

SOIL SURVEY OF THE WOODVILLE AREA, TEXAS.

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LOCATION AND BOUNDARIES OF THE AREA.

The soil survey of the Woodville area covers 100 square miles, lying in the central part of Tyler County. Woodville is approximately in east longitude $94^{\circ} 25'$ and north latitude $30^{\circ} 45'$. It is 85 miles northwest of Sabine Pass, situated on the Gulf of Mexico. The

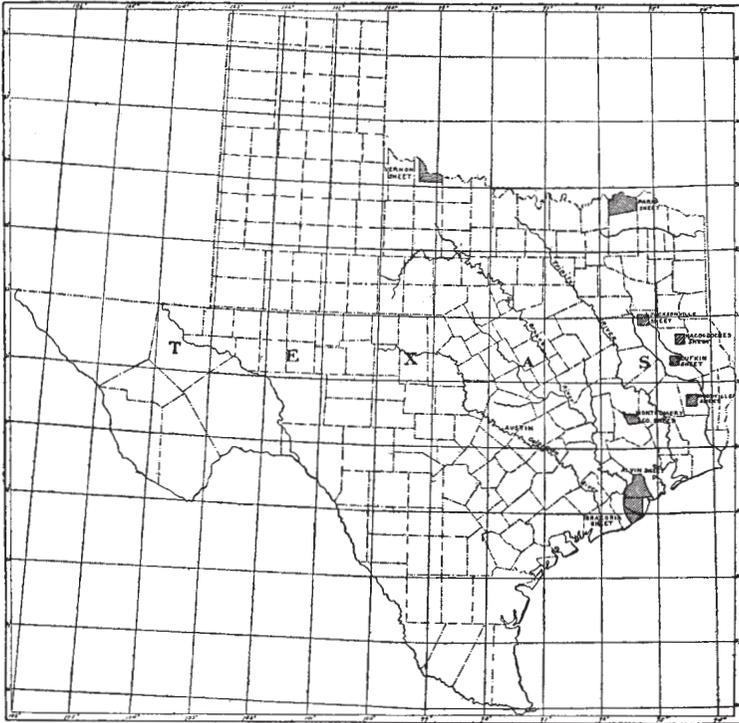


FIG. 23.—Sketch map showing location of the Woodville area, Texas.

distance to New Orleans by the Southern Pacific Railroad is about 330 miles. The area is about 65 miles north of Beaumont.

The survey extends 8 miles south, 2 miles north, 6 miles east, and 4 miles west of Woodville, forming a quadrangle, each side of which is 10 miles long.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

The first settlements were made in the county about seventy years ago. The country was then a dense forest, and only small clearings were made. Under the improvident methods of the early settlers the soil seems to have been exhausted, and many of these early clearings are now covered with dense growths of old-field pine. Small groves of second-growth sweet gum are also seen along the larger creek bottoms, where the soil was once cultivated. Cotton and corn were then, as they are to-day, the principal crops, with sugar cane and potatoes of less importance.

The present population of Tyler County is about 12,000. Less than 5 per cent of the area surveyed is in cultivation, the clearings are small, and the farmers for the most part live in comparative isolation.

CLIMATE.

The climate of east Texas is characterized by great relative humidity, long, hot summers, and mild, open winters. The most severe weather occurs in February, when cold "northers" are not uncommon. Ice seldom forms, however, and, except for rain, plowing and preparing for crops is possible throughout the winter. Few disastrous winds occur at any time during the year.

The following table gives the monthly and annual temperature for two Weather Bureau stations lying not far outside the area. Normals have not been established for these stations, but the averages are given for two years. These figures represent the only available data:

Monthly and annual temperature and precipitation.

