in the parish. Corn gives an average yield of 27 bushels per acre

without fertilizers, and 50 bushels have been secured where fertilizers were used. Before the advent of the boll weevil two-thirds bale of cotton per acre was regularly produced and much higher yields obtained in some instances. The yield of oats ranges from 30 to 50 bushels per acre, where proper methods of culture are followed.

Land of this type can be purchased at $20 to $24 an acre at the present time.

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

Mechanical analyses of Greenville 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.*
21082	Soil	0.2	0.7	1.0	58.0	10.5	24.2	5.2
21083	Subsoil	.6	.9	1.1	37.3	7.2	23.8	29.1

GREENVILLE LOAM.

The Greenville loam, to a depth of about 6 inches, is a red, heavy silt loam or clayey loam beneath which the subsoil, to a depth of 36 inches, is a red clay somewhat plastic and tenacious. The subsoil is considerably darker than the soil. From 20 to 60 per cent of the surface is covered with small ironstone fragments, and these are also scattered throughout the soil and subsoil in great abundance.

Only a few isolated areas of this type occur in the parish, many of these being too small to be shown on the map. It is developed in areas of Greenville gravelly sandy loam which have been subjected to washing, and owing to its quite rolling topography most of the sandy surface material has been removed, leaving a heavy surface soil.

This is considered a strong soil, but is more difficult to work than the Greenville gravelly sandy loam. It is mostly under cultivation, but as the fields are small no satisfactory data as to crop yields can, be given. It should be well adapted to grape culture. In the general cultivation of the type careful methods should be employed to prevent the soil from washing.

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

Mechanical analyses of Greenville 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.*
21084	Soil	2.6	4.0	3.7	28.5	17.8	26.3	17.1
21085	Subsoil	3.2	3.7	2.8	16.0	11.6	20.1	42.5

ORANGEBURG FINE SANDY LOAM.

The soil of the Orangeburg fine sandy loam is a gray and reddish-gray, rather loose-structured, fine sandy loam from 6 to 15 inches in depth. Beneath this and with a fairly sharp line of demarcation is the red subsoil, which is a heavy fine sandy loam in the upper portion, but becomes heavier with depth until it is a friable, fine sandy clay loam. It is seldom plastic or tenacious. Over a freshly plowed field the surface appears mottled with gray and red spots where some of the subsoil is turned up.

This type occurs as isolated areas scattered promiscuously over the parish, the largest area being in the southwestern part. It is usually associated with Greenville gravelly sandy loam, and occurs on ridges immediately around that type. It is sometimes associated with the Greenville fine sandy loam, small spots of which, as well as of Ruston fine sandy loam, occur within its boundaries. Sometimes small quantities of gravel are found upon the surface or as a stratum in the subsoil. It probably owes its origin to a mixture of the material which forms the Ruston fine sandy loam and that which constitutes the Greenville soils.

Most of this type is under cultivation. Because of its easy tillage, good drainage, rather level topography, and productiveness this is one of the desirable soils of the area. It is considered better than the Ruston fine sandy loam, though not so good as the Greenville fine sandy loam. Corn yields from 15 to 25 bushels per acre and cotton about three-fourths of a bale under favorable conditions. This is a favorite soil for peaches and fruits, to which it is well adapted.

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

Mechanical analyses of Orangeburg 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.*
21096	Soil	0.0	0.9	1.1	34.0	40.5	18.3	4.7
21097	Subsoil	.0	.4	.6	29.5	26.4	25.2	17.8

ORANGEBURG FINE SAND.

The Orangeburg fine sand, commonly known as deep sandy land, consists of gray to almost white fine sand or loamy fine sand having an average depth of 20 inches, underlain by a reddish subsoil which is a fine sandy loam for a few inches but gradually becomes heavier with depth until at 36 inches it is a red, fine sandy clay loam containing considerable silt. The soil is loose structured and very easily worked and quite typical of the Orangeburg fine sand as found in other surveys, but the subsoil is not quite so red as that of the Orange-

burg fine sand of the eastern Gulf States and the texture is possibly somewhat lighter than in these more eastern areas.

