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U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF SMITH COUNTY, TEXAS.

BY

L. R. SCHOENMANN, IN CHARGE, E. H. SMIES, W. A. ROCKIE,
E. T. MAXON, F. Z. HUTTON, AND H. G. LEWIS.

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1915.]



WASHINGTON:
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LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., March 1, 1916.

SIR: In the extension of the soil survey in the State of Texas work was undertaken in Smith County and completed during the field season of 1915.

I have the honor to transmit herewith the manuscript report and map covering this area and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1915, as provided by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

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MAP.

Soil map, Smith County sheet, Tex.

SOIL SURVEY OF SMITH COUNTY, TEXAS.

By L. R. SCHOENMANN, in charge, E. H. SMIES, W. A. ROCKIE, E. T. MAXON, F. Z. HUTTON, and H. G. Lewis—Area inspected by HUGH H. BENNETT.

DESCRIPTION OF THE AREA.

Smith County is situated in the northeastern part of the State of Texas. It is the fourth county south of the Red River and the third county west of the Louisiana State line. It is bounded on the north by Wood and Upshur Counties, on the east by Gregg and Rusk Counties, on the south by Cherokee County, and on the west by Henderson and Van Zandt Counties. The Sabine River forms the entire northern boundary of the county, and the Neches River a large part of the western boundary. The county varies in width from $27\frac{1}{2}$ miles across the southern boundary to 36 miles across the northern part. The eastern boundary is about 25 miles long and it is about 35 miles from the northwestern to the southwestern corner. Smith County has an area of 892 square miles, or 570,880 acres.

There are no striking variations in the physiographic features of the county. The surface is mainly gently rolling to moderately hilly. Even the smooth areas are undulating or faintly undulating rather than level. Such smooth areas occur in the southwestern part of the county at Bullard, in the northwestern part at Lindale, and in the north-central section at Sand Flat School. The areas of roughest topography occur in the vicinity of Red Springs Church, south and west of Starrville, and midway between Troup and Bullard on the divide between Mud and West Mud Creeks.

The divides between the major drainage basins vary from rather broad, undulating, plateaulike areas to comparatively narrow,



FIG. 1.—Sketch map showing the location of the Smith County area, Texas.

sharply defined hills and ridges. The broad areas are usually covered with a mantle of deep sand, while the narrow divides are gravelly. The rougher topography, associated with the narrow divides, is largely due to the resistance offered to weathering and erosion by the stratum of ferruginous sandstone, from which the gravelly material has been derived. Only a small part of the county, however, is too rough for cultivation, and a still smaller part is so smooth and level as to possess poor natural drainage.

Tyler has a reported elevation of 531 feet above sea level. Lindale, on the crest of the Sabine-Neches River divide, is 559 feet above sea level. Flint and Bullard, located on the Neches-Angelina River divide, have elevations of 525 and 502 feet, respectively, and Whitehouse and Troup, both well within the Mud Creek drainage basin, have elevations of 483 and 467 feet. Winona, at the edge of Harris Creek bottom, is 317 feet above sea level. Harris Creek has an extremely low gradient from this point to its confluence with the Sabine River. The highest points in the county probably are not over 600 feet above sea level. This gives a range in elevation of about 250 to 300 feet between the main valley bottoms and the highest intervening ridges and divides.

From the main drainage ways a large number of ramifying lateral branches have developed wide drainage basins, which narrow and deepen as the large streams are approached. The valleys are open, shallow basins in their upper part, and deep, with wide, level flood plains, along their lower courses. There are few large areas which are not reached by drainage ways. The slopes along the Sabine and Neches Rivers, and those along the lower courses of their main tributaries, are usually short and steep. The general slopes, adjoining the principal divides of the county, are not so abrupt, though locally irregular in direction.

The main divide is that between the drainage systems of the Sabine and Neches Rivers. It enters the county just west of Garden Valley and follows an irregular southeasterly course through the county, passing through Mount Sylvan, Lindale, and Swan. It crosses the eastern boundary where the International & Great Northern Railway enters the county. Tyler is just west of this divide.

The Sabine River, which forms the entire northern boundary of the county, receives the drainage of the north side of this divide. All its tributaries have their source within the county, and flow in a north and northeasterly direction. The drainage of the southern part of the county is through the Neches River system. The southwestern fourth of the county is drained directly into the Neches River through several tributaries which flow in a southerly and southwesterly direction. The southeastern fourth of the county is drained by West Mud Creek, Mud Creek, Horse Pen Creek, and Strikers

Creek. The last two are tributaries of Boles Creek in Rusk County. These streams flow southward and southeastward. They unite soon after leaving the county to form the Angelina River, which flows into the Neches River about 100 miles southeast of Smith County.

The divide between the Neches and Angelina Rivers branches off from the main divide near Tyler, and parallels the St. Louis Southwestern Railway to Bullard, where it passes beyond the limits of the county.

Smith County was created from Nacogdoches County in 1846, and was organized the same year. Tyler was made the county seat. The first settlements in Smith County were made during the early part of the nineteenth century. The first American settlers were from Tennessee and Kentucky, and later settlers from Georgia, North Carolina, South Carolina, Alabama, and Mississippi entered the county. The Mexican Government encouraged settlement, prior to 1836, by granting large tracts of land to both Mexicans and Americans. Several such tracts in the southeastern, southwestern, and north-central parts of the county passed into private ownership in 1835. The largest of these grants, comprising nearly 31,000 acres, centered about the present site of Noonday, where the commissary for this vast estate was located. Omen, in the southeastern part of the county; Jamestown,¹ in the east-central part; Starrville, in the northeastern; and Garden Valley, in the northwestern part, were other centers of early settlements. At these points small trading centers were established, but with the advent of the railroads they lost a large part or all of their population, which migrated to the newly established towns along the railroads.

The population of Smith County is reported in the 1910 census as 41,746. Three-fourths of this is classed as rural, giving a density of settlement for the rural population of about 34 persons per square mile. The population has increased nearly 100 per cent in the last 30 years.

Tyler, situated near the geographical center of the county, is the county seat and largest town. It has a population of about 10,400, and is 639 miles by rail from St. Louis, 263 miles from Galveston, and 102 miles from Dallas. Tyler is an important shipping and distributing point for agricultural produce and merchandise.

Troup, a town of 1,126 population, is situated in the southeastern part of the county. It is the junction point of the Mineola branch of the International & Great Northern Railway with the main line. This town also gins cotton and is an important point for shipping fruit and truck to outside markets. Lindale, with a population of 658, is situated in the northwestern part of the county, on the Inter-

¹ This town was abandoned and later destroyed by fire and must not be confused with the Jamestown in the northwestern part of the county.

national & Great Northern Railway, and it is the center of an important fruit and truck growing section. Other small towns with shipping facilities on the same railway are Arp, Whitehouse, and Swan. Bullard and Flint, in the southwestern part of the county, are located on the Lufkin branch of the St. Louis Southwestern Railway, and are shipping points for the surrounding country. Winona, in the northeastern part of the county, is on the main line of the St. Louis Southwestern Railway. Omen, Starrville, Garden Valley, Mount Sylvan, and Noonday are interior villages of local importance.

The main line of the International & Great Northern Railway was built through the southeastern part of the county in 1872. A branch of this system, which traverses the county in a northwest-southeast direction, passing through Tyler and connecting with the Texas & Pacific Railway at Mineola, was built the following year. In 1877 a railroad was completed from Tyler through the northeastern part of the county to Big Sandy, on the Texas & Pacific Railway. This line, which was built by local enterprise and was known as the Tyler Tap, has since become a part of the main line of the St. Louis Southwestern Railway, which continues through Tyler in a northeast-southwest direction. The Lufkin branch of this railway runs south from Tyler through Bullard, in the southwestern part of the county, to Lufkin, Tex. These railroads afford direct transportation to the principal outside markets for Smith County products.

The county is well supplied with public roads, but little attention has been given to proper road construction or maintenance. As a result the main highways are in poor condition the greater part of the year, and almost impassable during the rainy season. Recently considerable interest has been taken in a good-roads movement. During 1914-15 about 180 miles of scientifically constructed sand-clay road was built in the county, and the mileage is being extended. The construction of such roads was begun at Lindale, but the improvement has been most extensive in the vicinity of Tyler. Bullard and Winona are connected by improved roads with the Tyler district. The national highway, which crosses the county in a northeast-southwest direction, is well improved.

Nearly all parts of the county have rural delivery mail service, and telephones are in use in all the thickly settled sections.

CLIMATE.

The climate of Smith County is characterized by relatively mild winters and long, warm summers, with a gradual transition from one season to the other.

During the winter months pleasant, sunshiny days, with crisp, cool nights, alternate with periods of cloudy weather, or slow, gentle rains of two or three days' duration. Sudden cold waves,

locally known as "northers," occur between November 1 and April 1, varying in duration from a few hours to two or three days. They are marked by a sudden fall in temperature to freezing or below, by a brisk north or northwest wind, and occasionally by a fall of sleet or snow, but more often by clear, cold weather. At such times the ground may freeze to a depth of 1 or 2 inches.

The spring months are pleasant, and favorable for plowing and seeding. This season is usually the period of heaviest precipitation. The rains of the early spring months are generally warm and gentle, but in the late spring thunderstorms characterized by short downpours occur with great frequency.

During the summer months the long periods of hot weather are favorable to the growth of corn and cotton. The precipitation during this portion of the year is mainly of a torrential nature.

The fall months are marked by warm, pleasant weather. With the approach of winter the heavy local rains characteristic of the summer months become less frequent, and the slow, general rains of the winter season begin.

The average date of the last killing frost in the spring is given by the Weather Bureau station at Longview, Gregg County, as March 12, and the records of this station are representative of climatic conditions in Smith County. The average date of the first killing frost in the fall is given as November 16, while the earliest date of killing frost recorded is October 26. The latest date of killing frost recorded in the spring is March 31. This gives an average growing season of 249 days, or a little more than 8 months.