Month.	Trinity.				Jasper.			
	1901.		1902.		1901.		1902.	
	Tempera- ture.	Precipita- tion.	Tempera- ture.	Precipita- tion.	Tempera- ture.	Precipita- tion.	Tempera- ture.	Precipita- tion.
	° F.	Inches.						
January	54.9	1.22	48.2	1.47	56.6	1.95	48.0	1.50
February	51.3	6.06	50.0	2.43	54.1	4.27	3.11
March	60.2	4.85	61.4	3.32	59.8	3.28	62.8	3.21
April.....	63.8	2.37	70.8	3.62	65.6	1.85	69.5	2.24
May.....	73.4	2.71	77.6	5.45	74.6	2.96	77.4	3.76
June.....	81.8	2.14	83.0	3.24	81.0	3.05	80.5	1.95
July.....	83.7	1.12	81.7	6.95	83.4	5.62	6.46
August.....	85.1	3.03	85.4	.02	85.2	4.08	84.0	.83
September.....	76.2	2.03	77.6	6.11	77.1	2.70	76.9	3.64
October.....	68.8	.92	68.8	9.37	69.1	1.00	69.6	2.80
November.....	60.6	1.92	63.6	4.68	61.0	3.13	65.1	8.45
December.....	49.5	2.23	52.6	1.81	55.4	4.04	57.0	3.64
Year.....	67.4	30.60	68.4	48.47	68.6	37.93	41.59

PHYSIOGRAPHY AND GEOLOGY.

The area surveyed is characterized by hilly, rolling topography, a pleasant relief having been given to the country by post-Tertiary erosion. Some of the principal streams have built up alluvial flats of from one-eighth to one-half mile in width, while the smaller streams have cut quite deep valleys, the hills rising from them in some instances to a height of 40 or 50 feet. At Woodville the elevation above sea level is 213 feet, and in the higher parts of the area the hills probably rise to an elevation of 300 feet or over.

The geology of this part of Texas has not been fully worked out, and no map showing the boundary lines between the different Tertiary deposits has been published. Tyler County lies in what is known as the Mississippi Embayment, and was once covered by the northern extension of the Gulf of Mexico. It is believed that the principal deposits in the area surveyed are of Miocene age, though they are probably more or less reworked and intermixed with later Pleistocene material. No rock outcrops or consolidated material other than iron crusts are to be seen in the area. Very little waterworn gravel is found.

SOILS.

Four types of soil have been recognized in the Woodville area, as follows: Norfolk sandy loam, Lufkin clay, Orangeburg sandy loam, and Meadow.

The boundary lines between the Norfolk sandy loam and the Lufkin clay are seldom sharply defined, but between the Orangeburg sandy loam and the Meadow and the other soils they are fairly distinct.

Areas of different soils.

Soil.	Acres.	Per cent.
Norfolk sandy loam.....	52,864	82.6
Meadow.....	5,568	8.7
Lufkin clay.....	4,416	6.9
Orangeburg sandy loam.....	1,152	1.8
Total.....	64,000

NORFOLK SANDY LOAM.

The surface soil of the Norfolk sandy loam is a loose gray to grayish-yellow sand of a uniform medium texture, except near the boundary line dividing it from the Lufkin clay, where, in many instances, it is rather more compact and the texture is somewhat finer. In depth it varies considerably, ranging from 12 inches to 3 feet or more. In some localities the soil contains a small percentage of rounded iron concretions, while still retaining its looseness of structure. Near the boundary line between it and the Orangeburg sandy loam this iron gravel

frequently amounts to between 10 and 25 per cent. The subsoil consists of a brownish-yellow to a yellowish-red clay, usually containing a high percentage of sand. Often the subsoil is mottled with gray. Deep road cuts not infrequently show a peculiar marbled appearance of the sandy clay, with white or gray and deep-red colors in striking contrast. In a few localities of small extent the Norfolk sandy loam is underlain by a uniform red subsoil somewhat heavier in texture than that found in the greater portion of the type. The clay is here rather silty than sandy, and is more impervious than the sandy clay usually met with.

The Norfolk sandy loam is by far the most extensive type of the area and is very generally distributed. It is cut by relatively narrow areas of Meadow and by small areas of Orangeburg sandy loam. About three-fourths mile east of Woodville it is interrupted by a considerable area of Lufkin clay. As a rule the soil is deepest and most typically developed in the western half of the survey, where it covers alike the hills and the valleys.

The type is generally characterized by a rolling topography, the contour of the hills being smoothly rounded rather than abrupt. The hills rise gradually from the main stream courses until, in the eastern side of the area, between Turkey and Tuvanan creeks, they attain a relative elevation of about 100 feet. For the most part the drainage is excellent, although in a few instances on flat-topped hills water stands for some time after heavy rains.

So little definite information is available as to the position in the geological column to which this part of Texas belongs that it is impossible to state in exact terms anything about the origin of the soils. It would seem, however, that a part at least of this sand is the weathered product of the underlying sandy clay, which is believed to be of Miocene age.

