SOIL SURVEY OF LEE COUNTY, TEXAS.

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LOCATION AND BOUNDARIES OF THE AREA.

Lee County is situated in the Coastal Plain region of southeastern Texas and is approximately 150 miles from the coast. Meridian 30° west longitude and parallel 29° 20′ north latitude intersect a few miles south of Lexington. The boundaries of the county are irregular, owing to its having been taken piecemeal from the counties sur-

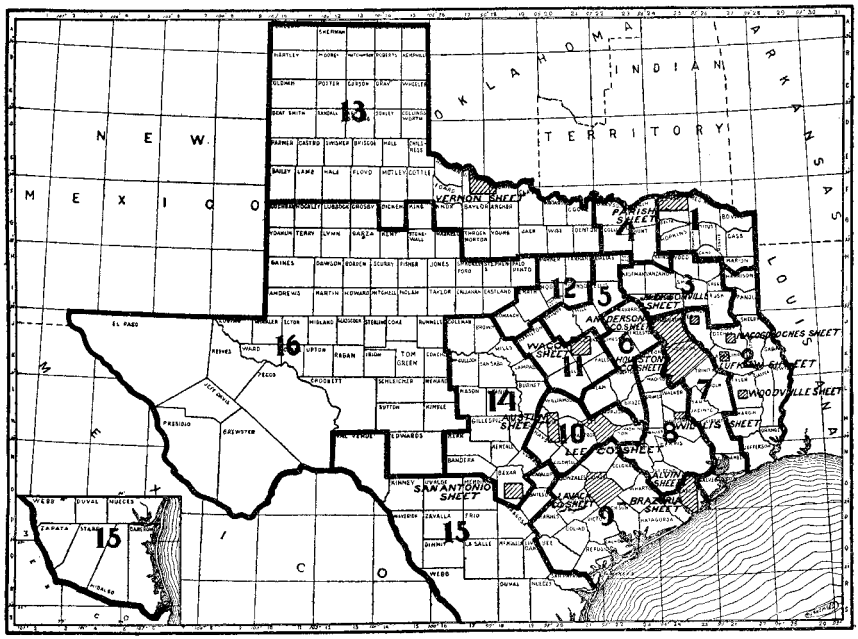

FIG. 24.—Sketch map showing location of the Lee County area, Texas.

rounding it. On the northwest and north it is bounded by Williamson and Milam counties, on the north and east by Burleson County, on the east and south by Washington and Fayette counties, and on the west by Bastrop County.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

The present county of Lee was formed in 1874 from portions of Burleson, Bastrop, Fayette, Washington, Williamson, and Milam counties. The first American settlers came to this section of Texas

some thirty-five years earlier, when trading posts were established on the present sites of Lexington and Lincoln. These were followed thirteen years later by a colony of Germans, who located at Serbin. The population of the country grew slowly till after the civil war, when a number of Bohemians and Germans came in as settlers. Some located near the old German settlement at Serbin, while others selected land at various points in the southern and southeastern part of the county. In 1870 a colony of Danes attempted a settlement in the northern part of the county, but climatic conditions were unfavorable and the colony was broken up. A colony of Bohemians located at Dimebox in 1880, and is in a prosperous condition. Most of the German and Bohemian immigrants make thrifty, prosperous citizens. Practically all the American element of the population came from the Southern States.

When American settlers first came to this part of Texas most of the land was open prairie and was devoted largely to cattle raising, other forms of agricultural pursuits receiving little or no attention. Practically no cotton was produced and very little corn was grown. The prairies were covered with tall grass, on which cattle lived the year round, no other forage being necessary. The growth of chaparral was kept down by the custom of burning the dry grass in the fall and spring. In 1859 there occurred one of those abnormal changes in climate which must always be reckoned with in the Southwest. The land became so parched during this dry year that only a small amount of grass grew on the prairies, and from this time on, the older settlers say, the chaparral gained an ascendancy over the cattle ranges, and the once rich pasture lands became covered with a dense growth of post oak and black jack bushes. The number of cattle that could subsist in the open pasture lands was greatly reduced, and many of the cattlemen were compelled to leave the country in quest of new grazing lands. Those who were so situated as to be unable to move away began to grow cotton and corn. About this time the war came on and much diversification became necessary. Not only cotton and corn, but wheat, oats, and other crops were produced with remarkable success. On the heavy prairie lands it was not unusual to get a yield of 30 bushels of wheat and 80 bushels of oats to the acre, while corn always gave good yields on these soils. After the war the price of cotton rose so high that, in comparison, the production of the grain crops became unprofitable and was abandoned. Besides, the farmers were located so far from markets that the cost of hauling a product of low value scarcely justified the effort.

Prior to 1871 most of the cotton was marketed at Brenham, in Washington County, but during that year the Houston and Texas

Central Railroad was completed through this part of the State, and Giddings became the shipping point for many of the farmers. In 1889 the main line of the San Antonio and Aransas Pass Railway, connecting Waco and San Antonio, was built through this county, thus giving the farmers an outlet to the north.

The boll weevil has been the only severe pest the farmers have had in this area. The last good crop of cotton was produced in 1899. Since then the crop has been reduced from 22,804 bales in 1899 to 8,000 bales in 1904. At present the ravages of the weevil are not so severe as heretofore.

CLIMATE.

