

SOIL SURVEY OF THE BRAZORIA AREA, TEXAS.

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LOCATION AND BOUNDARIES OF THE AREA.

The Brazoria area lies entirely within Brazoria County and covers 845 square miles, or 540,800 acres, comprising about three-fifths of the total area of the county. It is bounded on the north by Harris County, a part of its northeastern boundary is formed by Galveston

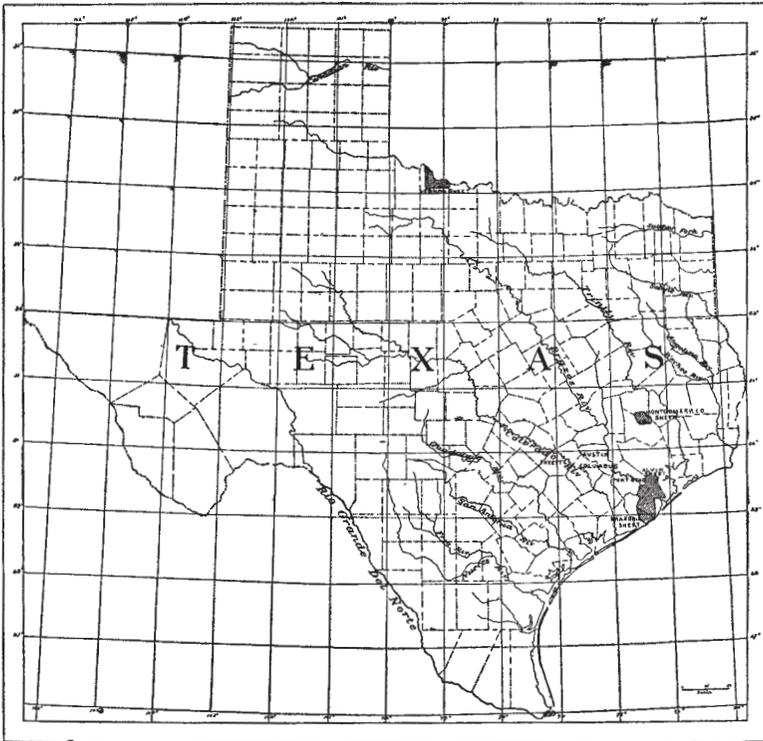


FIG. 9.—Sketch map showing areas surveyed in Texas.

County, and a part of the western by Fort Bend County and the Brazos River. The soil map is platted on a base made by the party in the field, no satisfactory published map sufficiently accurate for the soil survey work being procurable at the time the party went out. The soil map is divided into two sheets. The upper, called the Alvin sheet,

covering about half the survey, lies wholly on the east side of the Brazos River; the lower or Brazoria sheet comprises territory on both sides of the river, having for its western boundary the San Bernardo River, and reaching south to the Gulf of Mexico. (See fig. 9.)

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

Brazoria County was settled in 1823 by a colony under the leadership of F. Austin, whose father secured from the Mexican Government the first concession looking to colonization of the country. The elder Austin died before his agreement was carried out. The grant was very liberal, and allotted to each head of a family one league or 4,428 acres of land. Three hundred families were brought into the country by Austin. The most of these colonists landed at the mouth of the Brazos River, and settled on this river or its tributaries up as far as 20 miles above Old Washington. The most of them preferred lands along the canebrakes on account of the fertility of the soil. In order to prepare the soil for the planting of corn and tobacco—the crops at first grown—the cane was cut and burned. The Mexican Government limited the production of tobacco and stipulated that it should be grown only for home consumption.

About 1826 some cotton was grown, but not until 1830 was the cultivation of this crop extensively undertaken. Ten years later it had developed into quite an industry. In 1840 sugar cane was introduced, and in about seven years it had become one of the leading agricultural products of the county. At this time there were ten or fifteen large sugar mills in the county, and some large plantations made annually as much as 1,200 hogsheads of sugar. The industry grew very rapidly and production was so greatly increased that the price of molasses fell to such a degree as to make its production unprofitable. During this period of depression molasses was fed to stock or allowed to go to waste.

The cotton and sugar-cane industry developed very rapidly up to 1860, at which time Brazoria County produced more than any other county in the State. Cattle were introduced in 1826, the prairie being used for cattle and the bottoms along the Brazos River for general farming. Soon the cattle men had herds ranging from 100 to 5,000 head. In 1848 cattle were worth from \$4 to \$5 per head, and the price, with minor fluctuations, gradually rose until 1881, when they were worth \$20 per head.