Probably not over 5 per cent of this type of soil is in cultivation, the remainder being covered by forest. The principal crops grown are corn and cotton. The latter, under favorable conditions, will produce upward of half a bale to the acre. During the past season (1902) scarcely one-third of a crop was secured, owing to the damage done by the boll weevil. Only the "bottom crop," or that which is first ripened, was gathered before the advent of this insect. Wheat, grass, and other crops requiring a heavy, strong soil are not grown to any extent upon this type of soil. Some of the fruits, such as peaches and pears, are grown for home use, but so far have not been produced in sufficient quantities for market.

The native forest growth is a mixture of hard and soft woods. Near the streams the magnolia is fairly abundant, many of the trees reaching a diameter of 2 feet or more. Numbers of willows and water oaks are also seen growing in the moister places. Upon the lower hills and slopes is a mixture of shortleaf and loblolly pine, with many hard-

woods, of which white oak, beech, ironwood, hickory, sweet gum, and holly are the most important. Longleaf pine seems to prefer the higher, drier slopes and more elevated hilltops, and is seldom found mixed with the hardwoods. Longleaf, shortleaf, and loblolly pine are found growing together in some localities. The best specimens of the former, however, are found segregated, and oftentimes occur in quite large areas.

The Norfolk sandy loam corresponds very closely both in texture and depth to the trucking soils of the Atlantic Coast States, and is fairly well adapted to the growth of most of the early truck crops. Fruit, especially peaches, can be profitably grown upon well-drained areas. Pears yield well, though some of the varieties are seriously affected by blight. The soil is admirably adapted to the growth of sweet potatoes, and Irish potatoes give fair yields.

The following table gives the results of mechanical analyses of samples of the fine earth of this type:

Mechanical analyses of Norfolk 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 0.001 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>
8000	1½ miles N. of Hillister.	Gray medium sand, 0 to 18 inches.	0.48	2.34	10.60	11.34	31.24	29.14	9.72	5.18
8002	2½ miles S., 1 mile W. of Woodville.	Gray medium sand, 0 to 13 inches.	1.71	1.84	7.18	11.88	36.12	22.50	13.60	6.96
8001	Subsoil of 8000....	Sandy clay, 18 to 36 inches.	.31	2.50	7.24	7.88	23.68	21.50	10.12	27.10
8003	Subsoil of 8002....	Yellow loam or clay, 13 to 36 inches.	.38	.50	3.92	7.02	21.42	12.12	13.82	40.80

LUFKIN CLAY.

The Lufkin clay varies considerably throughout the area, both in depth and texture. The boundary lines between it and the Norfolk sandy loam are nowhere sharply defined, and where these boundaries occur the soil often partakes somewhat of the character of both types. The typical profile consists of from 3 to 8 inches of fine sand or sandy loam, underlain by a yellowish or reddish-yellow clay which usually contains a considerable percentage of sand. This clay, at a depth of 30 inches, and in some instances nearer the surface, becomes quite heavy, tenacious, and of a greasy consistency. It is generally mottled red, yellow, and white, but is sometimes of a quite uniform yellowish-red color. Small, pure white lime concretions are occasionally scattered through the subsoil in the lower depths, though their presence has never been noticed at the surface.

The largest solid body of this type in the area occurs 1 mile east and southeast of Woodville. A few smaller bodies are found irregularly distributed in other parts of the area, but all are confined to the northern half of the sheet.

In general, the character of the country in which this type of soil appears is rolling, although 2 miles southeast of Woodville a few hundred acres of the type occupy a fairly level position. The soil is here somewhat heavier and the drainage poorer. The erosion of the smaller streams has imparted to the hills a rather abrupt, choppy contour in some parts of the area occupied by this type. With the exception of the level area already mentioned the drainage is satisfactory. This results from the position of the areas, which nearly always lie adjacent to the streams.

It is believed that the Lufkin clay owes its origin to the weathering of Miocene clays. In the case of this type the weathering has not been so extensive as in the case of the foregoing type, or else much of the sandy product has subsequently been washed from the surface and carried away to be deposited along the larger streams.

Comparatively little of this type of soil has ever been under cultivation. Where tried it has produced about 25 bushels of corn and about three-fourths of a bale of cotton to the acre. So far as can be learned no wheat has been grown upon it.