The most serious damage from frost is suffered by fruit from the late "freezes" in the spring. Frequently a period of warm, pleasant weather occurs between February 15 and March 15, bringing such fruits as peaches and strawberries into early bloom, only to be followed by a sudden drop in temperature to freezing or below, due to a belated "norther." Some damage to these crops is experienced on an average in two or three of every five years.

The records of precipitation at Tyler are more nearly representative of the conditions prevailing in Smith County than those at Longview. The mean precipitation of about 38 inches is well distributed throughout the year. However, there are occasional periods of light rainfall, and when these occur during the growing season crops usually suffer from drought. The damage from this source can be greatly reduced by employing proper methods of cultivation for conserving soil moisture.

The climate is favorable for a widely diversified system of agriculture. The freedom from extreme cold temperatures favors dairying and stock and poultry raising. Live stock does not require expensive

housing, but merely a shelter from cool rains. Plowing and other cultural operations can be carried on during every month of the year. The growing season is sufficiently long for the maturing of all the staple crops and many varieties of fruits and vegetables, both early and late. Where an intensive system of farming is employed two or more crops frequently are grown on the same field in one season.

The data in the table below are compiled from the records of the Weather Bureau stations at Longview, Gregg County, and Tyler, Smith County. The normal monthly, seasonal, and annual temperature and precipitation at Longview are representative of Smith County, and are given in conjunction with the precipitation records for Tyler, Longview being the nearest point at which complete records have been kept. The records of the stations at Tyler and Longview cover periods of 13 and 19 years, respectively.

Normal monthly, seasonal, and annual temperature and precipitation.

Month.	Long View, Gregg County (elevation 336 feet).							Tyler (elevation 531 feet).		
	Temperature.			Precipitation.				Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	°F.	°F.	°F.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
December.....	48.6	83	13	4.16	7.38	8.96	0.6	2.74	0.77	8.12
January.....	47.3	80	7	4.18	.45	4.04	.3	4.10	.00	3.35
February.....	49.1	83	-7	3.72	3.74	2.33	.7	2.96	1.30	4.22
Winter.....	48.3	83	-7	12.06	11.57	15.33	1.6	9.80	2.07	15.69
March.....	58.2	89	19	4.35	3.18	6.00	.....	3.55	.00	5.47
April.....	65.4	93	34	4.39	2.49	8.00	.....	3.77	4.20	8.72
May.....	73.9	100	39	4.41	1.85	7.59	.....	3.63	.03	8.88
Spring.....	65.8	100	19	13.15	7.52	21.59	.....	10.95	4.23	23.07
June.....	81.1	105	50	4.31	2.41	8.51	.....	4.03	2.19	7.48
July.....	83.6	108	57	3.23	1.45	8.03	.....	3.46	2.25	9.58
August.....	83.4	110	48	1.84	2.15	.40	.....	1.93	1.60	.36
Summer.....	82.7	110	48	9.38	6.01	16.94	.....	9.42	6.04	17.42
September.....	77.5	105	40	2.89	1.46	2.08	.....	2.98	4.28	3.14
October.....	66.1	96	32	3.02	3.25	1.80	.....	2.23	5.90	2.00
November.....	56.2	93	21	4.10	2.30	5.56	.....	2.96	2.32	3.89
Fall.....	66.6	105	21	10.01	7.01	9.44	.....	8.17	12.50	9.03
Year.....	65.9	110	-7	44.60	32.11	63.30	1.6	38.34	24.84	65.21

AGRICULTURE.

The early settlers of Smith County were farmers, and from the outset occupation was along agricultural lines. In the early days the crops were grown for subsistence rather than for sale. Corn, wheat, peas, sweet potatoes, and vegetables were the principal products. A few cattle and hogs were kept by every farmer and pastured on the public range. Cattle and the surplus wheat were the only products marketed. The nearest markets were Jefferson, Tex., and Shreveport, La., and these points were reached only by a tedious journey. Some cotton was grown as early as 1850, but cotton did not become an important crop until after the Civil War. As the acreage devoted to cotton increased in the late sixties, wheat growing was abandoned, and corn and cotton became the most important crops, which position they have held ever since. The building of railroads in the early seventies stimulated settlement and development, but brought no immediate change in the crops grown or the methods of farming. During approximately the decade 1880-1890 considerable interest was taken in the growing of peaches, and since 1890 increasing attention has been given to the production of peaches, small fruit, and early truck.

Under the early system of agriculture, fields were planted continuously until yields became unprofitable. New land was then brought under cultivation and the old fields were allowed to lie idle for a period of years, growing up to brush and pine. Ridge culture was the general practice, and light implements with 1-mule draft were used for plowing and cultivating. These early methods still prevail on most farms.

Diversification is gaining in favor with the more progressive farmers, many of whom produce all the feedstuff required by their work stock, and a large part of the family supplies which formerly were purchased with the proceeds from the sale of cotton. Cotton promises to remain the principal cash crop, but it is recognized that a reduction in the acreage of this crop will enable the farmer to grow other cash crops and at the same time build up or maintain the productiveness of the soil by a system of diversification and rotation.

About one-third of the improved land of the county is devoted to cotton, and one-fourth to corn. The remainder is occupied by a variety of crops, including forage crops, vegetables, sugar cane, apples, peaches, small fruit, and pecans.

Cotton is the money crop of the county. The census of 1910 reports cotton on 87,123 acres in 1909, with an average yield for the county of slightly less than one-third bale per acre. The census reports 82,082 acres in cotton in 1899. Between 1900 and 1910 approximately 3,650 acres of good cotton land were planted to peach trees.

Next to cotton, corn is the most important crop. The 1910 census reports 68,052 acres in corn, with an average yield of slightly more than 12 bushels per acre. All the corn produced is consumed in the county, and in addition a large quantity is shipped in. The high prices paid for corn justify an effort to increase the local production.

Oats are grown to some extent on the upland soils. In 1909 this crop is reported on 2,056 acres. Cowpeas and peanuts are practically the only legumes grown. The census of 1910 reports 2,668 acres in cowpeas and 689 acres in peanuts.

Many vegetables are grown for home use and watermelons, cantaloupes, peppers, and asparagus to some extent on a commercial scale. The census of 1910 reports potatoes on 845 acres, sweet potatoes and yams on 702 acres, and all other vegetables combined on 2,906 acres. Sweet potatoes are grown for local markets and to a small extent for shipment, the yields ranging from 75 to 200 bushels or more per acre, depending on the productiveness of the soil. After January 1 the local supply usually is small, owing to the poor keeping quality of this product, and the price ranges from about 75 cents to \$1 a bushel. Tomatoes are grown to an important extent for early shipment to northern markets and to some extent for local canneries and for the late-fall market.

The 1910 census reports grains cut green from 1,083 acres and wild and cultivated grasses cut for hay and forage on about 200 acres. Bermuda grass is widely distributed and makes good pasturage. Hay is cut principally on the bottom lands, the yield averaging about 1 ton per acre. Sudan grass,¹ but recently introduced into the United States, is highly recommended by the Texas Agricultural Experiment Station as a hay crop. Johnson grass would be more extensively grown but for the difficulty in eradicating it.

Crab grass also is very troublesome in cultivated areas. It is used to some extent for pasturage in the fall. Broom sedge does well on all the uncultivated upland soils and affords some grazing. "Switch cane" in the bottoms affords some winter feed for stock.

Sorghum and milo are grown to a small extent for fodder. They make good yields.

The census of 1910 reports 605 acres of sugar cane in the county, and the area devoted to this crop has recently increased considerably.

The peach is the most important tree fruit grown. The 1910 census reports a total of 815,049 trees. The yield of peaches varies widely in different seasons, late frost in the spring frequently damaging the crop. The largest orchard in the county is situated near Winona. It comprises about 1,000 acres and includes 102,000 peach

¹ See Bul. 172, Texas Agr. Expt. Sta.

trees and 34,000 pecan trees interplanted. A total of 48,895 apple trees is reported. The yield of this fruit is low and the keeping quality inferior. Figs are grown in a small way for family use. Strawberries are the most important of the small fruits. The census of 1910 reports 667 acres devoted to this fruit, with a yield of 1,832,612 quarts. Ordinarily, yields of 100 to 200 crates per acre are obtained. Dewberries and blackberries are grown for shipment, but not so extensively as strawberries. The yield averages 100 24-quart crates per acre.

Pecan culture has received considerable attention in recent years. The principal orchards are just beginning to bear. Individual trees and the small orchards which have come into bearing show promising results. The 1910 census reports a total of 3,529 pecan trees in the county. Hickory nuts are gathered for home use, and several carloads are shipped out of the county annually.

The value of the live-stock products of the county in 1909 is given by the census as follows: Animals sold and slaughtered, \$365,893; dairy products, excluding home use, \$228,228; poultry and eggs, \$162,432.

Horses are used to some extent for draft animals, but mainly for saddle and driving purposes. Mules are used for farm work. Some oxen are used as draft animals in the lumbering industry. The dairy animals consist almost entirely of Jerseys or grades of that breed. The dairy industry has not been developed beyond supplying the local markets with milk and butter, except in the vicinity of Tyler, where a number of dairy farms have been established to supply the Tyler creamery with milk and cream for manufacturing ice cream and butter. Most of the dairy farms are stocked with purebred or good-grade Jerseys, and are supplied with silos.

The 1910 census reports 2,373 calves, 6,643 other cattle, and 14,458 hogs sold or slaughtered in 1909, and 879 horses and mules sold. A few hogs are kept on almost every farm, and on some of the larger farms considerable attention is given to hog raising. Rather extensive pastures are fenced for hogs in some of the principal stream bottoms. Crossing the native stock with Berkshire, Poland China, and Duroc Jersey has practically eliminated the "razorback" type.

Smith County offers attractive opportunities for the development of dairying, the raising of horses and mules, and the production of pork, beef, and poultry products for market. The mild climate permits grazing for 9 to 10 months of the year and makes expensive housing unnecessary. An abundance of nutritious pasturage and forage can be provided by growing such crops as Bermuda grass, bur clover, lespedeza, vetch, cowpeas, soy beans, velvet beans, peanuts, oats, rye, corn, and sorghum. Transportation facilities are favorable for shipping dairy and live-stock products.