The climate of Lee County is quite mild. There is neither extreme heat nor extreme cold. During the midsummer months the thermometer sometimes registers as high as 104° F., and during the midwinter months the temperature occasionally falls below zero, but these extremes have occurred, according to local records, only once in fourteen years. The accompanying table shows the mean annual temperature to be about 68°. The extremes of heat and cold generally range from 45° in winter to 90° or 95° in summer. The annual rainfall is about 35 inches, nearly one-half of which comes during winter and spring. July and August are comparatively dry months, as are October and November.

The latitude of this area would suggest a much higher summer temperature than exists, but excessive heat is prevented by the prevailing winds from the Gulf, which are nearly always to be felt. Notwithstanding the equable climate which usually prevails, there are occasional departures that cause serious trouble in case the farmer has not guarded against them. "Hot winds" from the north—dry, hot, land breezes—sometimes parch the crops in summer, and in the winter and early spring the "Texas norther" may be expected, and with it occasionally come temperatures below zero. The warnings of the Weather Bureau should always be carefully heeded by all fruit and truck growers of this section and steps taken to offset the evil effects of these sudden changes as far as practicable.

It is said that once in about every five or six years there occurs an exceptionally dry spell that cuts short all crops, and is especially harmful to corn. These dry years can be guarded against only by proper care in the conservation in the soil of the moisture derived from winter and spring rains.

The last killing frost in spring comes about February 20, and the first in fall occurs about November 20. Thus the growing season is nearly nine months long, and of some crops two harvests may be gathered in one year.

The following table shows the normal monthly and annual temperature and rainfall at Austin and Brenham, points located approximately at equal distances west and east of this area:

Normal monthly and annual temperature and precipitation.

Month.	Austin.		Brenham.		Month.	Austin.		Brenham.	
	Temperature.	Precipitation.	Temperature.	Precipitation.		Temperature.	Precipitation.	Temperature.	Precipitation.
	°F.	In.	°F.	In.		°F.	In.	°F.	In.
January	48.7	2.47	52.5	4.56	August	84.1	2.43	83.9	2.50
February	52.7	1.88	53.8	2.51	September	78.6	3.72	78.9	3.11
March	60.2	2.22	62.2	3.08	October	69.3	2.77	70.7	2.80
April	69.0	4.05	69.6	3.38	November	59.0	2.26	60.6	4.30
May	76.5	4.40	75.8	3.17	December	52.2	2.80	54.5	3.25
June	82.2	2.51	81.4	4.92	Year	68.1	33.81	69.0	40.50
July	85.1	2.30	83.9	2.92					

PHYSIOGRAPHY AND GEOLOGY.

Lee County lies wholly within the Gulf Coastal Plain. It is inclined to the southeast and south and has a general slope of about 4 feet to the mile. The divide between the Colorado and Brazos rivers crosses the southern part of the county, which is wholly drained by tributaries of these streams. The county has a mean elevation of about 400 feet above tide water and is thought to be outside of the artesian water and oil belt of the State. There is, however, a weak flow of artesian water in the county.

The main divide mentioned above is represented between Giddings and Ledbetter by a broad, flat, mesalike area from 1 to 3 miles wide. This belt becomes narrowed west of Giddings, where it takes a northwesterly direction, and culminates in what is known as the "knobs," a range of low hills composed of ferruginous sandstone.

South of this divide the surface is more rolling and is drained by Robbs, Knobs, and Pin Oak creeks, all of which flow into the Colorado River. The bottom lands along these creeks are narrow, and the bluff lines, while precipitous in some places, usually have very gentle slopes, and the bottom lands are rarely more than 50 feet below the surrounding uplands.

North of this divide is the drainage basin of West, Middle, and East Yegua creeks, which find their way to the Brazos River. Middle Yegua Creek flows across the county a little south of east and drains the larger part of the area. The bottom lands along these streams range from one-fourth to more than 1 mile in width. At some points along the lower courses of the Yegua creeks the bluff lines are quite precipitous on the south side, the bluffs rising sometimes as much as 100 feet above the stream bed.

The surface of the county as a whole may be described as gently rolling. The streams have carved out broad, shallow valleys, however, in which are many ravines and channels of small streams that cut the surface of the land near the line of drainage into many inequalities. Some of these are so pronounced that small areas skirting the streams and lying around the heads of draws are rendered uncultivable. The greatest inequalities of surface are found in the western part of the county in the vicinity of the "knobs" and in the eastern part where Nails and Cedar creeks join the Yegua. Other minor inequalities occur near the county line west and northwest of Serbin, along the lower course of Robbs Creek and on each side of the divide west of Giddings. Generally the surface is somewhat rough and broken at the junction of the uplands proper with the different major and minor drainage basins. Few of these dissected strips are too rough for cultivation and usually the farmer drives his horses directly from the uplands onto the bottom lands in cultivating his crops.

In the southern part of the county are broad ridges of gravel and stone, while in the northern part are broad ridges and large areas of deep, white sand. Scattered areas of clayey soils known as "mesquite prairies," because of the predominance of mesquite bushes in the native vegetation, are scattered here and there over the county. A chain of these prairies extending from Dimebox to Paige, in Bastrop County, is known as San Antonio Prairie. Another, called String Prairie, extends from Lexington to East Yegua Creek.

The soils of Lee County are influenced by two distinct geological formations. In the southern part of the county are found large areas of gravel, much petrified wood, fine sands, some soft fine sandstones, and gray to dark-gray mottled clays. According to Adams[a] this formation belongs to the Jackson stage of the Eocene Tertiary.