The prairie lands were considered of very little value for agricultural purposes up to about 1880 or 1885, when the pear and truck industries were started. Before this these lands sold for from 50 cents to \$3 an acre, while the fertile bottoms of the Brazos brought from \$20 to \$40 an acre.

The greater part of the products of the county up to 1870 was shipped to Galveston and New Orleans.

CLIMATE.

The climate of the Brazoria area is that of the warmer temperate zone. The temperature is high in summer, and the winters are so mild that roses bloom practically the year around. Gulf breezes moderate the heat of summer to some extent. Occasionally in winter a north wind brings in a short period of comparatively cold weather, but such periods rarely extend over two or three days.

The rainfall is sufficient for ordinary crops, but in many seasons it is unevenly distributed, an excess of precipitation being succeeded by periods of severe drought, often resulting in great loss of unirrigated crops.

The following table shows the normal monthly and annual temperature and precipitation as reported by the Weather Bureau station at Columbia:

Normal monthly and annual temperature and precipitation.

Months.	Columbia.		Months.	Columbia.	
	Tempera- ture.	Precipi- tation.		Tempera- ture.	Precipi- tation.
	°F.	Inches.		°F.	Inches.
January	54.0	4.45	August	82.1	3.47
February	57.3	3.10	September	75.5	5.13
March	62.5	2.39	October	69.2	2.84
April	70.1	2.34	November	55.4	3.32
May	75.2	3.02	December	56.6	2.58
June	80.1	4.60	Year	68.4	40.53
July	82.2	3.29			

The following table shows the first and last occurrences of severe frosts for a period of nine years, but it must be borne in mind that these dates do not represent so much the opening and closing of a winter season as the sporadic and temporary conditions of cold produced by the northers that now and then sweep in from the colder country in higher latitudes:

Dates of killing frosts.

Year.	Columbia.		Year.	Columbia.	
	Last in spring.	First in fall.		Last in spring.	First in fall.
1893	Jan. 20	Nov. 15	1898	Mar. 4	Oct. 27
1894	Feb. 26	Dec. 27	1899	Feb. 14	Dec. 16
1895	Mar. 2	Nov. 20	1900	Mar. 2	Nov. 12
1896	Feb. 15	Dec. 2	1901	Mar. 6	Dec. 3
1897	Mar. 24	Nov. 18			

PHYSIOGRAPHY AND GEOLOGY.

Brazoria County, bordering on the Gulf of Mexico and extending inland a distance of about 35 miles, lies entirely within the Coastal

Plain. For the purpose of description the area is separated into two physiographic divisions—the treeless prairie and the Brazos alluvium. The flat, open prairie is underlain by the Port Hudson formation, composed of yellow or drab clays, and often appears black on the surface from a combination of calcareous and organic elements. The yellow clay often appears on the surface. It contains a large amount of lime nodules. Beneath the clays, at a depth of from 15 to 30 feet, is found a stratum of very fine white sand. Even in the very driest seasons water can always be obtained from this stratum, and it is usually under sufficient pressure to rise within a few feet of the surface. Half fossilized shells have been found in these clays which are identical with those of crustaceans now living in the Gulf. This tends to support the supposition that the conditions of climate, etc., at the period when these deposits along the coast were formed did not differ materially from the present conditions, the only changes being in the relative level of the land and sea.

This open prairie region has a rise in elevation, going inland from the Gulf, of about 1 foot to the mile. It is interspersed with sand ridges of a very peculiar character. They consist of sand mounds from 10 to 20 feet in diameter and from 2 to 3 feet in height. It seems that a satisfactory explanation of this formation has never been given. One theory is that these mounds were formed through the agency of gas pressure, and this theory has perhaps been strengthened by the discovery of oil underlying the county. It is notable that most of the oil wells are on the highest elevations of these ridges. However, oil has not been found in paying quantities.

The alluvium, which is found along the Brazos River, extends back from the river for a distance ranging from 2 to 8 miles. The banks of the river rise from 5 to 30 feet above mean water level, and are composed of stratified yellow and chocolate-colored clays. Quite often a thin seam of black or drab clay is also found. The source of the river is at the foot of the Llano Estacado, and for a distance of 300 or 400 miles it cuts its way through gypsum beds, sandstones, and limestones. Material from these sources is brought down and deposited. The resulting soils are highly calcareous. A section of the river bank shows the top layer to be a yellow or yellowish-gray sand, and this material is being deposited at the present time. Beneath this is a chocolate-colored clay, which quite often contains a thin stratum of black clay. The sand which appears on the surface extends but a short distance from the streams, and then the chocolate clay occupies the surface, forming the lowest portion of these alluvial soils, or the Sharkey clay.