The type is extensively developed in the eastern extremity of the parish and occurs to some extent in other parts. It occupies portions of the main divides and is characterized by rather gently rolling topography made up of the upper courses of streams and small dunelike knobs and ridges on which small spots of Norfolk fine sand, too small to be separated, frequently occur. Its position assures thorough drainage, which in some cases is even excessive. The type is subject to more or less severe erosion, and gullies are sometimes formed. It is derived from the Lafayette mantle of fine sand or some similar deposit. Its rather light and loose structure has been conducive to oxidation, and hence the red color of the subsoil. Much of the finer material in the top soil has been removed by washing and only sand grains left to form the surface. Its ease of cultivation and elevation have made this type a desirable soil, and nearly all of it is under cultivation.

Cotton and corn have been the principal products, the cotton being the leading crop because the soil is much better adapted to it than to corn, though owing to the presence of the boll weevil in recent years much of the acreage formerly devoted to cotton has been planted in corn and peanuts. Cotton production, however, can probably be continued on this soil in spite of the boll weevil, for it offers advantages for the control of the insect in the scarcity of adjacent woods and in the hot surface sand.

Peanuts and all truck crops are grown with good success. Truck crops could be made very profitable on this type of soil. In former days this was considered the best soil for the production of tobacco, and if that industry should be revived it is probable that this type will be recognized as one of the best soils for the culture of this crop. It is also well adapted to the peach and plum.

The soil is badly in need of more organic matter, and applications of manure result in greatly increased crop yields. Corn yields from 10 to 20 bushels and cotton one-fourth to one-half bale per acre, though much larger yields of both of these staples have been secured and can be secured regularly by good management.

The results of mechanical analyses of the soil and subsoil of the Orangeburg fine sand are given in the following table:

Mechanical analyses of Orangeburg fine sand.

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.*
21092	Soil	0.0	0.3	0.4	63.7	11.4	19.4	4.6
21093	Subsoil	.3	.2	.3	50.4	8.4	19.4	20.7

RUSTON SAND.

The Ruston sand consists of from 8 to 24 inches of light-gray, rather loose and incoherent, medium sand, underlain by red loamy sand, in which the clay content gradually increases with depth until at 36 inches the material is a red rather sticky sandy clay. The sand grains are mostly white quartz, while the clay and silt particles are dark gray in the surface soil and bright red in the subsoil. This is a very easy soil to cultivate, as the particles do not run together as some of the other types nor is there any tendency to bake.

This type occurs in several isolated areas in the northeastern part of the parish, being especially developed in the vicinity of New Hope Church. It occupies high ridges, and except in small spots where the clay comes close to the surface good drainage is insured by the texture of the soil and its elevation. Permanent springs are frequently found within or adjacent to this type.

The Ruston sand represents the accumulations of the coarsest sand particles found in the parish and in some respects apparently marks the position of ancient beaches. When first cleared this soil produces fairly good crops, but as nearly all of it has been under cultivation for a considerable time the yields have greatly declined, owing mainly to the exhaustion of organic matter and to washing. This is not a good corn soil. It is better adapted to cotton, and the boll weevil can be fought more successfully on it than on the other types by shaking the weevil onto the hot sand. It is also an excellent truck soil, but its distance from market in this parish rather discourages that industry. The supply of organic matter should be constantly renewed in this soil in order to maintain satisfactory crop yields.

The following table gives the results of mechanical analyses of the soil and subsoil of the Ruston sand:

Mechanical analyses of Ruston sand.

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.*
21090	Soil	0.0	4.5	25.2	50.6	3.7	11.7	4.1
21091	Subsoil	.0	2.7	22.7	38.5	3.8	18.1	13.7

SUSQUEHANNA FINE SANDY LOAM.

The soil of the Susquehanna fine sandy loam closely resembles the fine sandy loam members of the Orangeburg and Norfolk series and the Ruston fine sandy loam. It varies from dark to light gray in color, according to the amount of organic matter present, which is usually much greater in timbered areas than in cultivated fields. The texture of the soil ranges from fine sandy loam to fine sand and

the depth of top soil from 5 to 20 inches, with an average of about 10 inches. There is an important phase of the type which is more a very fine sandy loam than a fine sandy loam. This is nearly always confined to timbered areas. There is usually a gradation from the sandy surface soil to the subsoil through a stratum from 3 to 5 inches thick of yellowish gray very fine sandy loam. The subsoil is a heavy, very plastic and tenacious red clay to a depth of 18 or 20 inches, at which point the red becomes mottled with dull white, the proportion of which slightly increases to a depth of 36 inches, but the clay frequently gives way to more sandy or loamy material below 30 inches. In some areas the subsoil is characterized by brownish or yellowish color rather than deep red. Small amounts of iron gravel frequently occur on the surface and through the soil, but rarely in the subsoil. While this soil as a rule is easily worked it has a tendency to form a crust and the loss of water by evaporation is relatively great.