North of a line running across the area approximately parallel with West Yegua Creek occur soils of a very different nature from those found south of this line. Both the soils and the topographic features of the country indicate an older formation than that lying in the southern part of the county. The fossil remains found in the marly clays are similar to those of the Eocene age found in other parts of the State, and according to the authority cited above this formation belongs to the Lower Claiborne stage of the Eocene Tertiary.

SOILS.

The soils of Lee County vary a great deal in respect to mechanical composition and agricultural value. These differences are at once recognized by the farmer when he comes to grow crops on them. Inequalities of depth, irregularities of composition of subsoil, varied

[a] Bul. 184, U. S. Geol. Survey.

drainage features, and different drought-resisting capacities all present a complicated soil problem which it is difficult for the average farmer to solve.

The different types found in the area are frequently badly mixed, and it has been necessary in the mapping to ignore small tracts of a few acres, but these will at once be recognized by the farmer from the descriptions of the various types. Ten different types of soil were recognized and mapped in Lee County. The following table shows these in the order of their extent:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Lufkin fine sandy loam	113,152	26.6	Sharkey clay	28,096	6.6
Orangeburg fine sand	69,696	16.4	Meadow	13,760	3.2
Orangburg fine sandy loam	57,920	13.6	Orangeburg clay	10,688	2.5
Lufkin gravelly loam	47,360	11.1	Lufkin loam	5,376	1.3
Norfolk fine sand	41,856	9.8	Total	426,112	
Houston black clay	38,208	8.9			

LUFKIN FINE SANDY LOAM.

The Lufkin fine sandy loam is a fine sandy loam, sometimes heavy, but generally very light in texture. It frequently contains a small percentage of gravel, the amount of which increases where it comes in contact with the Lufkin gravelly loam. The color varies from a gray to dark gray, depending on the amount of organic matter, which in turn depends largely on topographic position. Some small areas are found that are of a reddish hue, and again certain local conditions may cause the soil to become much darker. The gray color everywhere predominates, however, and changes to a reddish or darker color only where local conditions of drainage and aeration have influenced oxidation.

This type varies greatly in depth. On some of the hillsides and around the heads of draws where erosion has been quite active the soil is frequently not more than 3 inches deep, and in many places the heavy clay subsoil comes to the surface. Along the divides and in the more level areas the soil is much deeper, averaging about 15 inches. On examining road cuts and making borings in the field the depth of this soil was found to be very irregular, even on the broader divides, the clay subsoil coming within 3 or 4 inches of the surface, then dropping almost abruptly as much as 18 or 20 inches, and coming nearly or quite to the surface again only a few feet away.

The subsoil of this type is a stiff sandy clay. The texture is not everywhere the same, but the variations are not wide. In depth it varies from 3 to 36 inches, and usually becomes lighter in texture as

the depth increases. At 36 inches there is an increase in the proportion of sand, thus affording better drainage conditions than would otherwise exist. There is usually a perceptible amount of lime and gypsum in the subsoil. In color it is gray to dark gray, with occasional red and yellow spots scattered through it. As a rule the red and yellow subsoils underlie areas of thin soil where the surface is more rolling. The stratum of red or yellow is rarely more than a few inches thick and grades quickly into the gray clayey material beneath. The line of contact between the soil and subsoil is quite well marked, there being practically no gradation from the one to the other. During dry seasons the subsoil, unless covered by a good depth of soil, cracks deeply and opens large crevices into which subsequent rains descend, thus increasing the amount of water stored for the crop.

Although this soil has great water-holding capacity, the fine sand of which the soil is largely composed allows capillarity to work very rapidly, and unless due care is exercised in the preservation of moisture, crops will quickly suffer. Crops are frequently lost on this soil when an unusual dry spell occurs, while they are uninjured on other soils in the area in which capillarity acts more slowly.

The Lufkin fine sandy loam is found almost wholly south and east of an irregular line formed by Elm, West Yegua, and Middle Yegua creeks. There are a few small areas north of Middle Yegua Creek, but practically all of this soil lies in the southeastern part of the county, where it is the predominant type.

The greater proportion of this type is level to gently rolling, with here and there a moderately deep ravine that fingers out from some drainage channel. In the immediate vicinity of streams and around the heads of draws the surface is rougher, and in some cases small areas are found so dissected by ravines and gulches as to be of little agricultural value. The most level areas of this type lie east and northeast of Giddings.

The drainage features of the Lufkin fine sandy loam are generally good except along the main divide marking the rise of several small streams flowing either to the north or south. Along this divide there is some land that must be drained in order to insure good crops. During wet seasons the water stands on the surface and the heavy subsoil prevents it from percolating downward rapidly enough to keep the crops from suffering. Open ditches would probably be the cheapest method of reclaiming these low, flat areas. The water would be carried away rapidly, but there would be little erosive action accompanying this method of drainage.

This soil is derived from the weathering of sands, sandy clay, and arenaceous shaly beds of the Jackson stage of the Tertiary. During

the process of weathering, the fine sands, of which there is a considerable amount in these clays, have been separated from the clayey matrix in which they were held and allowed to remain in place while the rain waters removed the finer earth from the surface. This type is, therefore, of sedimentary origin and represents the weathered product of a comparatively recent coastal deposit.