Narrow ridges, ranging in elevation from 2 to 6 feet, have been deposited in these bottoms by the various sloughs and creeks,

SOILS.

There are eight soil types in the Brazoria area, the actual and relative extent of each of which is shown in the table given below. It will be noticed that over 50 per cent of the area is Houston black clay, the principal type of the prairie region and important as the soil upon which the rice industry is now being developed, while about 30 per cent is included in the Sharkey clay and Galveston clay, two types of poorly drained, marshy, or overflowed lands of little present agricultural value.

Areas of different soils.

Soil.	Alvin sheet.	Brazoria sheet.	Total area.	Proportional extent.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Per cent.</i>
Houston black clay.....	209,408	63,168	272,576	50.7
Sharkey clay.....	32,960	100,096	133,056	24.8
Lake Charles fine sandy loam.....	27,392	11,392	38,784	7.2
Yazoo sandy loam.....	4,544	27,328	31,872	5.9
Galveston clay.....		31,168	31,168	5.8
Calcasieu fine sandy loam.....	18,368	4,672	23,040	4.3
Yazoo clay.....	3,520	5,632	9,152	1.7
Galveston sand.....		1,152	1,152	.2
Total.....	296,192	244,608	540,800	.....

YAZOO CLAY.

The Yazoo clay is a yellow loam with a depth of 8 inches, containing silt and small amounts of very fine sand. From 8 to 36 inches the subsoil is a stiff chocolate-colored clay. There are small spots of yellow silt loam, varying in depth from 12 inches to 3 feet, which occur quite frequently and are from one-fourth acre to 2 acres in extent. The Yazoo clay occurs as a ridge on both sides of Oyster Creek, following the stream almost its entire length. There are very few breaks in the soil, and it never extends more than one-half mile back from the creek.

This type has been formed principally by Oyster Creek, although the Brazos River has aided in the formation, as material is carried into this creek by the river during the overflows. The principal timber growth is pecan and ash.

This is one of the most desirable soils of the bottoms, as it is very fertile, has good drainage, and is easily cultivated. The most of it is under cultivation at present. Sugar cane is the principal crop grown, but the soil is also well adapted to cotton and corn.

The yield of cane is about 20 tons per acre, and the yield of sugar about 150 pounds per ton. The majority of the sugar mills of the county are located on Oyster Creek, where this soil is principally found.

The yield of oats ranges from 40 to 65 bushels per acre. With so heavy a yield this crop should be planted more extensively than it is, the acreage now being comparatively small. It would seem that oats could be made more profitable than corn, as it is a crop not so apt to be injured by the droughts quite often occurring during the summer months.

The following table shows the texture of soil and subsoil of this type:

Mechanical analyses of Yazoo clay.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.06 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
7777	4 miles SW. of Angleton.	Brown clay loam with sand and silt, 0 to 8 inches.	2.50	0.00	0.14	0.08	0.88	18.54	61.30	18.56
7779	4 miles SW. of Sandypoint.	Light-brown clay loam, 0 to 8 inches.	3.50	.04	.48	.34	.94	13.50	60.32	24.00
7775	3 miles SW. of Angleton.	Yellow clay loam with sand, 0 to 6 inches.	3.83	.04	.60	.36	1.04	15.08	56.86	25.84
7778	Subsoil of 7777.....	Stiff brown clay, 8 to 36 inches.	1.97	.02	.26	.24	1.34	14.74	46.56	35.60
7776	Subsoil of 7775.....	Stiff brown clay, 6 to 36 inches.	1.35	.02	.08	.12	.54	6.20	55.64	37.02
7780	Subsoil of 7779.....	Brown clay with sand, 8 to 36 inches.	1.73	.02	.28	.18	.48	1.74	54.90	42.36

SHARKEY CLAY.

The Sharkey clay is a very stiff, waxy clay to a depth of 8 inches, varying in color from black to a light chocolate. It contains lime nodules, iron concretions, and, quite often, small particles of shell. The subsoil is a very stiff, impervious clay, having the same color as that of the soil. In dry seasons the surface cracks very readily, the cracks being from 1 to 3 inches in width and from 2 to 4 feet in depth. It is locally known as "buckshot land" or "elm flats."

This type occupies about three-fourths of the entire Brazos bottoms, forming the lowest areas, and it is very difficult to drain. Where it can be well drained it is a strong soil for sugar cane, corn, and cotton.