The agriculture of the county, in general, is but little influenced by the topography, but the adaptation of the various soils to certain crops is generally recognized. Cotton is grown on practically every type of soil in the county, but the best results are obtained on the fine sandy loams, gravelly sandy loams, clay loams, and gravelly clay loams of the uplands. In dry years the first-bottom soils give the largest yields, but the average return from cotton on the bottom lands is materially diminished by overflows and wet seasons. Corn is grown on most of the soils, with some preference given to the bottom-land soils where they are available. Cowpeas do best on the fine sandy loams. Peanuts are grown mainly on the deeper sands and the fine sandy loams. There are many leguminous crops that will thrive on the well-drained soils of this county. Such crops do well on soils ranging from deep sands to clay loams, and could well be more extensively grown. Aside from their value as forage and hay crops, they gather nitrogen from the air and store it in the soil for the use of future crops. The legumes are desirable in rotations and are the best crops to use for green manuring. Hairy vetch and bur clover are winter legumes and are good soil improvers. Vetch and peanuts do best on the deep sandy soils. Bur clover and crimson clover are better adapted to the fine sandy loams and heavier types. Inoculation may be necessary to obtain the best results with crimson clover. On bottom-land soil better results are had with lespedeza than with any other legume. Soy beans are well suited to the upland fine sandy loams and heavier types. This crop is valuable for both its feeding value and its good effect on the soil. Preparation and cultivation for soy beans are similar to those required for cowpeas. Alfalfa is not grown to an important extent. The Greenville and Orangeburg are the soils in Smith County best adapted to this crop. Liming and inoculation are necessary for best results with alfalfa. The crop should be sown in the fall without a nurse crop, on land previously freed from weeds and grass by clean cultivation.

Sugar cane is grown entirely on the bottom-land soils, and is manufactured into sirup on the farm. The yield varies from about 125 to 300 gallons per acre, the average being about 200 gallons. The light-textured bottom lands produce the best quality of sirup. Cane sirup finds a ready market at an average price of 75 cents a gallon.

Watermelons are grown principally on the deep sandy soils. The Georgia Sweet is the variety grown for shipment, and several car-loads of these are sent to northern markets each year. Peppers and asparagus are truck crops of minor importance grown on the fine sandy loam soils.

The fine sands and fine sandy loams of the uplands are well adapted to sweet potatoes.

The Greenville fine sandy loam and gravelly sandy loam, Orangeburg fine sandy loam, Ruston gravelly sandy loam, and the Susquehanna gravelly sandy loam are said to produce earlier and better colored tomatoes than the other upland soils. Owing to the injury from long hauls, tomato growing is confined to the vicinity of shipping points. Tyler, Lindale, Swan, Flint, Bullard, Whitehouse, Troup, and Arp are shipping points for the various tomato centers. The Norfolk and Ruston fine sandy loams are well adapted to late-maturing tomatoes. The yields are somewhat heavier than on the soils devoted to the early crops, 300 crates being the average per acre. Shipments made after September 1 usually are as profitable as those made in the early spring.

Peaches are grown mainly on the fine sands, the well-drained fine sandy loams, and the gravelly sandy loams of the uplands, in areas where shipping points on the various railroads can be reached by short hauls. The Orangeburg and Greenville soils are reported by growers as producing earlier and better colored peaches than the soils of the Norfolk and Ruston series.

Strawberries are grown mainly on the fine sandy loams of the Norfolk, Ruston, and Orangeburg series. Dewberries and blackberries do well on the fine sands and fine sandy loams of the Norfolk and Ruston series. Tyler, Lindale, and Arp are the principal berry-producing centers of the county.

The paper-shell varieties of pecans are planted most extensively, and preference is given to the fine sandy loams of the Norfolk, Ruston, and Orangeburg series in selecting orchard sites. Hickory trees grow wild in the forested areas of the upland fine sandy loams and gravelly sandy loams and produce heavy yields.

Triumph and King are the varieties of cotton chiefly grown. Recently a variety known as "Half and Half" has been grown to some extent. The popularity of this variety is due to its reputation of ginning approximately 500 pounds of lint from 1,000 pounds of lint and seed. The staple is extremely short, however, and the buyers have discriminated against this variety of late, so that now very little is grown.

Cotton is grown on beds or ridges. On the uplands the ridges are $2\frac{1}{2}$ to 4 feet apart and stand 5 to 8 inches above the bottom of the intervening "middles" or "water furrows." On the bottom lands the ridges are spaced from 3 to 6 feet apart and are correspondingly higher. Shortly before planting, these ridges are leveled to some extent and fertilizer, where used, is then applied with a distributor. The seed is planted thickly, during April, by means of

a one-horse cotton planter. After the plants are well up, the rows are "barred off" by running a plow close to the row and turning away a large part of the ridge, leaving the plants on a narrow strip. The plants are then "chopped" or thinned with hoes to stand about 10 or 15 inches apart on upland soils and from 15 to 24 inches in the bottoms. The subsequent cultivation is performed with shovel or sweep plows, the soil being thrown toward the plants, then away, and finally back, so as to leave them on well-defined ridges or beds after the last cultivation. Two or three hoeings are necessary to keep the rows clean of grass and weeds. The crop is "laid by" about July 15. Picking begins in August and continues throughout the fall. The cotton is ginned as it is picked. The usual charge for ginning is one-twentieth of the lint or a cash rate of about 40 cents per 100 pounds, the owner receiving the cotton seed.

Yields¹ of cotton range from one-fifth to 1 bale per acre, according to the type of soil, rainfall, fertilization, and thoroughness of preparation of the seed bed and cultivation. The yields could be materially increased by developing varieties better adapted to the different soil types, following good crop rotations, giving frequent and successively shallower cultivations, and practicing proper fertilization.

Land is prepared for corn in about the same manner as for cotton. The corn is planted either on ridges or in the water furrow. The seed is dropped by hand in shallow furrows, and covered by turning the soil over it. When planting is done in the water furrow the soil of the ridges is gradually worked toward the corn in subsequent cultivations, so that when the crop is "laid by" the plants occupy moderate ridges. Several hoeings are necessary to keep the rows clean of weeds and grass. Cowpeas are sometimes sowed between the corn rows at the time of the last cultivation. The corn is snapped and stored unhusked. The water-furrow method is used to some extent on the deep sandy soils, and on the fine sandy loams and gravelly sandy loams of the uplands. On the deep sandy soils the land frequently is plowed broadcast, and the corn planted rather deep without ridging. The cultivation given early in the season is nearly level, but later the soil is worked toward the rows so as to leave the corn on slight ridges at the last cultivation. This method is well suited to the fine sandy loams and gravelly sandy loams of the Greenville, Orangeburg, Ruston, and Norfolk series. Planting on ridges is advisable on the bottom-land soils of the Ochlockonee, Hannahatchee, and Trinity series, and on the poorly drained upland soils, such as the Caddo and Lufkin.

¹ Statements regarding crop yields in this report are based upon observation and on statements of farmers.

Fertilizers are used to some extent for corn on the upland soils, but only occasionally on the bottom lands. Barnyard manure and compost are considered the best forms of fertilizer, but only a limited supply of these is available. Applications of 100 to 300 pounds per acre of commercial fertilizer analyzing 10-1.65-2¹ commonly are made. Cottonseed meal is sometimes applied at the rate of 300 to 500 pounds per acre.

Yields of corn vary with the season and the productiveness of the soil. They range from about 8 to 15 bushels per acre on the deep sands and from about 15 to 30 bushels on the fine sandy loams of the uplands. The yields on new land are 10 to 15 bushels above the average for the respective types. The bottom soils produce on an average 25 to 45 bushels or more per acre. The bottom-land soils and the upland fine sandy loams with sandy clay subsoils are the best corn soils of the county.

In growing corn deep fall plowing is beneficial on all the soils, except the deep sands, and this crop, in rotation with legumes, to supply nitrogen and organic matter to the soils, is advisable. Ridge cultivation is wasteful of soil moisture, and, where topography and drainage conditions permit, more nearly level cultivation is best. Frequent tillage serves to conserve soil moisture, and it is good practice to make each successive cultivation somewhat shallower. Drainage and protection from overflow generally is needed in bottom-land areas.

Oats are sown broadcast early in the fall. They serve as a cover crop through the winter, furnish light pasturage in the spring, and are either turned under or harvested for hay early in the summer. The crop is seldom allowed to ripen. Oats do well on all the well-drained soils of the county, except possibly the deep sands. They are valuable as cover and green manuring crops and for winter pasturage and forage. Winter rye is better for these purposes on the deep sandy soils.

Cowpeas are grown almost entirely in conjunction with corn. Where grown for seed the crop is seeded in the spring in rows. The rows of cowpeas are alternated with rows of corn, and both are given the same cultivation. If the crop is grown for forage or green manuring the seed is sowed broadcast between the rows of corn at the time of the last cultivation. Cowpeas for hay also can be seeded broadcast after such early-maturing crops as oats or early tomatoes.

Peanuts are grown in rows, either alone or alternating with rows of corn. Some of the peanuts are sold, but the crop is used principally for forage. Usually the plants are pulled and the vines cured

¹ Phosphoric acid, 10 per cent; nitrogen, 1.65 per cent; and potash, 2 per cent.

and fed with the pods attached. This crop makes good hog feed, and where used for this purpose the hogs are allowed to graze on the vines and to root up and eat the pods.

Strawberries are heavily fertilized. The Klondike is the variety most extensively grown, because of its good shipping qualities. The berries are packed in 24-quart crates and shipped to outside markets. The picking season begins between April 1 and April 10.

Bermuda grass is grown from seed or from fragments of the grass roots. It spreads rapidly and forms a turf which is very effective in preventing and stopping erosion. It is somewhat difficult to eradicate, but can be killed by planting thick-growing, shade-producing crops, such as cowpeas.