Large tracts of the Lufkin fine sandy loam are yet in the virgin state and only a small percentage of it has been cleared and placed under cultivation. The only crops so far grown are corn and cotton, and after the first two or three years of cultivation the yields are moderate. From 15 to 20 bushels of corn and one-fourth to one-half bale of cotton to the acre are the average yields. It is probable that certain fruits and vegetables would do well. It is on a soil similar to this that Cuban filler tobacco is grown in Lavaca County. Where the soil is thoroughly drained and from 10 to 15 inches deep it is quite probable that peaches would prove profitable, and there is little doubt that tomatoes, beans, and other vegetables which thrive in a light soil would prove remunerative to the grower.

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

Mechanical analyses of Lufkin 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.*
13746, 13748	Soil	0.3	0.7	2.5	35.5	29.1	26.1	5.3
13747, 13749	Subsoil	.1	.5	1.6	23.6	25.6	24.1	24.0

LUFKIN GRAVELLY LOAM.

The Lufkin gravelly loam is characterized by the large amount of gravel in or immediately under the surface soil. The native vegetation is a mixture of black-jack and post oaks. The depth of the soil varies from 0 to 15 inches, and the fine earth mingled with the stones and gravel is generally a gray fine sand, though heavy areas are found that approach a clay loam in texture.

The subsoil is always a heavy sandy clay, ranging in color from red to yellow and gray, with the red color predominating. It has a depth of from 2 to 3 feet and grades into arenaceous shale.

The most of this type is found in the southern and eastern part of the county and in general is associated with the Lufkin fine sandy loam. It is found upon the divides between the larger streams and sometimes extends down to the bottom lands along them.

The surface of this type is generally rough and hilly and the most of it is used for pasture. Steep-sided ravines and gulches cut through large areas of this type and render it useless for cultivation.

There are small areas of this gravelly soil that are level enough for the plow, and when carefully handled produce fair crops.

The drainage of this soil is perfect. Like the Lufkin fine sandy loam, this type is derived from the weathering of the underlying sandy clay and shale beds. The stones and pebbles are invariably siliceous and are generally composed of chert, showing their origin to have been from the breaking down of limestone strata which belonged, in all probability, to the Cretaceous age. The stones and pebbles are all well rounded and doubtless represent the shingle of some old shore line. This is, therefore, a sedimentary soil derived from the weathering in place of Tertiary deposits.

Only a small proportion of this type is under cultivation. Corn and cotton are the crops grown, with yields of about one-third bale of cotton and 15 bushels of corn to the acre. Where the surface is not too rolling and the amount of gravel not too great, good crops could be produced. It is naturally a fairly strong soil. It contains much lime and gypsum and should produce good crops once it is put in good mechanical condition. It is on this type of soil, where the clay is from 6 to 10 inches below the surface, that a good quality of dill, caraway, and coriander are grown in some parts of the State.

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

Mechanical analyses of Lufkin 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.*
13763	Soil	0.4	0.3	1.1	36.5	41.2	11.9	8.9
13764	Subsoil	.7	.5	1.7	16.9	15.9	20.5	43.8

HOUSTON BLACK CLAY.

The soil of the Houston black clay varies from a heavy loam to a clay loam or clay, though small areas of a few acres are frequently found where the soil is light enough to be classed as a sandy loam. This is the heaviest upland soil in the county, and is called "waxy clay land" by the farmers. Gravelly areas and areas with an abundance of iron concretions may be found. Near Lincoln there are several hundred acres of this type with sufficient gravel to be mapped as the Lufkin gravelly loam.

The soil is from 3 to 12 inches deep, the depth depending on the amount of surface erosion. The physical properties of this soil give it great water-holding capacity. During dry periods it cracks badly, many of the crevices being 3 or 4 inches wide and more than 2 feet deep. When heavy rains fall these cracks catch large quantities of water, which are stored deep in the subsoil and comparatively little of

the summer rainfall escapes into the surface drains. The color of the soil is dark to dark-brown. Occasional spots of red and yellow are found where conditions of texture and drainage have augmented oxidation.

The subsoil of this type is always a heavy clay, varying in depth from 10 inches to 3 or 4 feet, where it grades into stratified clays. The subsoil carries large amounts of lime and gypsum. In color it is prevailingly dark, with here and there a thin stratum of red or yellow.

The location of this soil follows a line running in a general northeast and southwest direction across the center of the county. Small areas are found north and south of this line and are locally called "mesquite prairies." This belt of soil is not continuous across the county, but is intersected here and there by the bottom lands of the streams and by areas of other soil types. The greater proportion of this soil has always been free from forests, and since it was early traversed by the main line of overland travel from Caldwell to San Antonio it is popularly known as the San Antonio Prairie.

The surface of the Houston black clay is gently rolling, and it is nowhere too rough for cultivation. There are some fields with small ravines that might prevent the use of modern machinery, but these heavily rolling areas are not large and usually occur near streams. The surface drainage of the type is good, as a rule, only a few local areas needing artificial drainage. Water moves slowly through the subsoil, but the rolling surface prevents water-logging.