During the inundations of the bottom lands the coarser materials are deposited near the stream, while the finer particles of clay are held in suspension and are carried back from the stream and deposited in the low flats, forming the Sharkey clay. During each deposit a large quantity of leaves and various kinds of vegetable growth is covered over by the sediment, thus making the soil very rich in organic matter. This soil is subject to overflow almost every year, as a rise of

6 or 8 feet in the river is sufficient to back the water up the small streams and numerous bayous that flow into it. When the water is high enough to overflow the natural terraces along the banks of the river the basin-shaped depressions which form a large part of the Sharkey clay are covered with water from 3 to 10 feet deep. The only outlets for this water are the small streams, and with the slight fall it takes a long time for it to drain back into the river. A thorough drainage and dike system will have to be had before this soil can be utilized to any great extent for agricultural purposes. It is not likely that this will be done for many years, as there are in the bottoms large areas of much more desirable land that remain uncultivated.

The timber growth is principally elm, with a dense undergrowth of vines and various kinds of bushes. The undergrowth furnishes to cattle and grass protection from the cold winds prevailing during some parts of the winter, thus making this land very desirable for winter grazing.

The following table shows the texture of typical samples of the soil and subsoil of the Sharkey clay:

Mechanical analyses of Sharkey clay.

No.	Locality.	Description.	Organic matter.								
				Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.	
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	
7815	6 miles SE. of Brazoria.	Waxy gray clay, 0 to 8 inches.	4.01	0.30	2.20	2.16	12.98	8.48	26.26	48.04	
7817	1 mile N. of Columbia.	Waxy dark-brown clay, 0 to 6 inches.	1.31	.70	2.02	1.28	3.42	2.42	32.10	59.54	
7819	4 miles SW. of Angleton.	Waxy brown clay, 0 to 7 inches.	1.98	.30	1.36	.78	1.92	1.32	26.10	68.42	
7816	Subsoil of 7815.....	Gray and light-brown clay, 8 to 36 inches.	1.20	1.84	2.46	1.26	3.42	3.00	32.30	55.52	
7818	Subsoil of 7817.....	Waxy brown clay, 6 to 36 inches.	.22	.54	1.50	.64	1.62	2.30	31.78	62.04	
7820	Subsoil of 7819.....	Stiff brown clay, 7 to 36 inches.	1.23	.34	.86	.64	2.10	1.80	25.72	68.74	

GALVESTON SAND.

The Galveston sand is a light-gray sand, with a depth of 12 inches, containing a high percentage of fine particles of shell mingled with a smaller proportion of larger pieces. The subsoil is a sand of the same character as the soil, the color being a little lighter and the particles of shell somewhat larger.

This soil occurs as a ridge, about one-fourth mile in width, along the Gulf of Mexico, upon which its waves beat. This sand has been

deposited by the Gulf, and the surface is usually covered with various kinds of shell and driftwood, which the high tides have brought in.

At present there is no part of this soil under cultivation, but with the aid of fertilizers it is known to have produced very good truck and fine watermelons. It is similar to the pineapple soils of southern Florida.

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

Mechanical analyses of Galveston sand.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.06 mm.	Silt, 0.06 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
7799	6 miles SW. of Velasco.	White sand, 0 to 12 inches.	0.23	0.20	1.46	5.10	83.80	8.00	0.06	0.46
7800	Subsoil of 7799	White sand, 12 to 36 inches.	.11	1.34	3.84	9.44	81.68	2.92	.10	.14

GALVESTON CLAY.

The Galveston clay varies from a drab to a yellow-colored clay, occasionally with a thin surface covering of a gray or yellow sand. Generally a large percentage of calcareous nodules is found in the soil.

This type of soil is found near the Gulf, being separated from it by the narrow ridge of Galveston sand that borders the shore. It runs parallel to the Gulf and is from 3 to 6 miles in width.

The part mapped between the Brazos and the San Bernardo rivers forms a kind of basin, having the ridge of Galveston sand on the south, the ridge that follows the Brazos River on the east, and the San Bernardo River on the west. This basin is dotted with ponds and sloughs, which furnish breeding places for myriads of mosquitoes.

This soil has little natural drainage and is wet and marshy even in the driest seasons. The only growth on it is salt grass. It is used only for a cattle range, and is not considered very good even for that.