In growing tomatoes the seed is planted in hot beds from about January 10 to February 1, and the young plants are transferred to the field when 3 or 4 inches tall, after danger from frost is past, about April 1 to 15. The plants are set in 3 by 4 foot checks. In addition to hoeing, about three cultivations are given, by which the soil is thrown toward the plants. The crop is fertilized rather heavily, principally with commercial fertilizers. Shipping begins about May 25 to June 1, and continues three to six weeks. The tomatoes are packed in four-basket crates, holding about one-third bushel. The early crop yields an average of 250 crates per acre.

Young orchards are sometimes cropped to cotton the first few years and then allowed to grow up in weeds and grass. The best cared for orchards are regularly pruned and given clean cultivation. The Elberta is the most popular commercial variety of peach. Mamie Ross, Alexander, Victor, Belle of Georgia, Slappee, and Sneed are earlier varieties which are grown to some extent. The varieties of pecans which have proved their adaptability to local soil and climatic conditions at the State agricultural experiment station farm at Troup are the Frotscher, Mobile, Sweet Meat, and Delmas.

A total expenditure of \$176,962 for labor is reported in the 1910 census. The supply of labor for general farm work is adequate. The daily wage ranges from 50 to 75 cents. Laborers employed for long periods receive \$12 to \$18 a month with board, and from \$22.50 to \$28 without board. During certain periods for special farm work, mainly for cotton chopping, cotton picking, and the harvesting of the berry and peach crops, the supply of labor is not equal to the demand. From 75 cents to \$1.25 a day is paid for cotton chopping. For cotton picking laborers are paid 50 cents or more per 100 pounds. Berries are picked at a certain rate per quart or crate.

The census of 1910 reports 75.9 per cent of the area of the county in farms. The average size of the farms is given as 75.5 acres,¹

¹ Each tenancy is tabulated as a "farm" by the census. The average size of individual holdings is greater than the figure stated.

of which on an average 59.7 per cent, or 45 acres, is classed as improved land. The total number of farms is 5,924. Forty-five per cent of the farms are operated by owners, and practically all the remainder by tenants. The proportion of tenant farms has increased materially from the 33.7 per cent reported in 1890. Land is rented on either a cash or share basis. Cash rent ranges from \$2 to \$6 an acre, and prevails near the larger towns and shipping points, where the crops grown are mainly truck and small fruit. Under the share system several different plans are in common use. In some cases the rental consists of one-fourth of the cotton and one-third of the corn, the tenant furnishing everything necessary to produce the crop. Where fertilizers are used under this system, the cost is divided on the same basis as the crop produced. Where the landlord furnishes everything necessary to grow the crop, including seed, tools, and stock, and a house for the tenant, the tenant furnishing the labor, the crops are divided equally. In this case the landlord frequently extends credit for the tenant up to a certain amount.

The value of farm land depends primarily upon location and improvements. Near the towns and shipping points the value of improved land ranges from about \$40 to \$80 an acre, and of unimproved land from \$15 to \$30 an acre. The price of both improved and unimproved land decreases very rapidly as the distance from towns increases, and away from the town the value depends more upon the character of the soil. No point in the county is more than 10 miles from a railroad or more than 15 miles from a shipping point, and the road improvement now in progress is equalizing the value of farm land throughout the county.

SOILS.

Smith County lies within the inner or higher part of the Gulf Coastal Plain. Based upon the manner of their formation and distinguished by topography as well, the soils of the county may be classed with two general groups: (1) The upland soils, and (2) the lowland, or alluvial, soils. The soils of the lowland group may be divided into two groups, based on position: (*a*) First-bottom soils, and (*b*) second-bottom, or terrace, soils.

The soils of the upland division represent eight soil series, viz, the Greenville, Orangeburg, Ruston, Norfolk, Susquehanna, Caddo, Lufkin, and Henderson. The upland soils have been derived by weathering from beds of sand, sandy clay, and heavy clay, which were laid down in the remote past by water, probably as marine sediments, the material having been brought probably from the highlands to the north.

That weathering has caused important changes in the original material is evidenced by a comparison of the characteristics of the

present surficial material with those of the underlying strata, especially in regard to color. There remains, however, a close relationship between the soil and the parent underlying beds. The lithologic character of the beds immediately underlying the soil material can generally be determined by an examination of the deep subsoil. In many places the underlying strata alternate, so that a stiff, plastic clay, for example, may not extend to very great depths before material of another character is encountered. Erosion has cut through these strata in such a way that a variety of soils may be encountered on a single slope.

Oxidation and vegetation have brought about differences in the color of the soils, and erosion has played an important part in effecting differences in the texture of the surface material, washing the sandy and other soil materials from some areas, exposing the subsoil clay, and increasing the depth of the soil on lower slopes by sweeping the material from above. The dominant characteristics of the soils, however, are primarily dependent upon the character of the underlying material over far the greater part of the area. There is no very marked relationship between soil and physiography, except such as distinguishes the bottom lands from the uplands. The character of some soils is due to topography, however, certain types occurring in depressions and others over hilly or rolling country. In general the principal upland soils have a wide distribution.

With the exception of the Lufkin and Caddo, and a very small part of the Susquehanna, the upland soils are well drained. The Lufkin soils, comprising a small total area, are very poorly drained, while the Caddo soil is rather poorly drained. More than 75 per cent of the upland soils are high in content of quartzose material, and consist of fine sands, fine sandy loams, and gravelly sandy loams. The subsoils of these range from fine sand through sandy clay to stiff, heavy clay. The clay types have a relatively small total area, but the clay loams and gravelly clay loam are fairly extensive.

The Greenville, Orangeburg, Ruston, and Norfolk soils are derived from beds of sand and sandy clay. The Orangeburg, Ruston, and Norfolk soils are predominantly gray to grayish brown in the surface soil, but in the subsoil they differ from one another in color, though closely related in texture and structure. The Norfolk subsoils are prevailingly yellow, the Ruston reddish yellow or yellowish red, and the Orangeburg red. All the subsoils are friable.

The Greenville types are mainly reddish brown in the surface soil, and have dark-red, friable to moderately friable subsoils. Over considerable areas the material is as friable as that of the typical Greenville encountered in other parts of the Coastal Plain, but there are many areas in which the subsoil is somewhat stiffer than that of the more representative areas. The Greenville soils are

highly ferruginous, as indicated by the large and small fragments of ferruginous rock and the large number of iron concretions present, as well as by the rusty shade of the red. Some of the rock contains impure glauconite.

The Susquehanna soils are gray to grayish brown in the surface section, with red or mottled red, yellow, and gray, stiff, plastic clay subsoils. The subsoil material has been derived from beds of heavy clay instead of sandy clay.

The Caddo soil resembles the Norfolk soils in the surface part and frequently in the upper part of the subsoil. The lower subsoil is compact and mottled, and though similar in color it is characteristically more sandy than the corresponding section of the Susquehanna soils. The drainage usually is poor, especially in the subsoil.

The Lufkin types are gray or mottled gray and brownish in the surface soil with mottled gray and yellow, compact clay subsoils. These soils occur in depressions without adequate drainage outlets.

The surface soil of the Henderson series is dark gray or drab, with a greenish-yellow, plastic subsoil. This series is derived from calcareous clays.

The lowland soils of the county are classed with five soil series. Those mapped as the Trinity, Hannahatchee, and Ochlockonee series are first-bottom soils, while those of the Bienville and Kalmia series are terrace soils. The greater part of the first-bottom, alluvial soils is clay and silty clay loam, but the sandy bottom-land soils have an important development.

The first-bottom soils are composed of material washed from the uplands of the county and of contiguous regions, where the streams rise beyond the county limits, with some wash from the calcareous prairies to the northwest. The material has been deposited over the flood plains of the streams by overflow water. All these soils are subject to inundation, but between overflows, at least during the summer, they are fairly well drained.

The Trinity series, which represents alluvium containing some wash from areas of the calcareous Houston soils to the northwest, is dark brown to black in the surface soil, while the Ochlockonee soils are brown and the Hannahatchee reddish brown. The Ochlockonee and Hannahatchee are made up of material washed largely from the Caddo, Norfolk, Orangeburg, Greenville, Susquehanna, and Ruston soils, the Hannahatchee containing sufficient wash from the Greenville to impart a distinctive reddish color.

The stream-terrace soils are sandy, and are rather unimportant in extent. The terraces represent remnants of former first-bottom deposits, which were laid down when the streams flowed at higher levels. The drainage of these soils is good. The Kalmia soil is gray

in the surface section, and yellow in the subsoil. The surface soil of the Bienville is brown, and the subsoil light brown.

Meadow is a miscellaneous type, embracing poorly drained strips of soil of widely variable texture developed along the smaller streams.

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

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Ruston fine sandy loam.....	129,792	22.7	Meadow.....	8,512	1.5
Susquehanna fine sandy loam.....	125,184	21.9	Ruston fine sand.....	7,360	1.3
Norfolk fine sand.....	102,976	18.0	Orangeburg fine sandy loam..	6,464	1.1
Ochlockonee fine sandy loam	37,056	6.5	Greenville fine sandy loam...	6,016	1.1
Caddo fine sandy loam.....	32,000	5.6	Hannahatchee fine sandy		
Greenville gravelly sandy			loam.....	3,712	.6
loam.....	22,336	3.9	Trinity clay.....	3,648	.6
Greenville clay loam.....	¹ 19,904	3.5	Kalmia fine sand.....	1,984	.3
Norfolk fine sandy loam.....	15,744	2.8	Bienville fine sand.....	1,024	.2
Susquehanna gravelly sandy			Lufkin silty clay loam.....	960	.2
loam.....	13,248	2.3	Henderson clay.....	192	.1
Ochlockonee clay.....	12,096	2.1			
Ochlockonee silty clay loam..	11,136	2.0			
Ruston gravelly sandy loam..	9,536	1.7	Total.....	570,880	.....

¹ The greater part of this area consists of Greenville gravelly clay loam, shown by gravel symbol in Greenville clay loam color.

GREENVILLE GRAVELLY SANDY LOAM.

The Greenville gravelly sandy loam to a depth of about 4 to 10 inches consists of a light-reddish to reddish-brown or brownish-red gravelly loamy fine sand, grading into a red gravelly fine sandy loam. Underlying this at about 8 to 18 inches, and extending to more than 3 feet, is a deep-red, moderately friable clay, usually containing small streaks or pockets of friable, ochereous-yellow or greenish-yellow material. The gravelly material of both soil and subsoil is composed of small iron concretions and fragments of ferruginous rock.