The Houston black clay has been under cultivation for several years, but thus far cotton, corn, and oats have been the only crops grown. It is the strongest upland soil in the area, and is well suited to the staple crops. Owing to the large quantity of water stored in the subsoil, crops of corn and cotton remain unharmed through long dry periods on this soil, while the vegetation on some of the other types dies for lack of moisture. Under favorable conditions corn will produce 50 bushels, and cotton from one-half to 1 bale to the acre. It is quite probable that alfalfa, if properly seeded, would do well on this soil. Much of it is now used for pasture and meadow. It is on this type that the root rot of cotton is most serious. Deep plowing and frequent cultivation are recommended for cotton grown on this soil. The cultivation should be continued until August 15, and the cotton should be topped rather low, so that the plant may branch out and shade the land early in the season.

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

Mechanical analyses of Houston black 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.*
13740, 13744	Soil	1.1	1.3	1.1	11.2	18.6	38.4	27.8
13741, 13745	Subsoil	.7	.9	1.4	12.9	10.1	34.5	38.6

ORANGEBURG FINE SANDY LOAM.

The Orangeburg fine sandy loam is characterized by a uniform color of soil and subsoil, a large amount of iron concretions, fragments of ferruginous sandstones, and a forest growth of post and black-jack oak. The soil varies in depth from 6 to 15 inches over most of the type. There are, however, small spots and strips of the Orangeburg fine sand scattered through it. The soil is a medium to fine sand, reddish-brown to gray in color, and is slightly loamy where the subsoil comes close to the surface. It does not contain much organic matter.

Much of this soil is yet in its virgin state, being covered with oak forests and used for pasture. It is not naturally a retentive soil, but its capacity for holding moisture can be greatly increased by the plowing under of green crops or the use of stable manure, straw, leaves, or other organic matter. Its light texture makes it an early soil and in its virgin state it is quite productive.

The subsoil nearly always consists of a red sandy clay, usually more than 3 feet deep. The clay content is rather high and the capacity for holding moisture relatively great. Small iron concretions are abundant throughout both soil and subsoil and aid materially in the drainage of the type. The subsoil is underlain by stratified clays that everywhere lie horizontal.

With the exception of a good-sized area of this soil north and south of Old Serbin, the most of it is found north of Middle Yegua Creek in the northern part of the county, and around the headwaters of that creek in the extreme western part of the county. The surface is rolling but not too rough for cultivation, except over a small area in the western part of the county, in the range of low hills known as the "knobs." The drainage of the soil is everywhere very good.

This soil is derived from the weathering and disintegration of the sandy clay beds of Eocene Tertiary age. During the process of weathering the fine earth has been carried away in the drainage waters. The sand is largely siliceous, only a small amount of feldspathic fragments being present.

Cotton and corn are the only crops thus far grown to any extent. On new land corn yields from 30 to 40 bushels and cotton from one-half to three-fourths of a bale to the acre. The virgin fertility is soon lost under continuous cropping and it is important that some system of crop rotation be practiced by which large amounts of organic matter may be retained in the soil. It is recommended that a three-year rotation of cotton, corn, and cowpeas be practiced on this soil. The pea vines should always be left on the ground and turned under as soon as the hogs have harvested the peas.

The Orangeburg fine sandy loam is an excellent truck and peach soil and would, in all probability, produce an excellent quality of cigar tobacco. There is little doubt that the truck and fruit industries will be largely developed on this type of soil in this county. Already the attention of fruit growers and truckers is being called to the feasibility of locating commercial peach orchards and truck farms around Lexington, where large areas of this soil are found. On this and other light soils in the county there would be little risk in attempting to grow melons, cucumbers, white and sweet potatoes, egg plants, beans, and peas; but cabbage, cauliflower, and bulb crops are not recommended for this soil.

The following table gives the average results of mechanical analyses of the fine earth of the soil and subsoil of this type.

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.*
13759, 13761	Soil	0.8	1.7	3.4	43.1	31.9	13.7	5.4
13760, 13762	Subsoil	.3	.6	.8	9.5	15.9	19.2	53.9

LUFKIN LOAM.

The Lufkin loam is characterized in this area by its generally flat surface and a native growth of live oak trees. The soil is from 3 to 10 inches deep, grading from a heavy loam to a fine sandy loam, and contains a fair amount of organic matter. It is dark gray in color and usually compact in structure. This soil puddles easily and must be handled carefully to prevent it from "running together." The subsoil is a stiff, compact, dark-colored clay, inclined to be sandy.

The most important body of the Lufkin loam lies 3 miles east of Giddings, on both sides of the Houston and Texas Central Railroad. It marks the apex of the divide between the Colorado and the Brazos rivers. The surface of this type is only gently rolling and for the most part is nearly flat. It is poorly drained, the rain waters moving but slowly toward the drainage channels. The subsoil being of a heavy, compact nature, the subdrainage is also poor. During wet springs

crops suffer from standing water. Open ditches would be efficient in correcting this condition. As the surface is so nearly level there would be little damage from erosion.

The Lufkin loam is derived from the weathering of the sandy clay beds of Tertiary age. The soil differs from the Lufkin fine sandy loam, which has a similar origin, only in the fact that clays and silts from the surrounding uplands have accumulated on the nearly flat surface of this soil and have been gradually incorporated with the fine sand, making a heavy loam. The subsoils of the two types are, in many respects, much the same.

Corn and cotton are the crops generally grown on the Lufkin loam. It is a strong soil and crops give good yields when the season is not too wet. Corn produces from 25 to 35 bushels and cotton from one-fourth to three-fourths of a bale to the acre. It is quite probable that certain varieties of truck would yield profitable returns on this type. In some parts strawberries are successfully grown, and no doubt cabbage, cauliflower, and similar crops would do well.