The following table shows the texture of the soil and subsoil of this soil type:

Mechanical analyses of Galveston clay.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
7795	1 mile S. of Velasco.	Stiff gray clay, 0 to 6 inches.	4.09	0.10	0.86	0.72	1.82	5.92	43.20	46.44
7797	6 miles SW. of Velasco.	Gray clay, 0 to 10 inches.	2.13	.24	.36	.44	.86	9.00	31.96	56.38
7796	Subsoil of 7795.....	Gray and yellow clay, 6 to 36 inches.	.25	.20	.30	.14	.46	4.60	60.70	31.06
7798	Subsoil of 7797.....	Brown or yellow clay, 10 to 36 inches.	1.17	.10	.34	.20	.50	6.08	35.16	56.82

CALCASIEU FINE SANDY LOAM.

The Calcasieu fine sandy loam is a compact gray to dark-gray sandy loam, 6 to 18 inches deep, resting on a clay loam which grades into a black or yellow subsoil containing a few iron concretions and large quantities of lime nodules. This soil usually occurs along the streams in broad areas, extending back into the prairie a distance of from one-fourth mile to 2 miles. The areas are commonly raised from 3 to 6 feet above the adjacent prairie, and are thus well drained.

Small white spots free from vegetation occur in this type. The soil in such places is a very fine white sand and silt, from 2 to 4 inches deep, underlain by an impervious yellow clay containing a very large proportion of lime nodules. This yellow clay has been formed by the decomposition of these pockets of calcareous nodules. The spots vary in size from a few square feet to one-fourth of an acre. A chemical analysis shows this soil to contain from a trace up to 0.50 per cent of water-soluble salts, or alkali.

One of the characteristic features of the Calcasieu fine sandy loam are the sand mounds which rise from 10 or 12 inches to 3 feet or more above the surrounding surface. These mounds are from 10 square feet to one-fourth acre in extent. A large part of the area of this soil has been formed through the erosion of these mounds, which are numerous enough in most areas of this type to make the topography slightly rolling.

The Calcasieu fine sandy loam is the principal truck soil of the area. It is upon this soil that the pear industry has been attempted, and which has been generally unsuccessful owing to the general and rapid spread of the pear blight. (See Pl. XX.)

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

Mechanical analyses of Calcasieu fine sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.06 mm.	Silt, 0.06 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
7769	2 miles SE. of Alvin.	Compact dark-gray sandy loam, 0 to 12 inches.	1.02	0.10	0.44	0.52	13.28	55.38	22.76	7.36
7773	1 mile S. of Angleton.	Dark-gray sandy loam, 0 to 12 inches.	1.46	.24	.46	1.50	23.64	47.14	19.60	7.36
7771	1 mile SE. of Alvin.	Compact dark-gray sandy loam, 0 to 10 inches.	1.29	Tr.	.74	.50	14.60	50.96	25.06	8.02
7774	Subsoil of 7773.....	Stiff yellow clay, 12 to 36 inches.	.35	.20	.64	1.10	17.76	35.18	25.50	19.20
7770	Subsoil of 7769.....	.....do.....	.84	Tr.	.34	.46	8.94	30.70	24.86	34.44
7772	Subsoil of 7771.....	Yellow waxy clay, 10 to 36 inches.	.78	Tr.	.10	.20	7.10	34.18	22.62	35.14

LAKE CHARLES FINE SANDY LOAM.

The surface soil of the Lake Charles fine sandy loam is a heavy black or dark-gray sandy loam, from 6 to 12 inches in depth, containing enough clay to cause a thin crust to be formed on drying. The subsoil is a drab or yellow clay, or in some cases a clay loam, with a depth of 3 feet or more, containing a small percentage of lime nodules and iron concretions.

This soil is usually found in low, broken ridges back from the streams. Alkali spots and sand mounds occur in this type also, but not so frequently as in some of the other soils of the area.

The greater part of the Lake Charles fine sandy loam is used for a cattle range, but some of it is used for farming purposes. It is very easily cultivated, and, on account of its moisture-holding properties, is quite desirable for the production of the truck crops and pears.

This soil type very closely resembles the Yazoo sandy loam in color and texture, but it is a prairie soil, while the Yazoo sandy loam is found in the Brazos River bottoms and is a great deal more fertile. The Lake Charles fine sandy loam is an intermediate type between the Calcasieu fine sandy loam and the Houston black clay. In some cases it is necessary to drain areas of this soil before cultivation, but it usually has satisfactory natural drainage.