This type is distributed over the parish, but is developed principally in the southern part, the largest areas being along the south parish line. For the most part it occupies the more rolling areas along the streams and its extent is usually limited by the character of the topography. On long, gentle slopes or gently rolling areas the type may be quite extensive, but where the valley sides are steeper it is rarely developed in areas of sufficient size to be shown on the map, though patches of it are nearly always present. It occasionally occupies low hills and ridges.

Over most of the type natural drainage is well developed and indeed is likely to be excessive. On the slopes the surface soil is likely to be removed by washing and the subsoil is especially susceptible to erosion, consequently the neglected areas of this soil become badly gullied and almost beyond agricultural use.

The Susquehanna fine sandy loam is derived from fine sand and clay strata of the lower Claiborne formation. The clay stratum is but a few feet in thickness.

It is probable that about one-half of this type is under cultivation. Large areas are still in timber, consisting mostly of post oak, blackjack oak, and shortleaf pine. Like most sandy soils, crop yields on this type for the first four or five years after being put under cultivation are above the average. From 20 to 30 bushels of corn and, before the advent of the boll weevil, from one-half to two-thirds of a bale of cotton per acre are about the yields on newly cleared areas. Upon continued cultivation, however, the yields decrease from year to year until they are practically unremunerative. There are two causes for this decrease—the loss of humus and the natural tendency of the soil to dry out rapidly. Under present conditions the heavy clay subsoil can not be depended upon to store much moisture, for

water does not readily penetrate it, and the crop must receive most of its moisture from the sandy overlying material. These unfavorable conditions can be alleviated by cultivation. Organic matter incorporated in the soil will greatly increase its water-holding power and frequent stirring of the surface will prevent loss of water by evaporation. With attention to these details the crops will withstand periods of drought that under present conditions cause considerable damage.

Shallow plowing is practiced on this type as on the others, but the results are more injurious. Plowing to a depth which would turn up and mix with the surface sand the very fine sand and silt which lies immediately above the subsoil is most urgently advised. It is doubtful whether the plow would turn up any of the clay subsoil, but crops can be grown which will penetrate this material to some extent.

The growing of cowpeas, rye, and oats as green manuring crops will add greatly to the productiveness of this soil. The heavy subsoil is in some respects a material benefit when it comes to the permanent improvement of the soil, as it prevents the leaching of fertilizers and manures to a great extent.

No place was found where underdrainage had been tried in this type, but it is believed this would be beneficial in promoting a freer movement of air and water in the subsoil, a material now practically impermeable. It is quite possible that the structure of the subsoil would materially change after a few years of subdrainage.

Corn and cotton are the principal crops grown on this type of soil. Inasmuch as oats require a firm seed bed, this soil should be well adapted to this crop, though only a limited acreage is grown. Early maturing truck crops do well, as do also peaches and figs.

Land of this type can be bought at prices ranging from $5 to $25 an acre, the timber being of considerable value in some localities.

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

Mechanical analyses of Susquehanna 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.*
21104	Soil	0.3	0.2	0.2	47.3	26.0	20.3	5.7
21105	Subsoil	.1	.7	.3	9.5	16.1	21.8	51.4

SUSQUEHANNA GRAVELLY LOAM.

The soil of the Susquehanna gravelly loam is a gray or reddish-gray fine sandy loam with a depth varying from 6 to 10 inches. Ordinarily the material is rather loose-structured and easily worked,

but it may be packed hard by heavy rains. From 15 to 20 per cent of the surface soil is composed of small iron fragments, which makes boring difficult. When the type is plowed rains soon wash the finer particles from the immediate surface and expose the gravel, which may occur in sufficient quantities to cover from 40 to 60 per cent of the surface. The subsoil is the characteristic Susquehanna clay, red to a depth of about 24 inches, below which it becomes mottled with light gray or dull white, the proportion of light mottling increasing with depth. At depths slightly greater than 36 inches the texture becomes somewhat lighter.