As this soil puddles easily, care must always be taken to keep it well mulched with a layer of fine, dry soil by frequent cultivations during the growing season. Capillarity works very rapidly in this soil, and only a few days neglect might allow large stores of moisture to escape by evaporation during hot, windy weather.

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

Mechanical analyses of Lufkin 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.*
13765	Soil	0.2	0.9	3.0	34.1	26.1	21.6	13.6
13766	Subsoil	.0	.4	1.8	26.1	15.7	17.0	38.3

NORFOLK FINE SAND.

The Norfolk fine sand, a fine, loose, gray sand, is uniform in both color and texture. The material is always over 3 feet deep, and there is generally little or no difference between the soil and subsoil. The soil has a little more organic matter than is found in the subsoil, but otherwise the two are nearly identical. Only a small percentage has yet been reclaimed from forest conditions.

This soil is located north and west of a line running through the center of the county in a northeastern and southwestern direction, passing through the towns of Manheim, Lincoln, and Dimebox. The largest continuous areas are found in the extreme northern part of the county, in the vicinity of Tanglewood. The surface is everywhere rolling, and the sand is deep enough to insure perfect drainage.

Some small areas occur near the "knobs" that are too rough for cultivation.

In this area the Norfolk fine sand, in all probability, represents the sandy beaches of ancient shore lines that existed in early Tertiary time. Its relationship to the Orangeburg clay and the Houston black clay, both of which are undoubtedly of marine origin, tends to strengthen this view. These sands have undergone considerable weathering, but it is hardly probable that they have, as a whole, ever been more consolidated than they are to-day. An exception to this is found in the case of that portion of the type found around the "knobs," which is doubtless derived from the disintegration of the ferruginous sandstones of which these hills are composed.

This soil is so light that it is generally considered of little agricultural value, and only a small area is planted to crops. When first cleared it yields fair crops of cotton, but corn makes only an indifferent growth. It is not so droughty a soil as might be supposed, since the fine, incoherent sand tends to keep the surface mulched and the soil water escapes only by percolation. Green manuring would greatly improve the water-holding capacity of this soil.

The Norfolk fine sand is well adapted to the production of watermelons, which are grown and shipped to northern markets. Peaches will do well on this soil if properly managed, and there is little doubt that the growing of grapes could be made profitable. Tomatoes would do well, and would prove profitable if planted so as to mature for early market.

The following table gives the results of a mechanical analysis of a sample 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.*
13752	Soil	0.1	0.2	1.2	57.8	27.1	10.8	2.7

ORANGEBURG FINE SAND.

The Orangeburg fine sand is composed of medium to fine sand, loose and incoherent for the most part, though occasional spots are found that approach a sandy loam texture. The depth of the soil varies from 18 to 36 inches. In color it is a gray to yellowish-gray. The subsoil is nearly always a red sandy clay, changing sometimes to a clayey sand. It usually gets more sandy with depth and at 30 to 36 inches frequently changes to a gray sandy clay grading into the stratified sandy clays below.

This type is located mostly in the northern and western part of the county. Some long, narrow strips are found in the south, along

Nails and Middle Yegua creeks. It is most typically developed around Lexington and northwest of Lincoln. Large areas are also found east and north of Lexington in the vicinity of Middle Yegua and Brushy creeks. The surface of this soil is always rolling and the undulations sometimes culminate in low hills, but nowhere is the surface too rough for cultivation. The drainage is almost perfect. There are, however, a few low, flat areas near stream channels which are liable to become water-logged during long wet spells. All these low places, and all depressions into which cold air is likely to drain, should be carefully avoided by peach growers and market gardeners.

The origin of this soil is the same as that of the Norfolk fine sand, the only distinctions between the two being a slight difference in mechanical composition, the former having more heavy material than the latter, and a difference in depth, the Norfolk type always being over 3 feet deep.

The crops at present grown on the Orangeburg fine sand are cotton and corn. In its virgin state the yields are good—25 to 30 bushels of corn and from one-third to one-half bale of cotton to the acre. The humus is soon exhausted from this soil and systematic green manuring is recommended to maintain its productiveness. This is a good truck and peach soil and commercial orchards and gardens would doubtless prove remunerative if located sufficiently near a shipping point. The crops suggested in the discussion of the Orangeburg fine sandy loam would be suitable for this type.

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

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.*
13757	Soil	0.2	0.4	1.1	68.5	15.6	8.6	5.6
13758	Subsoil	.5	.5	.6	38.3	12.5	9.1	38.5

ORANGEBURG CLAY.

The soil of the Orangeburg clay varies in depth from 3 to 10 inches and is characterized by a prevailingly red color. In texture it grades from a heavy sandy loam to a loam. The soil contains many iron concretions and occasional fragments of marly rock are found. It usually contains much organic matter, giving it the dark-red hue. The subsoil usually extends to a depth of more than 36 inches, but sometimes grades into consolidated marly clays at 30 inches below the surface. Fragments of marly rock of a yellowish-brown color are also found scattered through the subsoil. These rock fragments contain shells and casts of shells, showing the origin of the soil.