Mechanical analyses of Lake Charles fine sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.06 mm.	Silt, 0.06 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
7805	2 miles SW. of Liverpool.	Dark-gray sandy loam with clay, 0 to 8 inches.	1.88	0.10	0.20	0.50	10.04	27.02	51.26	10.62
7803	3 miles NW. of Angleton.	Dark-gray sandy loam with clay, 0 to 9 inches.	3.26	.28	.44	.18	5.56	29.56	53.02	10.96
7801	4 miles SW. of Alvin.	Gray sandy loam with clay, 0 to 6 inches.	1.31	.02	.26	.14	2.70	37.66	46.50	12.72
7806	Subsoil of 7805.....	Stiff gray clay 8 to 36 inches.	1.25	.94	.94	.70	8.66	24.30	51.72	12.52
7804	Subsoil of 7803.....	Gray sandy loam with sand, 9 to 36 inches.	1.34	.04	.36	.20	4.30	22.14	49.32	23.64
7802	Subsoil of 7801.....	Stiff gray clay, 6 to 36 inches.	1.20	.00	.10	.12	4.68	25.14	42.36	27.60

HOUSTON BLACK CLAY.

The Houston black clay is a black or drab clay from 6 to 10 inches in depth, underlain by a drab or yellow waxy clay containing lime nodules and sometimes small quantities of iron concretions. It becomes compact and cracks into very hard, irregular blocks on drying, but when well cultivated it is quite friable and has a texture much like a clay loam. In very dry seasons the cracks in the lower areas of this type are often from 2 to 6 inches wide and from 3 to 6 feet deep. There is a phase of this soil locally known as "hog wallow," where the surface is rather uneven.

Alkali spots and sand mounds similar to those occurring in the Calcasieu fine sandy loam occur in this type, but the mounds are comparatively rare. In some places, on the other hand, the alkali spots are very plentiful, though of small extent, rarely exceeding 4 feet square. They are usually in depressions from 5 to 10 inches lower than the surrounding soil. (See Pl. XIX.)

The Houston black clay comprises about three-fourths of the area of the treeless prairie, and is found in the parts having the least elevation.

The larger part of this soil is used as a range for cattle, but where it can be well drained it is considered good for general farming purposes. Even the truck crops and pears have been found to do well upon it. Rice has been found to give a good yield, and this soil is doubtless destined to become one of the best rice soils of the country. The yield of prairie grass is very heavy, and a large quantity of it is cut

and baled each year, the price varying from \$3 to \$8 per ton. When there is an extended drought in northern and western Texas the prices sometimes range higher.

Quite often there is a very narrow strip of forest found on this soil bordering the streams. This consists of a variety of small oaks, and some areas are covered with a very thick growth of a bush locally called "coffee bean."

The following table gives the mechanical analyses of typical samples of the soil and subsoil of the Houston black clay:

Mechanical analyses of Houston black clay.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
				<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
7813	4½ miles SE. of Angleton.	Gray clay, 0 to 8 inches.	2.55	0.00	0.10	0.28	8.48	22.82	51.76	16.62
7811	4 miles N. of Angleton.	Gray clay, 0 to 7 inches.	3.65	.20	.50	.20	6.48	17.80	50.46	24.36
7809	3 miles NW. of Alvin.	Black clay, 0 to 6 inches.	3.88	.20	.56	.34	1.70	6.16	38.44	52.40
7814	Subsoil of 7813.....	Stiff gray clay, 8 to 36 inches.	2.21	.00	.04	.28	6.96	17.18	52.06	23.20
7812	Subsoil of 7811.....	Gray and yellow clay, 7 to 36 inches.	.79	.60	1.06	.50	2.18	12.16	51.44	32.06
7810	Subsoil of 7809.....	Waxy gray clay, 6 to 36 inches.	2.37	.32	.40	.24	1.06	3.82	37.10	57.00

YAZOO SANDY LOAM.

The Yazoo sandy loam is a dark-gray sandy loam to a depth of from 6 to 15 inches, underlain by a drab clay loam containing some sand. Immediately below this is a yellow or light-chocolate colored clay which extends to a depth of 3 feet or more. In some small areas the sandy loam soil extends to a depth of 3 feet or more.

The Yazoo sandy loam occurs in narrow ridges, seldom, if ever, exceeding 1½ miles in width, along sloughs and lakes and along both sides of the Brazos River. As will be seen from the map, no very large areas are found east of the Brazos River, but an extensive area is represented on the west side, occupying a ridge extending from the northern boundary of the Brazoria sheet down to within about 5 miles of Velasco, a distance of about 25 miles.