Some narrow, unimportant areas of Ruston and Susquehanna gravelly sandy loam are included with the type. These occur in isolated areas, chiefly on steep slopes along streams or as narrow ridges and knolls, which probably are due to the resistance to weathering and erosion of the ferruginous sandstone.

This type usually occurs in close association with the other soils of the Greenville series and occupies gently sloping areas, which become rather steep and broken in some places adjoining the gravelly clay loam. In such places the surface soil is predominantly reddish and

often contains quite large ferruginous rock fragments. Where not closely associated with other Greenville soils the surface soil has a more reddish brown color, becoming lighter or grayish as the adjoining gray soils are approached, and the soil depth is generally greater.

Owing to its open structure, where this soil occurs on the steeper slopes it is rather excessively drained, but where its surface is gently sloping it is a fairly productive soil, especially when care is taken to prevent erosion.

The largest areas of the Greenville gravelly sandy loam occur in the southwestern and south-central sections of the county and in the northern part around Winona, Utica School, and Mount Carmel Church. Smaller areas are found in other parts of the county.

Probably less than one-third of this soil is under cultivation, the remainder being forested, chiefly with blackjack oak, red oak, hickory, and shortleaf pine. The cultivated areas are confined to the gentler slopes and are considered the most desirable of the gravelly sandy loam types in the county, owing to their greater productiveness without the use of fertilizer.

The principal crop on the Greenville gravelly sandy loam is cotton, with some corn to feed the work stock. Some peaches also are grown. The other products, including oats and truck crops, are not important. Crops, particularly cotton, do not suffer from the effects of drought as much as the loose character of the soil would lead one to expect.

Under the prevailing methods of farming on this type corn yields average from 12 to 25 bushels, and cotton from one-fourth to three-fourths bale per acre. These yields are increased in some cases by using fertilizer, as on the Greenville fine sandy loam, and by contour plowing and terracing. This is a very desirable soil for the production of peaches and tomatoes. Berries usually do well. This soil is one of the earliest in the county.

The Greenville gravelly sandy loam ranges in value from \$15 to \$70 an acre, depending upon location, topography, and improvements.

This type could probably be made more productive, and much more of it could be utilized, by contour plowing and terracing, as is done by the more progressive farmers near Lindale, and by growing the legumes, such as cowpeas, in rotation with the clean-cultivated crops.

GREENVILLE FINE SANDY LOAM.

The surface soil of the Greenville fine sandy loam consists of a brownish-red to deep-red loamy fine sand to fine sandy loam to a depth of 6 to 15 inches, with an average of about 10 inches. When dry it has a reddish-brown cast, and in places where the organic-

matter content is high the color is dark reddish brown. The surface soil grades quite rapidly into a deep-red, friable to moderately friable fine sandy clay. Frequently yellowish, friable material, probably limonite, is encountered in small quantities as mottlings in the deep subsoil. Some small fragments of iron sandstone and ironstone which is less arenaceous and iron pebbles (concretions or accretions or both) are present in places in both the soil and subsoil.

The Greenville fine sandy loam differs from all the other typical fine sandy loam soils of the uplands chiefly in its uniformly reddish surface color and the more loamy nature of the surface material. In all other characteristics it very closely resembles the Orangeburg fine sandy loam, with which it is often associated and with which it merges in places so gradually that sharp boundaries can not be drawn.

The Greenville fine sandy loam occurs most extensively in the vicinity of Bullard and Whitehouse, the largest area probably not exceeding 1 square mile in extent. Smaller, detached areas are found throughout the county. The smaller areas that do not adjoin other members of this series are associated chiefly with the Orangeburg and Ruston soils.

The surface is predominantly undulating to very gently rolling, the type occupying either plateaulike positions or very gentle slopes. Drainage is generally well established, and by reason of the open character of the material there is little erosion, the soil readily absorbing the rainfall and the excess surface water running off slowly.

This soil is easily cultivated and may be handled under a wide range of moisture conditions, although it is somewhat sticky when wet. It is not so loose as to be droughty when handled with care, and it is easily kept in good tilth.

The Greenville fine sandy loam is practically all under cultivation and is recognized as one of the most desirable soils in the county and one capable of being brought to a high state of productiveness. Cotton is the chief crop grown. Most farmers grow enough corn for the work stock. The system of farming, however, is practically a one-crop system, consisting of cotton production, following the usual methods of clean cultivation, with a relatively unimportant acreage devoted to corn and oats and other crops.

Cotton yields from one-half to one bale, and corn about 20 to 40 bushels per acre. While commercial fertilizers are not so commonly used on this type as on the gray soils, and though the farmers do not usually pay close attention to fertilization, it has been demonstrated that best results are obtained where the content of nitrogen in the fertilizer is high. In the vicinity of Bullard and northwest of Lindale yields of corn as high as 75 bushels per acre have been obtained by adding nitrogen and carefully cultivating the crop.

Cottonseed or cottonseed meal also is used to a small extent as a fertilizer for corn, being applied in the early spring and plowed under, and a noticeable increase in yield is said to result. Peaches do well on this soil. Among the other crops which are successfully grown, though in a small way, are tomatoes, potatoes, peanuts, and berries.

Land of this type ranges in value from \$20 to \$60 an acre, depending upon location and improvements.

GREENVILLE CLAY LOAM.

The Greenville clay loam consists of a reddish-brown to dark-red clay loam, in many places somewhat sandy in the surface 3 or 4 inches, underlain at about 5 to 8 inches by deep-red, friable or moderately friable clay, which in the lower part often carries a varying quantity of ochreous-yellow or greenish-yellow, friable material. The surface frequently has a thin covering of red fine sandy loam, but when cultivated the soil works up into a typical clay loam.

The Greenville clay loam is level to undulating. Drainage is good except in a few small, flat spots. The soil is retentive of moisture, although it tends to bake in dry seasons, causing crops to suffer, unless the soil is kept in a mellow condition by proper plowing and the maintenance of the organic-matter supply. It is a productive, durable soil. Heavier teams and implements are required for efficient tillage than on the sandy soils.

This type is the heaviest of the Greenville soils in this county. The most important developments occur in the vicinity of Bullard, Whitehouse, and northwest of Basconi Church. Small areas also occur at Garden Valley, and another in the vicinity of Bethlehem Church. These areas are closely associated with other soils of this series, and are surrounded by them or lie just below.

The original forest growth on this type was blackjack oak, red oak, post oak, and shortleaf pine, with some hickory. Practically all of it is now under cultivation.

The Greenville clay loam is one of the strongest of the upland soils. It is considered a very desirable soil for cotton and corn, which are the chief crops grown. Cotton yields from one-fourth to 1 bale and corn from 15 to 40 bushels per acre, depending upon the methods of handling the soil. Yields have been increased in the vicinity of Bullard and Bascom Church by the addition of relatively large quantities of nitrogenous fertilizer and by careful cultivation. Near Whitehouse this soil produces tomatoes, which are said to be of excellent quality. It is reported that good results have also been obtained with oats and small fruits.

Owing to its productiveness and to its favorable location with respect to markets this soil is held at \$35 to \$50 an acre.

GREENVILLE GRAVELLY CLAY LOAM.

Areas within the Greenville clay loam marked with gravel symbols represent the Greenville gravelly clay loam. The type consists of a reddish-brown to dark-red clay loam or fine sandy loam which passes quickly into clay loam underlain at about 4 to 6 inches by deep-red, moderately friable to rather stiff clay. The subsoil becomes more friable with increasing depth, and usually contains small pockets or thin layers of ochreous-yellow or greenish-yellow, friable material in the lower part. Small, angular fragments of iron sandstone and iron concretions or pebbles are present throughout the soil section, being so abundant in the surface soil as to give it a decidedly gravelly nature. The greater part of the gravelly material ranges from less than $\frac{1}{4}$ inch to 2 or 3 inches in diameter, but larger, angular, and platy fragments of iron sandstone, ranging to 2 or 3 feet in diameter, occur in some places.

In some areas of the Greenville gravelly clay loam there is a thin covering of fine sand to fine sandy loam. This covering is rarely deep enough materially to affect the texture of the surface soil when cultivated, and usually occurs along the contact with a lighter soil. On portions of the type erosion has been quite active and practically all the surface soil has been removed, leaving a deep-red, heavy gravelly clay loam to moderately friable gravelly clay exposed. As mapped this type includes occasional unimportant patches of Greenville gravelly sandy loam and fine sandy loam, which are too small to map satisfactorily. In other places there are included patches of Susquehanna gravelly sandy loam.

The Greenville gravelly clay loam occurs chiefly on the tops of rather narrow divides, on stream slopes, and in narrow strips on the abrupt slopes of some of the larger hills. It has its principal development in some of the rougher and more severely eroded sections of the county. The largest development forms a broken strip extending across the northern part of the county from near Harris Creek to Garden Valley, and south to Mount Sylvan. Large areas occur to the northeast, east, and southeast of Tyler, and in smaller areas in other parts of the county. It usually is associated with the Greenville gravelly sandy loam. The sloping surface insures good drainage, and causes destructive washing in places.

A large part of this soil is forested, mainly with shortleaf pine, red oak, blackjack oak, post oak, and hickory. Native grasses afford fair pasturage where the timber growth is sparse. The uncleared land is valued chiefly for its timber. The cultivated land of this type is confined to the moderate slopes of the divides.

The Greenville gravelly clay loam is used principally for growing cotton and corn. In seasons of average rainfall cotton yields from

one-fourth to three-fourths bale, and corn from 10 to 25 bushels per acre. In drier years the type is inclined to be droughty. Although peaches are grown only to a small extent, they have given good yields in the vicinity of Bullard and Amigo. The peaches are said to be highly colored and of good quality.

The cultivated areas of this type are often included in farms with other soils, making it difficult to ascertain the value of this type.