With the exception of two small areas west of Fedor and a few spots in the extreme western part of the county, the whole of this type is located north of Middle Yegua Creek, in the northern part of the county. The largest area is String Prairie, extending from Lexington east to East Yegua Creek. Other smaller areas occur north of Lexington along Brushy Creek, and in the extreme northeastern part of the county. The surface of this type is everywhere rolling, but nowhere is it too rough for the plow. String Prairie contains some areas of this soil that are only gently rolling. Along the line of contact with the sandy areas to the north and south there is a narrow, though not continuous, strip of land, that is too much dissected for cultivation. The surface drainage of this type is good, except on a few small flat areas in String Prairie which would be benefited by tiling.

This soil, like the Houston black clay, is of marine origin and belongs, in all probability, to the Eocene Tertiary. From the included fossil remains it is evidently a salt-water deposit, and the present outlines of the larger areas show the deposition to have been made in a narrow sound. Since the surface of the soil areas has been elevated the elements have caused a general disintegration of the beds in the upper 6 to 10 feet and the material has been oxidized and changed from a dark-green to a red or yellow color. There exist to-day, at only a short distance from the surface, well-preserved beds of greensand marl. Surface erosion, acting in conjunction with cultivation, has removed from the surface large amounts of fine earth and changed the soil from a clay loam to a loam or sandy loam.

This soil type contains much lime in the subsoil and is recognized as one of the best cotton and corn soils in the county. Corn yields from 30 to 40 bushels and cotton from one-half to three-fourths of a bale to the acre under favorable conditions of climate and cultivation. Most of this soil is now under cultivation, it being the soil on which settlers in this part of the State first located. Some of it is in meadow and good crops of Johnson grass hay are secured. It is probable that alfalfa would do well on this soil. There is an impression among the farmers that commercial peach orchards can be located on this type of soil. This impression seems to have originated from the fact that the soil is uniformly red, the idea being that red soils make highly colored fruit. While the red color is not objectionable, this soil is much too heavy, rich, and generally too poorly drained, even on the hillsides, for growing commercial peach orchards. It would doubtless be well to try small orchards to supply the family, but the planting of peach orchards on this type of soil for commercial purposes would not be advisable. It is thought that the type may produce a good grade of Cuban filler tobacco.

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

Mechanical analyses of Orangeburg 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.*
13753, 13755	Soil	1.4	1.9	1.9	21.5	21.0	26.7	25.6
13754, 13756	Subsoil	1.5	1.7	1.4	7.3	7.8	28.7	51.7

SHARKEY CLAY.

The soil of the Sharkey clay, from 10 to 20 inches deep, is usually a heavy clay, containing enough organic matter to give it a yellowish-gray to dark-gray color. Occasional spots and strips of sand occur over the surface, deposited by shifting currents during flood time. It is an alluvial soil, and on account of the irregularity of its deposition both the texture and depth of soil vary considerably. The subsoil grades from a stiff heavy clay of a dark color to a fine yellow sand. The sand is found at from 12 to 36 inches below the surface, but frequently the clay is over 3 feet deep.

This type occurs along the lower courses of the larger streams north of Giddings, but little or none is found near the sources or along the tributaries of these streams. The surface of the Sharkey clay is generally level and is subject to annual overflow, and great care must be exercised in growing crops on it. A large proportion of it should be drained both with tiles and open ditches. The open ditches would carry away the surface water, and the tile, if placed at the proper depth, would lower the water table to at least 3 feet from the surface. The drainage of most of this bottom land is quite feasible because the stream beds lie several feet below its surface.

The Sharkey clay is alluvial in origin, being composed of the finer particles carried in suspension by the streams of the area. The soil is found along the lower parts of the streams, where the overflow waters have little movement or remain impounded after the floods have subsided.

In general, only the lighter phases of this type are under cultivation. Cotton and corn are the crops grown, and fine yields are uniformly secured in good seasons. Fifty bushels of corn and a bale of cotton to the acre are not unusual yields on these bottom lands. Floods are yearly expected and the crops are frequently lost by inundation. In order more nearly to insure crops on this fertile soil it is recommended that the land be thoroughly prepared in the spring and fallowed to keep down weeds until, in the judgment of the farmer, the liability to overflow has passed, when the crop may be planted with little risk of failure.

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

Mechanical analyses of Sharkey 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.*
13769	Soil	Tr.	0.1	0.2	1.6	2.9	41.1	54.5
13770	Subsoil	0.0	.1	.1	.5	1.3	52.6	46.2

MEADOW.

The Meadow is quite variable, both in depth and texture of soil and subsoil. Sometimes it consists of a fine loamy sand over 3 feet deep and in other of more clayey material. As a whole, however, the soil is light in texture. It is usually from 10 to 24 inches deep and consists of a fine loamy sand containing a fair amount of organic matter. The color is gray to dark gray. The subsoil is a dark gray, fine loamy sand, usually containing more clay than the soil. The amount of heavy material in the subsoil varies considerably, and at 30 to 40 inches it sometimes changes to a sandy clay.

The Meadow is most typically developed along Robbs Creek south of Giddings, but is found along almost all the smaller streams in the county. Its surface is generally level, except where it has been cut by the swift overflow currents. It is nearly all level enough for the plow. It is subject to annual overflow, but both the surface and subsoil drainage are good and crops do not suffer from an excess of moisture.