For general farm products this is believed to be the best soil in the area. While perhaps not so rich in plant food as the small areas of alluvial soils along the streams, it retains moisture well, is better drained, always cultivable, and much more productive than the Norfolk sandy loam. It should prove well adapted to grass and grain crops, and in fact to the needs of a diversified agriculture.

Results of mechanical analyses of this soil are given in the following table:

Mechanical analyses of Lufkin 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>
8357	1½ miles E. of Woodville.	Gray fine sandy loam, 0 to 5 inches.	1.83	0.12	0.96	4.58	23.18	35.16	23.02	12.96
8359	3 miles S. 33° E. of Woodville.	Sandy loam to clay loam, 0 to 9 inches.	2.62	.50	3.44	6.66	16.60	7.06	26.68	39.02
8360	Subsoil of 8359.....	Stiff mottled-red clay, 9 to 36 inches.	.52	.64	3.38	6.00	13.98	5.54	32.94	37.40
8358	Subsoil of 8357.....	Sticky clay, 5 to 30 inches.	.69	.04	.70	5.76	19.98	17.70	17.32	38.46

The following samples contained more than one-half per cent of calcium carbonate (CaCO₃): No. 8359, 1.54 per cent; No. 8360, 2.53 per cent.

ORANGEBURG SANDY LOAM.

The soil of the Orangeburg sandy loam is a compact red sandy loam containing considerable silt. It ranges from 6 to 10 inches in depth, and there is present in it from 10 to 40 per cent or more of rounded iron concretions, averaging about one-fourth of an inch in diameter. The subsoil is a heavy sandy clay to a depth of 3 feet or more. It contains a few particles of quartz sand, and ranges from an ochreous red to a deep red in color. The same iron gravel noticed in the soil is present in the subsoil, though to a less degree. There is usually a peculiarly dry, crumbly characteristic in the subsoil, causing it to roll easily under the thumb, yet to become smooth and polished with sufficient pressure.

This type of soil covers but a small portion of the area surveyed. It occurs in small, irregular, rounded or elongated areas of only a few acres in extent. The greater portion of the type is found southeast and southwest of Woodville, at a distance of 1 to 4 miles from the railroad. Little of it occurs in the northern one-third of the area.

The absence of this type from the central and south-central part of the area is due to the fact that it is found occupying only the highest ridges, away from the principal stream, which flows south through nearly the center of the area surveyed. The contour of these red gravelly hills is generally somewhat more abrupt than that of the hills of Norfolk sandy loam. Sometimes, however, the presence of areas of Orangeburg sandy loam is not indicated by any marked difference in topography, and they are to be found only on close inspection. This soil is never found to extend far down a slope, and is usually on the nearly flat tops of the sand hills.

The drainage of the soil is always excellent. Besides the part which topography plays, by allowing the surface water to run off freely, the subsurface drainage is greatly assisted by the presence of the ferruginous gravel in the subsoil, and probably artificial drainage will never be necessary.

The soil is believed to be the weathered product of the Miocene clays. The presence in a few instances of a small amount of water-worn quartz gravel among these iron concretions would seem to indicate that in some cases all of the material had been transported a greater or less distance by water, but in general it is believed that these concretions are gradually built up in place by the ordinary process of oxidation of the iron and the cementing together of the sand grains. The concretionary material is occasionally, though rarely, in the form of irregular, angular iron crusts, sometimes weighing several pounds.

With one unimportant exception this type of soil is covered with forest. The growth upon it is almost exclusively long-leaf pine, with occasionally a few scattering black-jack oaks of low, scrubby growth.

The forest floor is almost invariably clean and free from undergrowth, and presents a beautiful parklike appearance.

When cleared of the forest this type will prove a highly productive soil, adapted to a considerable range of farm crops. For the growing of the highest type of Cuban filler tobacco it is believed to be unexcelled.