The type, though of relatively small extent, is of frequent occurrence in the more rolling portions of the parish, particularly in the northwest section. It is nearly always found associated with the Greenville gravelly sandy loam and occupies rather steep slopes or rolling areas. It is derived from a clay stratum in the lower Claiborne formation, the gravel being remnants of ironstone strata which originally occurred in overlying deposits.

No large areas of this type are under cultivation, but many small ones are tilled in the same fields with the Susquehanna fine sandy loam and Greenville fine sandy loam. It is not, however, as good a soil as the Greenville fine sandy loam.

The results of mechanical analyses of the soil and subsoil of the Susquehanna gravelly loam are given in the following table:

Mechanical analyses of Susquehanna gravelly 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.*
21102.....	Soil.....	1.5	2.3	0.6	52.0	15.5	20.8	7.0
21103.....	Subsoil.....	.6	1.0	.5	19.9	3.7	16.2	58.1

SUSQUEHANNA CLAY.

The Susquehanna clay consists of about 4 inches of yellowish-gray very fine sandy loam, underlain by a heavy red clay extending to a depth of about 20 inches. Below this the material is mottled with dull white spots which increase in size with further depth until the mass becomes white mottled with red. The material also becomes much lighter in texture at depths varying from 30 to 45 inches.

But little of this type is found in Lincoln Parish, the largest area being in the southwest part. Other small areas are scattered in different parts of the parish. It occupies rather low-lying areas with gently rolling surface features. The drainage is not the best and the land remains wet for long periods. Roads over this type are almost impassable during wet weather.

The Susquehanna clay is derived from clay strata of the Claiborne formation. None of it was seen under cultivation because of the difficulty in handling it. The subsoil is very tenacious and its proximity to the surface makes it almost impossible to plow the land with the implements at hand. At present it supports a growth of shortleaf pine and oaks and is mostly valued for its timber. It will be some time before this type is brought under cultivation, but with the best methods of cultivation it would produce oats and hay.

The following table gives the results of mechanical analyses of the soil and subsoil of the Susquehanna clay:

Mechanical analyses of Susquehanna 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.*
21106	Soil	1.6	3.1	0.6	10.7	33.0	38.3	12.6
21107	Subsoil	.9	2.9	1.2	6.8	12.1	26.2	50.1

NORFOLK FINE SAND.

The Norfolk fine sand occurs only in a few isolated areas of sufficient size to be shown on the map, though there are numerous other smaller areas associated with the Orangeburg fine sand. The soil, to a depth of about 6 inches, is a light-gray fine sand which, especially in timbered or newly cleared areas, contains an appreciable amount of organic matter. The subsoil is a loose, rather incoherent fine sand of a yellowish cast, reaching to a depth of about 30 inches, at which point it becomes somewhat loamy and has a faint reddish tinge.

The type occurs on high narrow ridges and knobs having a dunelike appearance. Natural drainage is likely to be excessive, though when well worked the material holds moisture during a drought better than would be expected. The soil is derived probably from the Lafayette. Crop yields without fertilizers are small, but by constantly incorporating organic matter much better yields could be obtained.

This soil can most profitably be used for truck crops where conveniently located for markets.

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

Mechanical analyses of Norfolk fine sand.

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.*
21086	Soil	0.0	2.7	10.7	66.2	4.9	11.9	2.9
21087	Subsoil	.0	1.7	10.9	65.4	5.4	11.7	4.1

CADDO FINE SANDY LOAM.

The soil of the Caddo fine sandy loam consists of about 5 to 8 inches of gray, slightly mottled with yellow, very fine sandy loam, which contains a relatively large quantity of silt. The subsoil, extending from 8 to 36 inches, contains slightly more clay and fine sand than the soil and is highly mottled with brownish yellow and gray.

This type of soil is of limited extent. One area of some size which lies east of Dubach occurs as low-lying nearly level land adjacent to the bottoms of Bayou D'Arbonne. Here both soil and subsoil become very compact and almost impervious to water, and locally the type is known as "crawfish land." Besides the few areas mapped there are numerous small areas which were too small to be shown on the map. Very little of the land is under cultivation. Natural drainage is often quite deficient, and to cultivate the soil with success to any extent underdrainage would probably be necessary. If put in proper condition it should produce fairly good yields of cotton, corn, and sugar cane. Strawberries and other small fruits should do well.