The Meadow is an alluvial soil derived from the wash of the surrounding uplands, where the soils are generally fine sands and fine sandy loams. It is easily tilled, and most of it is under cultivation. Corn and cotton are the crops grown. The yields are low, except in the northern part of the area, where the soil is stronger than it is in the southern part. Twenty bushels of corn and one-third bale of cotton are the average yields. It is a good soil for such crops as cucumbers and watermelons, and certain varieties of pears would do well on it. Cotton would make a better yield if grown after a leguminous crop.

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

Mechanical analyses of Meadow.

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.*
13738	Soil	Tr.	0.1	0.7	43.2	37.1	8.3	10.6
13739	Subsoil	Tr.	.1	.5	41.2	39.2	6.8	12.1

AGRICULTURAL METHODS.

In the majority of cases the practice of more modern methods of agriculture would result in increased profits to the farmers of Lee County. In planting cotton many simply throw two furrows together on unbroken land in the spring, thus forming a ridge under which lies a strip of hard, unbroken soil, and on this ridge and over this strip of hard land the cotton is planted. Some of the farmers plow the land in the spring just before or at the time of planting the crop. The plowing is always shallow, regardless of the texture of the soil. Subsequent cultivation is usually from 3 to 5 inches deep, and the ridge method is universally practiced. This ridge method should not be practiced on the upland soils, except where level cultivation would not secure proper drainage. It is recommended that shallow plowing be practiced on all the sandy soils where the clay subsoil is more than 10 inches below the surface, to be followed by cultivation not less than 3 inches deep. All clay lands should be broken deeply and followed by 3 or 4 inch cultivation. The object in both cases is to conserve moisture for use of the crop.

There are a number of farmers in the county who are following more modern methods. Some of them are practicing a mixed husbandry—growing various forage crops and marketing hogs and cattle as well as cotton. Cowpeas are grown between the rows of corn, and large areas are planted to peanuts. Both are excellent feed for hogs, and by their use good pork can be produced cheaply.

No system of rotation is practiced that has as its prime object the maintenance of humus in the soils. The sandy soils are usually in need of large quantities of organic matter for the best crop yields, and it is recommended that a four-year rotation of corn, cotton, peanuts, and cowpeas be followed on all sandy soils where staple crops are grown.

The planters of this area allow cotton to go unpruned in order to get a "top" crop. This practice is rarely ever advisable, since the early crop is of better quality than the later one, and in the experience of the best farmers the early topping of cotton adds from 25 to 40 per cent to the yield. Cotton should be topped soon after the first bolls are formed, that the vitality of the plant may be concentrated in the fruit and not distributed throughout a surplus growth of stalk.

Some of the farmers have found that a five-year rotation—corn two years, sorghum one year, and cotton one year—is effective in controlling the root rot of cotton.

AGRICULTURAL CONDITIONS.

Of the 424,000 acres of land in Lee County, about 400,000 were in farms in 1900, 32 per cent of this area being improved. There has been no great change in conditions since then, but the size of the farms is gradually decreasing and the character of the crops is slowly changing. While a majority of the farmers own their farms, the farming class as a whole can not be called prosperous, and many of the farms are mortgaged. This condition is due mainly to decreased profits in cotton growing since the advent of the boll weevil.

The farms of Lee County range from 40 acres or less to estates of thousands of acres. According to the Twelfth Census, the average size of the farms is about 133 acres. In this average, however, each tenancy is considered as a separate farm, and the individual farms contain a much larger mean acreage than the census figures indicate.

Colored labor is about the only kind available. The foreign element does not use much hired help. Men, women, and children all work in the field in the German settlements. During cotton-picking time the floating population moves here and there wherever wages invite.

The principal products in this area are cotton and corn, but only cotton is put on the market. Of less importance is the production of potatoes, oats, and peanuts. Some of the farmers are beginning to make peanuts an important product on the farm. These are fed to hogs, for which there is a ready market at Fort Worth. The cattle industry is receiving more and more attention each year, and good breeds of stock, such as Hereford and Shorthorn, are being introduced.

The business of fruit and truck growing is beginning to engage the attention of some of the farmers and business men. There is an excellent opportunity for the development of this industry in Lee County. It is quite probable that the greatest returns will come from the production of peaches and truck. There are also good tobacco soils in the county, and the production of a good grade of Cuban tobacco is quite feasible.

The adaptation of the Orangeburg clay, Houston black clay, and Sharkey clay to the production of corn has long been recognized by the farmers, although the crops gathered are not always a true measure of the fertility of these soils. Cotton also does well on these heavy soils, but the yield would be increased, it is believed, if the plants were topped earlier. The sandy soils are nearly all well suited to the growing of cotton, cowpeas, peanuts, certain varieties of truck, peaches, and Kieffer pears, provided the pear trees are located where ample moisture can be had at all times.

The farmers of Lee County have access to markets over the Houston and Texas Central and the San Antonio and Aransas Pass railroads, and most of the county is conveniently situated with reference to shipping points. The San Antonio and Aransas Pass Railway runs through the area from north to south, and the Houston and Texas Central Railroad traverses the southern part from east to west. The location of the county is such that nearly all the principal markets of the Mississippi Valley may be reached in from one to three days. The San Antonio and Aransas Pass Railway connects the area with Waco and Fort Worth, and from here Denver may be reached in about forty-eight, Kansas City in twenty, and St. Louis in thirty hours. Over the Houston and Texas Central Railroad, Austin, Houston, Galveston, and New Orleans may be reached in less than twenty-four hours.

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