These ridges are elevated from 1 to 4 feet above the adjacent soil, which is usually Sharkey clay. Some of the sloughs along which this soil is found appear to have been flowing streams at one time, and it is very likely that during the overflows of the Brazos River this material, forming one of the most valuable soils of the Brazos bottoms, was



A PRAIRIE OF THE HOUSTON BLACK CLAY WITH ONE OF THE SMALL ALKALI SPOTS IN THE FOREGROUND, BRAZORIA AREA, TEXAS.
This soil has been used as vast cattle ranges, but it is being taken up now for rice culture.



PEAR ORCHARD AND STRAWBERRIES ON THE CALCASIEU FINE SANDY LOAM, BRAZORIA AREA, TEXAS.

This fruit and vegetable soil occurs on slight ridges in the Houston clay (black prairie). Very few of these pear orchards have escaped the ravages of the pear blight, which has almost wiped out what was once thought to be a most promising and profitable industry.

carried into the sloughs and deposited along their banks as along the river itself.

The elevation of these ridges gives the soil excellent drainage. A large part of it is not subject to overflow even during the highest water.

The principal timber growth is usually ash, live oak, and pecan. For general farming purposes the Yazoo sandy loam is considered one of the best soils of the area, being very easily cultivated and admirably adapted to sugar cane, corn, and cotton. While very little truck has been grown on this soil type, the indications are that it should be one of the leading truck soils of the county. Irish potatoes have been found to do very well, yielding from 200 to 300 bushels per acre. The crop has to be shipped to market very soon after ripening, as the tubers rot in a short time after removal from the ground. It is very fertile and has at the same time the light, friable texture needed to secure the best results in the production of early truck for the Northern markets. Most of the areas bordering the Brazos River have at some time been under cultivation, but they are now largely under a second growth of forest, principally pecan, and there are large areas where the trees are from three to five years old. If these trees were trimmed—possibly grafted—cultivated, and well taken care of, a handsome profit could be realized from the production of this nut. Up to the present time very little attention has been paid to pecan growing along scientific lines.

The following table shows the texture of the soil and subsoil of this type:

Mechanical analyses of Yazoo sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
7789	3 miles NW. of Columbia.	Compact dark-gray sandy loam, 0 to 10 inches.	2.13	Tr	8.84	0.68	1.04	19.32	68.36	9.58
7791	2 miles NW. of Brazoria.	Dark-gray sandy loam, 0 to 10 inches.	2.29	0.14	.60	.64	15.14	50.30	21.60	11.32
7793	8 miles SE. of Brazoria.	Compact dark-gray sandy loam, 0 to 12 inches.	1.99	.16	.74	.44	.90	17.76	68.06	11.48
7794	Subsoil of 7793.....	Yellow clay loam with fine sand, 12 to 36 inches.	1.14	.08	.40	.24	.44	14.04	67.80	16.12
7792	Subsoil of 7791.....	Yellow clay, 10 to 36 inches.	.26	.70	.80	.26	.88	25.10	49.34	22.00
7790	Subsoil of 7789.....	Yellow clay loam with sand, 10 to 36 inches.	1.00	Tr.	.38	.24	.54	13.72	57.00	27.58

AGRICULTURAL CONDITIONS.

The farming class, as well as all others, have been very unfortunate in the last few years, having suffered from the disastrous flood of 1899 and the storm of 1900, both of which caused the loss of crops and live stock, together with a vast amount of other property. The boll weevil also made its appearance in this area about four years ago, and has decreased the yield of cotton very rapidly. Soils that produced on an average from 1 bale to $1\frac{1}{2}$ bales of cotton per acre will to-day only yield from one-fourth to one-half bale. The towns of Brazoria and Columbia four years ago shipped from 4,000 to 5,000 bales of cotton annually. At present they are shipping from 400 to 500 bales. For this reason very few of the cotton gins that were destroyed by the flood and storm have been rebuilt, as the product would be too small to supply the great number of gins the county once had. The cotton acreage is decreasing very rapidly each year.

Sugar cane is to a certain extent gradually taking the place of cotton, and the sugar mills are being rebuilt. It will require the investment of immense capital to cultivate all the cotton plantations in cane, and for that reason if for no other it will take many years to entirely replace the production of cotton.

When cotton was extensively grown it was difficult to get labor on the cane plantations, as the negro considered the work harder, but at present labor is more plentiful.

There are seven sugar mills in the county. The plantations that own their mills usually plant from 500 to 1,000 acres in cane. The small farmers either sell their cane to the sugar mills or else make it into sirup by means of small mills run by horsepower.

There are several systems of farming employed in the area. When the farm is small it is usually farmed by the owner, but where it is large the owner manages the entire farm or employs an overseer, wage labor being hired by the day or month. Some of the farmers rent a part of their land either on a cash or share basis. Large plantations usually have a store, from which supplies may be obtained by the laborers.