BIENVILLE FINE SANDY LOAM.

In certain parts of the bottoms, notably along the Bayou D'Arbonne, south of Dubach, there is an alluvial fine sand, rather loamy, loose structured, and of brownish color, to a depth of 36 inches. This material has been mapped as Bienville fine sandy loam. It is rarely if ever overflowed, and is used largely as pasture, though it could profitably be devoted to truck crops and small fruits.

The following table gives the results of a mechanical analysis of the soil of this type:

Mechanical analysis of Bienville 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.*
21075	Soil	0.4	1.0	2.8	63.4	12.6	12.2	7.2

MEADOW.

The soil mapped as Meadow is somewhat variable in its physical characteristics. In the main, however, it consists of about 10 inches of slightly reddish brown fine-textured loam, underlain by yellowish and light-gray mottled material of somewhat heavier texture. The light-gray spots usually contain a larger percentage of clay than the yellow. The brownish material may be as much as 24 inches in depth, or it may be entirely absent and the surface itself be mottled. In some places the surface soil may have a distinctly red color and in

others almost gray. In texture the type includes variations from a silt loam to fine sandy loam.

Meadow occurs in all parts of the parish as bottom land along the different streams. Except for abandoned channels and large pot holes, both of which are numerous in certain localities, the surface of the bottoms along the larger streams is level and nearly all is subject to overflows. So far as could be learned no dikes or levees have ever been built to keep the overflow from these lands, consequently not very much of the type is under cultivation. Where it lies above overflow it is highly prized for corn and cotton, but is better for corn, as the boll worm is a dangerous pest in moist localities. Sugar cane on some of this land yields 250 gallons of sirup per acre, though it has not the high quality of that produced on some of the lighter upland soils.

The Meadow type has been formed by the accumulation of the silt and finer sand grains washed from the uplands and carried into the swamps, there to be redeposited from the slower moving currents. This process of soil formation is still going on. In certain localities a complete system of dikes and tile drains would give effective drainage, but the present demand for land is not sufficient to warrant such an outlay. Corn yields about 25 bushels per acre on an average, but far exceeds this figure in favorable years. The mayhaw grows abundantly on this type and could be utilized profitably for jelly making.

SUMMARY.

Lincoln Parish lies in the shortleaf pine uplands of north-central Louisiana. It contains 302,080 acres, or about 472 square miles.

Over half of the parish is drained by Bayou D'Arbonne, which flows east across the northern part, while the headwaters of the Dugdemona flow southeast in the southwestern part and the Big Choudrant drains the southeastern part.

The topography is that of a dissected plain having undulating to gently rolling divides and giving way to more rolling and hilly relief toward the mouths of the streams. Gentle slopes, as of second bottoms, occur in places. The bottoms along the larger streams are comparatively wide and level and are frequently covered with overflow water. The range of elevation is over 200 feet. The region has been settled largely by farmers from the eastern Gulf States.

The Vicksburg, Shreveport and Pacific Railway crosses the southern part of the parish, and the Chicago, Rock Island and Pacific runs through its center north and south. Ruston, the parish seat and largest town, lies at the intersection of these roads. Simsboro to the west and Choudrant and Tremont to the east are important lumbering towns. Dubach is an important village in the northern

part. The numerous dirt roads can be greatly improved by properly working them.

Schools and churches are conveniently located throughout the parish and free rural mail delivery and telephone service are enjoyed. The climate and soils are admirably adapted to all crops of the region.

The soils belong to the Coastal Plain province. Fourteen types were recognized, being mostly fine sandy loams and fine sands of the Norfolk, Orangeburg, Susquehanna, and Greenville series. The Greenville gravelly sandy loam is the predominating type.

Cotton and corn are the principal products, but damage by the boll weevil has somewhat discouraged the growing of cotton, and potatoes and peanuts are being substituted on a part of the cotton acreage.

With the eradication of the Texas fever tick it is expected that stock raising will assume considerable importance.

Truck crops can be produced to advantage on a number of the soils.

By incorporating large quantities of organic matter the soils will show marked improvement, the crop yields will be increased, and the tendency of the soils to wash and gully will be greatly lessened. To this end the three-year rotation of cotton, corn with cowpeas planted at last cultivation of corn, followed by oats, and then by a crop of cowpeas, is recommended. Deep plowing and level cultivation of well-drained areas is also advised.

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