The steeper slopes of the Greenville gravelly clay loam are best used either for forestry or as pasture, and contour cultivation and terracing are advisable on the gentler slopes where used for cultivated crops.

ORANGEBURG FINE SANDY LOAM.

The typical Orangeburg fine sandy loam is a gray or slightly brownish gray fine sand, which grades through several inches of pale-yellowish or reddish-brown fine sand or fine sandy loam into red, friable fine sandy clay at about 10 to 20 inches. In places a few iron concretions are present in the surface soil. The lower subsoil of some areas is more friable than the upper subsoil and contains some ochreous-yellow material. The shallow areas of the type have a reddish cast when plowed deeply.

This type usually occurs in association with the Ruston fine sandy loam and the Greenville fine sandy loam, and the boundaries between these soils usually are not sharply defined. Though very similar to the Ruston fine sandy loam in surface appearance, the subsoil of the typical Orangeburg fine sandy loam is decidedly redder and somewhat more friable. The type differs from the Greenville fine sandy loam in having a gray, instead of red surface soil.

The Orangeburg fine sandy loam covers an area of 10.1 square miles. The principal areas are associated with the Greenville soils in the southern and southwestern parts of the county. Other areas of importance occur near Whitehouse and on both sides of Harris Creek, near Winona. A number of small isolated bodies are scattered over the remainder of the county.

This type occurs on broad divides and gentle slopes. The topography varies from almost level to undulating and gently rolling. Good surface drainage and underdrainage prevail over the entire type. Owing to the gentle slope and the absorptive capacity of the soil, the greater part of this type can be cultivated without danger of serious erosion. Cultivation can be safely carried on within a day or two after heavy rains. The soil is quite retentive of moisture and crops do not suffer from drought, except during exceptionally long dry periods. It is easily cultivated.

Practically all the Orangeburg fine sandy loam is under cultivation. It originally was forested with blackjack oak, red oak, and hickory, with some sweet gum and shortleaf pine.

This type is considered one of the most desirable soils in the county for general farm crops, vegetables, strawberries, and peaches. Cotton is the principal crop grown. It yields from one-fourth to 1 bale per acre. Corn produces 15 to 25 bushels per acre. Oats usually are cut for hay, and produce good yields. Several peach orchards are located wholly or partly on this soil, and the growers consider it one of the best peach soils in the county. Strawberries grown on this type at Arp and Whitehouse are reported to yield from 150 to 200 24-quart crates per acre.

Land of the Orangeburg fine sandy loam in cultivation about 7 miles west of Bullard is valued at \$35 an acre. In general, improved land of this type ranges in value from \$25 to \$50 an acre, depending upon the location and the improvements.

This soil responds readily to good management. It is low in organic matter and where cowpeas are grown a noticeable increase in the yield of the succeeding crops is reported. Crop rotations including this legume for forage and green manuring might well be employed more generally.

RUSTON FINE SAND.

The Ruston fine sand consists of a gray, loose fine sand which passes at about 12 to 16 inches into reddish-yellow and then into yellowish-red or dull-red fine sand, usually slightly loamy in the lower part of the 3-foot section. Ordinarily this type is very uniform in character. Two areas of Orangeburg fine sand are included with it because of their small extent. These areas are distinguished from the Ruston by their conspicuously red subsoil. The Ruston fine sand differs from the Norfolk fine sand, which it resembles in surface appearance, in having a yellowish-red instead of a pale-yellow subsoil.

The Ruston fine sand occurs mainly in the western half of the county. It occurs on relatively broad ridges and gently sloping sides of valleys. The surface features vary from undulating to gently rolling or gently sloping. The drainage is good to excessive. During dry periods crops often suffer from lack of moisture, although this type is held by farmers to be more drought resistant than the Norfolk fine sand. About one-half the type supports a growth of small blackjack oak, bluejack oak, and shortleaf pine.

Cultivated areas are devoted mainly to the staple crops, cotton and corn. Peaches, blackberries, dewberries, and strawberries, named in the order of their relative importance, are grown to some extent for market. Newly cleared fields give moderate yields of corn and cotton for several years, but under the prevailing method of growing clean-cultivated crops without rotation, the yields decrease rapidly. Cot-

ton averages about one-third bale per acre on new land, and about one-fifth to one-fourth bale on old. The yield of corn ranges from 8 to 20 bushels per acre. Peaches do well in favorable years. Blackberries, dewberries, and strawberries, grown with commercial fertilizers, give moderate yields.

The value of this type is based largely upon its location. Areas remote from towns are held at \$5 to \$12 an acre, while those near shipping points command a considerably higher price.

The Ruston fine sand is a soil of relatively low agricultural value, though considered by farmers to be slightly stronger than the Norfolk fine sand. The same method of improvement may be employed on either of these types. The greatest need is organic matter, which may be added either in the form of green crops turned under or barnyard manure. Applications of commercial fertilizers increase the yield.

RUSTON GRAVELLY SANDY LOAM.

The surface soil of the Ruston gravelly sandy loam consists of grayish to brownish gravelly fine sand. The subsoil, beginning at about 8 to 16 inches, is a yellowish-red or dull-red, moderately friable fine sandy clay. The subsoil usually is rather compact in the lower part of the 3-foot section, and is mottled with shades of red and yellow. Small angular fragments and pebbles of ironstone and iron sandstone are plentifully distributed over the surface and disseminated through the soil. In a few places some gravel is encountered in the subsoil. Larger platy fragments of iron sandstone also are present in the soil of some areas. When such areas are cultivated this material is removed, leaving a soil of gravelly, rather than stony, character.

The Ruston gravelly sandy loam is not an extensive type, but it is rather widely distributed through the eastern half of the county. It occurs on the tops of rather narrow divides, on knolls, and along abrupt slopes and bluff lines. A few areas are comparatively level, but over the greater part of the type the surface is hilly to steeply sloping. The topography insures good surface drainage. The type supports a growth of blackjack oak, red oak, hickory, and shortleaf pine.

Cultivation is confined to the few smooth areas and the moderately sloping areas. The type is fairly productive. Cotton, peaches, and early tomatoes are the crops most commonly grown. Cotton yields about one-half bale per acre. This soil is considered only slightly less desirable than the Greenville gravelly sandy loam for peaches and tomatoes.

Cultivation can probably be extended to some of the steeper areas by means of contour cultivation and terracing, as has been done just

west of Omen, but most of these areas should be left in forest or used for pasture land.

RUSTON FINE SANDY LOAM.

The typical Ruston fine sandy loam consists of 6 to 12 inches of gray to slightly brownish gray fine sand or loamy fine sand, grading below into pale-yellow to slightly reddish or buff fine sandy loam. The subsoil, beginning at a depth of 12 to 20 inches, is a dull-red or brownish-red to yellowish-red, friable to moderately friable fine sandy clay. There are many places in which mottlings of yellow and red appear in the lower subsoil, especially where the type approaches areas of the Susquehanna soils. Occasionally the lower subsoil is rather compact. A small quantity of gravel in the form of small fragments of iron sandstone and iron concretions is often encountered on the surface and in the surface soil. Where this material is present in sufficient quantity and to a sufficient extent, the soil is mapped as the Ruston gravelly sandy loam.

The Ruston fine sandy loam resembles the Norfolk, Orangeburg, and Susquehanna fine sandy loams in surface appearance. The subsoil, however, is not so yellow as that of the Norfolk fine sandy loam, nor so red as that of the Orangeburg fine sandy loam. The type differs from the Susquehanna fine sandy loam in having a more friable subsoil, which is less conspicuously mottled. The boundary between these other upland fine sandy loam types and the Ruston fine sandy loam is not everywhere sharply defined. As the Norfolk fine sandy loam is approached, the subsoil frequently becomes mottled with yellow and reddish brown. In passing from the Ruston fine sandy loam to the Susquehanna and Caddo fine sandy loams, the lower subsoil becomes somewhat plastic, and mottlings of red, yellow, and gray appear.

Another variation from the typical soil occurs in the east-central part of the county in the drainage basin of Wilder Creek, in the west-central section in the drainage basins of Indian and Butler Creeks, and south of Swan. In these places much of the Ruston fine sandy loam has a subsoil which begins abruptly at a depth of 12 to 16 inches as a yellowish-red, compact sandy clay, faintly mottled with yellow. At a depth of about 18 to 24 inches this material passes into friable or mealy sandy clay, mottled conspicuously with yellow and reddish brown.

The Ruston fine sandy loam is the most extensive type in the county. The principal areas occur between Whitehouse and the Cherokee County line and to the east and north of Arp, but the greater part of the type occurs as relatively small areas, separated or interrupted by other upland soils.

This type occurs both on rather broad, undulating ridges and on moderately sloping valley sides. The surface features vary from undulating to gently rolling and sloping. On the broader divides almost level to gently sloping areas of considerable extent are mapped. The steeper areas occupy the slopes leading down to the larger stream bottoms. Most of the type can be cultivated without danger of harmful erosion. Both surface drainage and internal drainage are well developed. The sandy clay subsoil absorbs and retains moisture well. This type probably ranks next to the Norfolk fine sandy loam in resistance to drought.

The Ruston fine sandy loam originally was forested with a mixed growth of shortleaf pine, blackjack oak, red oak, hickory, and gum, with some walnut. Considerably more than one-half the type has been cleared and put into cultivation. It is considered a very desirable soil for the general farm crops of the region. Cotton is the main crop, and usually enough corn is grown for live stock. Corn yields about 15 to 30 bushels per acre without fertilization. Cotton yields range from about one-third to three-fourths bale per acre. Sweet potatoes yield from 100 to 150 bushels, and Irish potatoes from 80 to 100 bushels per acre, but these are not very important crops. A 1,000-acre peach orchard, near Winona, is located principally on this type, and yields well in favorable seasons. Strawberries and other small fruits are grown to some extent for market at Lindale. Definite statements concerning strawberry yields are not available, but the crop is very profitable.

From 200 to 300 pounds per acre of commercial fertilizer analyzing 10-1.65-2 or 12-2 is commonly used for the staple crops. Instead of the mixed fertilizer an acreage application of 300 pounds or more of cotton seed or cottonseed meal frequently is made for the same crops. For the special crops heavier applications of high-grade mixtures are used.