The farms vary in size from 100 to 5,000 acres. Perhaps one-third of the area included in farms may be under cultivation, although on some of the small plantations the proportion ranges from one-half to three-fourths. There are very few plantations of over 1,000 acres. The greater part of the planters own their own farms. Many of the negroes also own farms containing from 10 to 100 acres, and are in a very prosperous condition. The large plantations in the area are gradually being subdivided.

The greater part of the cultivated lands lie in the alluvial bottoms, although there are some small areas tilled in the black prairie section.

The rice industry promises to give great impetus to the development of the prairie lands. The Houston black clay, which occupies a very large area, is admirably adapted to the cultivation of rice. The first rice was planted in the area about four years ago, and the growers have not been uniformly successful. The failures have been due in part to the cultivation of a crop new to the area by men not skilled in the methods of its cultivation, but chiefly to an insufficient supply of water, which has been drawn in some cases from lakes and bayous and in some from wells. The only irrigation canal of any importance in the area has a length of about 6 miles, taking water by means of a pump from Bastrop Bayou about 4 miles southeast of Angleton. The canal was designed to irrigate 2,500 acres, but on account of incorrect surveys and poor management of the water its capacity is probably about 1,200 acres.

Rice can not be grown on a very much larger scale in the Brazoria area until canals are constructed from the Brazos River. Several such canals have already been proposed and the surveys made, and it is very likely that some of these will be constructed in the near future. When these canals are built there is no doubt that this will become one of the greatest rice regions of the United States, for it has already been demonstrated that the soils are well adapted to the crop and that the product is of fine quality.

There are at present about 3,000 acres devoted to rice culture in the Brazoria area. The yield per acre ranges from 12 to 15 sacks, and the average price per sack in 1902 was about \$3.15. Lands adapted to the cultivation of rice, situated where water is easily obtainable, are worth from \$15 to \$30 per acre, while other prairie lands are held at from \$8 to \$12 per acre. Such areas are well suited to rice if water be brought to them. Water is near at hand in the water-bearing substratum, but it is difficult to use, as the pumps soon clog with sand which is so very fine that no means has yet been devised to separate it from the water. If this one difficulty could be overcome, irrigation with artesian water would be very successful.

In the vicinity of Alvin trucking has proved quite profitable and the industry is being rapidly extended. Strawberries are the principal crop. All the beds were destroyed by the storm of 1900, and the growers were left in sorry plight, but through public subscription funds were raised for the purchase of plants, and some 800,000 were shipped in in one season and the industry put upon as prosperous footing as before. Thirty thousand crates of berries, valued at \$60,000, are shipped annually from Alvin. The varieties of strawberries chiefly grown are the Lady Thompson, Hoffman, Michel's Early, Miner, and Excelsior. Two-thirds of the crop are of the variety first named. While a few berries are shipped to market as early as January, the season really opens about March 1.

In addition to strawberries, some blackberries are grown for market, the Wilson being a favorite variety. The Rodgers dewberry, taken from a seedling found in the Brazos bottoms, is also an important berry. It is said to be the best blackberry in the United States for shipping.

During an average season about 12,000 boxes, holding one-third bushel, of mixed vegetables are sent to the Northern markets. The average value of such shipments is about \$4,000. Not less than \$7,000 worth of tomatoes are produced. These are sent to market in four-basket crates, bringing from 90 to 95 cents per crate.

There are about 4,000 acres in pear orchards in the Brazoria area, and a few years ago handsome profits were realized from this industry, but the orchards are becoming badly affected by blight, the trees are dying rapidly, and many orchards have been cut down, having become unprofitable. The Le Conte and Kieffer are the favorite varieties. The latter is more resistant to blight than other varieties, and some orchards are still bearing very well, but in a few years, from present indications, and unless more care is taken of the trees by concerted action, there will be no pear orchards left in the area.

There are three railroads traversing the county: The Gulf, Colorado and Santa Fe Railway, which runs through the northern part of the area; the International and Great Northern Railroad, which follows the eastern edge of the Brazos bottoms, with its southern terminal at Columbia, and the Velasco, Brazos and Northern Railway, a short line extending from Anchor to Velasco on the Gulf. All these roads lie east of the Brazos River, and that part of the area has very good transportation facilities. West of the river the conditions are in this respect very unfavorable to the development of agriculture. The roads are impassable during a considerable part of the year, and the shipping of products is largely dependent upon the small steamers that ply the river and bayous.

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