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

Mechanical analyses of Orangeburg 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.
			<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>
8006	2½ miles S., ¼ mile W. of Woodville.	Brown sandy loam, 0 to 9 inches.	0.82	4.34	13.22	17.38	30.08	13.86	11.82	9.30
7940	5 miles SE. of Woodville.	Red sandy loam, 0 to 9 inches.	3.85	1.60	9.96	15.68	34.54	16.26	7.18	13.96
8004	2 miles W., 2 miles S. of Woodville.	Brown sandy loam, 0 to 8 inches.	2.33	2.60	7.20	10.30	28.14	15.34	9.60	26.74
7941	Subsoil of 7940....	Red clay, 9 to 30 inches.	1.04	1.14	10.06	13.04	21.84	6.42	5.60	41.82
8005	Subsoil of 8004....	Red clay loam or clay, 8 to 36 inches.	.71	3.30	7.64	7.78	19.54	10.18	8.50	43.26
8007	Subsoil of 8006....	Red clay, 9 to 36 inches.	.44	.92	6.60	10.08	11.50	5.30	10.90	54.62

MEADOW.

What is usually classed as a Meadow soil is one which, by reason of its occurrence along streams and its flat position and poor drainage, is not well suited to agriculture. While some of the Meadow mapped on the Woodville sheet is fairly well drained, its extent is not sufficient to warrant its classification and description as a separate soil type, and, as will appear further on, it possesses most of the characteristics of a true Meadow soil.

The soil varies from a brown fine sandy loam to a gray clayey silt mottled with iron stains. The depth of the soil averages about 10 inches. The subsoil is subject to about the same variations as the soil and ranges from a loose brown sand (where it underlies the brown sandy loam soil) to a gray and mottled silty clay. In the latter phase the mottling is due to the more or less oxidized iron salts, the stains sometimes appearing a deep rich brown or again almost a black. The subsoil is 3 feet or more in depth.

The soil is found along the larger streams, where the areas vary from one-eighth to one-half mile in width. The greater proportion of it

occurs in the eastern and northern parts of the sheet. The physiography is generally flat, though in some instances somewhat hummocky. These mounds are small in extent and not over 3 or 4 feet in height.

The greater part of the Meadow is fairly well drained, especially immediately adjacent to the stream banks, and in most instances but a small outlay for drainage would be necessary to bring it under cultivation. Other parts of the area are wet and swampy and covered with a thick undergrowth of red bay and other shrubs. These spots are locally known as "bay galls."

The soil is derived from the sediments deposited by the streams, which during high water occasionally overflow their banks. At present but a few acres are in cultivation within the area, though a few old fields, now covered with old-field pine and sweet gum, bear testimony to former attempts at cultivation. These old fields afford pasturage to a few head of stock. In its virgin state the forest growth upon the best-drained phase of this type of soil is largely beech. A little judicious drainage might put some of this type of soil into shape for corn, cotton, and grass. However, the danger of untimely overflows is always to be taken into account.

AGRICULTURAL CONDITIONS.

The settlers of the community are fairly prosperous, and the majority of them own their farms. The clearings are for the most part small in extent and rather widely separated. The timber rights of much of the forested land in the area are owned by the big lumber companies.

The farmers perform most of their own farm work with the help of negro labor. Farm labor is scarce and dear, for the reason that plenty of work is to be had in the lumber industry—about the mills and in the woods—at higher wages than the farmer generally feels able to pay. To this fact is attributed much of the backwardness in the agricultural development of the country.

The principal products of the area are cotton, corn, Irish and sweet potatoes, a small amount of sugar cane, fruit—such as peaches, pears, and apples—and the usual garden vegetables. Considering the wooded character of the country, a good deal of stock, especially hogs and cattle, is raised.

There seems to be little recognition of adaptation of soils to crops. The majority of the small farms are located upon the sandy soils, which soon wear out and are laid by, and then, after a period of rest, are again broken and cropped.

Transportation to points outside the county is had over the Texas and New Orleans Railroad, a branch of the Southern Pacific system.

The wagon roads radiating from Woodville are indifferently good at best. In dry weather the sandier ones are deep, and make hauling hard, while during rainy seasons those crossing areas of Lufkin clay are almost impassable on account of mud. Some little attempt is made to improve them by running the water off the surface in shallow ditches, but without much success. Deep, boggy holes are allowed to form, so that during periods of rain the driving of a single horse and buggy over the roads is almost an impossibility.

In the event of the establishment of a fruit or truck industry in this area the greater part of the product would have to be shipped out of the area, there being no local market of any considerable extent. The population of Woodville is only about 1,000, and a great many of the residents have their own gardens and orchards.

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