This type varies in price with location and improvements. Farm land with average improvements, conveniently located with reference to shipping and marketing facilities, is valued at \$30 to \$75 an acre.

This type can be improved by adding organic matter to the soil in the form of stable manure or green manuring crops, such as cowpeas. Winter cover crops of oats and rye provide fall and spring pasturage, and add considerable organic matter when turned under. These crops can easily be included with corn and cotton in a well-balanced crop rotation. Deeper plowing is needed; subsoiling is now being practiced with very satisfactory results by some of the more progressive farmers. An increased acreage of cowpeas, peanuts, sweet potatoes, and winter forage crops would permit in-

creased hog production. The type is well suited to the raising of hogs, and the transportation facilities favor the development of this industry.

NORFOLK FINE SAND.

The Norfolk fine sand consists of a gray, loose fine sand which passes at 5 or 6 inches into pale-yellow, yellowish-gray or gray, loose fine sand. Ordinarily the fine sand subsoil continues without change to a depth of 36 inches or more, but in places the lower subsoil is somewhat loamy, and in some included patches the deep subsoil is a yellow, friable sandy clay, such areas representing a deep phase of the Norfolk fine sandy loam. Areas of the virgin soil with an accumulation of organic matter in the surface few inches have a darker gray color. With cultivation, however, the color rapidly becomes lighter gray. An included area of about 300 acres over a low flat at the head of Bellwood Lake, about 2 miles southwest of Tyler, is poorly drained and closely conforms to the Lufkin soils, having a gray to dark-gray surface soil and a light-gray subsoil, mottled freely with dingy gray and slightly with yellow. The Norfolk fine sand resembles the Ruston fine sand in color, texture, and structure of the surface soil, but it is decidedly different in color of the subsoil, showing no reddish color whatever.

The Norfolk fine sand is extensively developed and widely distributed in this county. The largest continuous body extends from just north of Tyler northeastward for a distance of about 10 miles. Other important areas occur between Starrville and Douglas School, north of Pleasant Grove School, at Eabelle School near the junction of Hill and Mud Creeks, just southwest of Tyler, in the vicinity of Lindale, and between Garden Valley and the Sabine River. Small, isolated areas are found in all sections of the uplands.

The Norfolk fine sand occupies nearly level to undulating plateau-like areas on the tops of ridges or divides, gently sloping areas on the lower slopes or approaches to stream bottoms, and gently rolling to rolling or hilly areas where it occurs in large tracts.

The open, porous structure of this soil gives good to excessive drainage. It can be worked or cultivated under a wide range of moisture conditions.

The forest growth consists of shortleaf pine and a variety of oaks, including stunted post oak, blackjack oak, and bluejack oak, with some small hickory, holly, and sparkleberry, and occasional bunches of bear grass. Native grasses furnish scant pasturage where the forest cover is open and consists largely of oak.

Probably less than one-half the type is cultivated. The principal crops are cotton and corn—cotton is the money crop and corn is grown chiefly for the work stock. Peaches, strawberries, blackberries,

and dewberries are grown locally for market, but not on a large scale. The fruit and berry crops give moderate to good yields. Cotton yields about one-fifth to one-third bale per acre, and corn averages from 5 to 18 or 20 bushels per acre, depending upon the rainfall during the growing season. Sweet potatoes yield from 75 to 125 bushels per acre, but are grown mainly in patches for home use.

Uncleared land is valued at about \$5 to \$10 an acre. Improved land, somewhat remote from markets, is held at \$10 to \$25 an acre, but in highly improved areas near the larger towns this type is valued at as much as \$50 an acre.

The naturally low organic-matter content of the Norfolk fine sand can be increased by applying barnyard manure or, where such material is not available, by growing green manuring crops, such as winter oats, winter rye, hairy vetch, crimson clover, cowpeas, and soy beans. This will also increase the water-holding capacity and drought-resisting power of the soil. Of the green manuring crops, hairy vetch, crimson clover, cowpeas, and soy beans add nitrogen to the soil. Oats, rye, and hairy vetch are valuable as winter cover crops, to prevent the blowing and drifting of the loose surface soil. These crops can be plowed under as green manure in the spring or allowed to produce forage.

Cultivation, to compact the subsurface material after planting, and the maintenance of a dust mulch during the summer by frequent shallow tillage are beneficial. Compacting the subsurface soil improves the capillarity, while the maintenance of a dust mulch prevents, to a large degree, the loss of soil moisture through evaporation.

The Norfolk fine sand is a good soil for early truck, and it is used in many parts of the South for trucking, where transportation and market facilities are favorable.

NORFOLK FINE SANDY LOAM.

Typically the Norfolk fine sandy loam consists of 6 to 8 inches of grayish fine sand, which grades into pale-yellow to yellowish-gray loamy fine sand to fine sandy loam, and this at a depth of about 12 to 24 inches into yellow, friable fine sandy clay. This type resembles the Orangeburg and Ruston fine sandy loams in the surface soil, but differs from those types in the subsoil, the Orangeburg fine sandy loam having a deep-red subsoil and the Ruston fine sandy loam a reddish-yellow to buff-colored subsoil. The boundary between the Norfolk fine sandy loam and the Caddo fine sandy loam is difficult to establish, as these types grade imperceptibly into each other in places. As the Caddo fine sandy loam is approached, mottlings of red appear in the lower subsoil, which becomes somewhat more plastic and slightly heavier.

The largest area of the Norfolk fine sandy loam occurs in the vicinity of Tyler. This type is not extensively developed, but a number of isolated areas of about 10 to 400 acres each occur throughout the county.

The type occupies divides and gently sloping valley sides. Its surface configuration varies from nearly level to gently sloping and undulating, with usually sufficient slope for good surface drainage without serious erosion. However, some of the steeper slopes require terracing, where cultivated, to prevent erosion. The friable fine sandy clay subsoil is sufficiently porous to permit adequate internal drainage, though it retains a good supply of moisture. These characteristics tend to make the Norfolk fine sandy loam one of the most drought resistant types of the county. The soil can be worked under a wide range of moisture conditions.

The original forest growth was mixed pine and hardwood, with a predominance of hardwood. In some localities the forest cover was almost wholly oak, hickory, and walnut, with but little pine. Locally the type is known as "hickory and walnut land."

The Norfolk fine sandy loam is a good general-farming soil. The principal crop is cotton. Corn is grown on practically all the farms, chiefly for the work stock. Corn yields about 15 to 40 bushels per acre, and cotton about one-third to three-fourths bale. Sweet potatoes yield from 100 to 200 bushels per acre, but this crop has not been developed as an important market product. The type is considered well adapted to strawberries, acreage yields of 100 to 200 24-quart crates being reported. Tomatoes, blackberries, and dewberries are successfully grown for market. Peanuts, cowpeas, sorghum, oats, rye, and milo are grown for forage and give satisfactory yields, but these crops do not as yet have very important places in the prevailing type of farming.

This type is largely under cultivation. Land values range from \$15 to \$60 an acre. The higher prices prevail in the vicinity of Tyler and the other towns.

The Norfolk fine sandy loam, in common with all the upland types, needs the addition of organic matter in some form. Cowpeas, soy beans, winter oats, and rye may be used as green manuring crops. Deeper plowing and more frequent shallow cultivations during the summer months are beneficial. The present methods of cultivating cotton are generally very good.

SUSQUEHANNA GRAVELLY SANDY LOAM.

The soil of the Susquehanna gravelly sandy loam to a depth of about 6 or 8 inches is a gray to brownish-gray gravelly fine sand, passing into a brownish to reddish-brown gravelly fine sandy loam. The subsoil, which is encountered at a depth of about 10 to 20 inches, consists of red, plastic, heavy clay, usually mottled with yellow and

gray in the lower part. This type closely resembles the Susquehanna fine sandy loam, but the surface soil and, in places, the subsoil are decidedly gravelly. The gravel consists mainly of fragments of ironstone, iron sandstone, and iron concretions, usually less than 2 inches in diameter. Quartz gravel is not common, but in a few areas near the mouth of South Prairie Creek there is a conspicuous quantity of this material. A small part of the type approaches a stony loam in character.

The Susquehanna gravelly sandy loam occurs principally on the tops of hills, knolls or ridges, and on the abrupt slopes to the stream bottoms. It frequently occupies some of the highest elevations in the section in which it occurs. The surface ranges from steeply sloping to rolling and hilly, and the run-off is rapid. The most pronounced slopes are in many places badly eroded and gullied. A large part of the type is still forested, chiefly with shortleaf pine, hickory, and blackjack oak.

This type is fairly extensive and is widely distributed over the uplands. Some of the principal areas are found west of Swan, in the vicinity of Red Springs School in the north-central part of the county, along the east side of Harris Creek, and in the southeastern section at Troup. Cultivation is confined to the smoother areas. The cultivated areas are devoted largely to cotton, which ranges in yield from one-fifth to one-half bale per acre. Corn and oats are of some importance, but these crops are not usually grown for market. Corn yields about 10 to 20 bushels per acre. Winter oats make good yields when cut for hay. The type is considered a good early soil for vegetables, such as tomatoes. Crops requiring a long growing season frequently are injured by drought in the latter part of the summer. At Troup several peach orchards are located wholly or in part on this soil. Good yields are had in favorable seasons, and the fruit is said to be of good color and quality. Tomatoes also are grown to a rather important extent in the same vicinity. Shipping begins between May 25 and June 1, and the yields average 250 4-basket crates per acre, each crate holding about one-third bushel. Sweet potatoes are grown for home use, and moderate yields are reported.

This type is valued at about \$35 to \$65 an acre at Troup. Areas less favorably located with reference to shipping points range considerably lower in value.

The Susquehanna gravelly sandy loam is deficient in organic matter and is subject to erosion. The methods employed by the best farmers in remedying these conditions on other soils can be followed in the improvement of this type, the steepest slopes being used for pasture or woodland, the steeper cultivated slopes terraced, and a good supply of organic matter maintained in the soil.

SUSQUEHANNA FINE SANDY LOAM.

The surface soil of the Susquehanna fine sandy loam consists of a grayish fine sand or loamy fine sand grading quickly into pale-yellow to reddish loamy fine sand to fine sandy loam. The subsoil, beginning at any depth from about 6 to 20 inches, is a red, plastic, heavy clay which becomes increasingly mottled with drab or yellow or both colors as the depth increases. The texture and structure of the subsoil continue uniform to a depth of 3 feet or more. The change from surface soil to subsoil is usually abrupt, but where the surface soil is deepest the lower few inches are often a yellowish or reddish fine sandy loam to fine sandy clay. On areas which have recently been cleared and brought under cultivation the surface few inches are noticeably darker than the remainder of the material above the clay, owing to the presence of dark-colored vegetable matter. Small, platy fragments of iron sandstone and iron concretions occur to some extent in the surface soil. Such material is most plentiful on the steeper slopes and the sharper knolls and ridges. Where the quantity and extent of the gravel are great enough the areas are mapped as the Susquehanna gravelly sandy loam. The surface soil is usually deeper on the tops of the broader ridges than on the slopes.

The principal variation within the Susquehanna fine sandy loam as mapped is encountered in the flatter areas. The surface of this variation is a dingy-gray fine sandy loam, underlain by mottled yellow, drab, and red, sticky clay loam, which grades at about 20 to 24 inches into mottled drab and red, heavy, plastic clay. This variation is widely distributed over the county, and occurs mainly as relatively small bodies intimately associated with the typical soil.

The Susquehanna fine sandy loam resembles the fine sandy loams of the Norfolk, Ruston, and Orangeburg series in surface appearance. It is distinguished from these soils by its mottled, heavy, plastic clay subsoil. It is an extensive and important soil, widely distributed over the uplands of the county. The principal areas occur in the southeastern part of the county, east and northeast of Troup, and in the northeastern part between Starrville and the Sabine River. There are many smaller areas intricately associated with the other upland soils of the county.

The type occurs mainly on valley slopes. The larger areas frequently occupy both the valley sides and the intervening divides. A part of the type occurs as isolated areas on the divides and ridges. It has a wide range in topography, varying from undulating or gently sloping to steep and hilly. In the southeastern part of the county it has a gently rolling to rolling topography, and many of the slopes are rather gentle, while the divides are relatively broad and undulating. Over the remainder of the county the slopes are steeper and are dissected by draws or gullies. On account of the pre-

vailing sloping surface the drainage is usually well developed, though in the smoother places, as on a few flat areas about the heads of streams, artificial drainage may be necessary, owing to the impervious character of the subsoil. In places the soil in these areas ranges to a loam in texture.

The chief difficulty in the cultivation of this type arises from its tendency to erode badly on slopes. The heavy clay subsoil absorbs water so slowly that the loose, sandy surface soil is soon saturated during heavy rains. When it is in this condition the drainage water in flowing down the slopes carries with it large quantities of the surface soil and frequently develops pronounced gullies.

The native vegetation consists of a mixed growth of shortleaf pine and red oak, white oak, post oak, hickory, gum, and other hardwoods, the pine predominating. Most of the merchantable pine in the county has been cut from this soil.

Probably less than one-half of the Susquehanna fine sandy loam is under cultivation. A considerable part of the uncleared soil occupies slopes which are too steep for cultivation without terracing. It is considered a soil of only moderate productiveness, rather susceptible to drought under the prevailing conditions. Farming is largely on newly cleared land and yields decrease as subsequent cultivation depletes the organic matter. Cotton and corn are the principal crops grown, the latter chiefly for the work stock. Cowpeas are grown in the corn on a small acreage. Corn yields about 10 to 20 bushels and cotton from one-fourth to one-half bale per acre. Winter oats are grown to a small extent as a forage crop. Sorghum for forage yields moderately well but is not extensively grown. Formerly peaches were planted rather extensively on this type, but the returns were not satisfactory and many of the orchards are being removed or allowed to die.

No system of crop rotation is followed on this type. Most fields are cropped to corn and cotton continuously for a number of years. Contour cultivation and terracing to prevent erosion are practiced more generally than on any other type in the county.

The use of commercial fertilizers is increasing. Cotton seed or cottonseed meal is often used for corn, with good results. For corn or cotton, about 200 to 300 pounds per acre of a fertilizer mixture analyzing 10-1.65-2 is used. Similar applications of a 12-2 mixture are used for cotton. Cowpeas and winter oats are sometimes turned under for green manure, but are more often cut for hay. Cultivated crops are planted almost entirely on ridges.

Owing to the wide distribution of this type throughout the county and to its varied topography, land values vary widely. Partly improved farms situated from 2 to 4 miles northeast of Troup are valued at \$25 to \$40 an acre.

The productiveness of the Susquehanna fine sandy loam can be improved by adopting methods which are used to some extent by the best farmers on this and other types of the county. These include the use of winter cover crops, contour cultivation on the moderate slopes and terracing on the steeper slopes, to control erosion; the plowing under of green manuring crops to increase the organic-matter content of the soil; the growing of summer legumes in well-balanced crop rotations; and deeper plowing, with shallow cultivation during the growing season to conserve soil moisture. Bermuda grass usually does well and furnishes good grazing, and this grass, together with the abundance of forage that can be produced cheaply on the type, suggests the possibility of making the raising of cattle an important industry.

SUSQUEHANNA CLAY.

The Susquehanna clay is shown on the soil map by inclusion symbols in Susquehanna fine sandy loam color. It consists of a red, plastic clay which passes quickly into mottled red, yellow, and gray, plastic, heavy clay. A surface covering of 1 to 4 inches of grayish to brownish-gray fine sand or fine sandy loam frequently occurs in small patches, but this material passes abruptly into the clay. Ferruginous sandstone fragments and iron pebbles are present on the surface in places.

The Susquehanna clay is closely associated with the Susquehanna fine sandy loam, and usually is surrounded by that soil. It occurs on small knolls or on the slopes where erosion has been very active. The surface drainage is good. The type is of small extent, and while small areas are scattered over different parts of the county, its principal development is in the southeastern section.

This soil is seldom cultivated, except in conjunction with the adjoining soils. Most of it is forested. It is considered of low agricultural value, and for this reason its improvement has been retarded. Practically the only crop on this soil is cotton, which produces very low yields, owing chiefly to the intractable character of the surface soil and the impervious subsoil, which causes the type to be droughty. The land is valued chiefly for its pine growth.

CADDO FINE SANDY LOAM.

The surface soil of the typical Caddo fine sandy loam is a gray or dingy-gray loamy fine sand, which grades into yellowish fine sandy loam. The subsoil, beginning at about 12 to 18 inches, is a yellow fine sandy clay, which passes below into rather compact fine sandy clay, mottled with grayish and yellowish or grayish, yellowish, and reddish colors. A substratum of mottled heavy clay usually underlies the type at a depth of slightly more than 3 feet. Some included areas closely approach or consist of the Lufkin fine sandy loam.

Low, dome-shaped or irregular mounds, from 2 to 5 feet in height and from about 15 to 60 feet in diameter, separated by poorly drained depressions, give some areas of this type a billowy or hummocky surface. There are a few areas in which these mounds do not occur. The surface soil on these mounds is mainly a brownish-gray loamy fine sand, with a depth of about 16 to 20 inches, while the subsoil is a yellowish fine sandy clay, frequently showing grayish and reddish mottlings in the lower part. On the larger mounds the soil often consists of Ruston fine sand or fine sandy loam. In some cases the soil in the intervening depressions is a gray to dark-gray fine sandy loam, and is underlain at about 12 to 20 inches by mottled yellow and drab, rather plastic clay. Here it resembles the Lufkin fine sandy loam.

The most important variation from the typical soil occurs at Avenue Church, about 3 miles northwest of Bullard. There are only a few mounds in this area, the surface being nearly flat to slightly undulating. The soil, which is about 8 to 12 inches deep, consists of a brownish-gray or grayish-brown fine sand or fine sandy loam, and the subsoil is a yellow, friable fine sandy loam to fine sandy clay loam, which passes at about 15 to 20 inches into a mottled yellow, rusty-brown, and red clay. A few iron concretions occur in the surface soil and subsoil.

The chief differences between the Norfolk and Caddo fine sandy loams are the slightly heavier texture and less friable structure of the Caddo subsoil and its mottled color in the lower subsoil. The chief resemblance between the Caddo and Susquehanna fine sandy loams is in the mottled character of their lower subsoils. In the former type the predominating color is yellow, while in the latter it is red.

The Caddo fine sandy loam is associated with the Susquehanna fine sandy loam. It is moderately extensive, but widely distributed over the county, particularly in the southwestern and southeastern parts. It occupies three distinct topographic positions: (1) The undulating tops of comparatively broad divides; (2) the gently sloping valley sides and low-lying approaches to streams; and (3) the slightly depressed areas around stream heads. The surface is gently sloping to billowy or hummocky. The surface drainage and internal drainage are not well developed. The mounds over a large part of the type impede the run-off, and over the remainder the surface drainage is slow because of the gentle nature of the slopes. Owing to the impervious character of the substratum and the lower subsoil, water does not pass downward rapidly, so that in many places the type is under water for some time after rains. This condition causes the soil to be rather late and crops to be injured by insufficient drainage in seasons of average rainfall.

A fairly large part of the type is under cultivation. The remainder is forested, principally with post oak and shortleaf pine. The cultivated portion is used almost entirely for cotton and corn. Crop yields vary considerably with different seasons. Cotton ranges from about one-fourth to two-thirds bale and corn from 15 to 30 bushels per acre. The soil is not considered desirable for the production of peaches, although orchards have been set out on some of it.

Owing to the prevailing poor drainage, it is considered advisable to plant corn and cotton on ridges. Tile drainage has not been attempted, but open ditches frequently are used.

Land values range from about \$8 to \$20 an acre, according to location and improvements.

LUFKIN SILTY CLAY LOAM.

The Lufkin silty clay loam to a depth of about 6 to 8 inches is a mottled brown, rusty-brown, and drab silty clay loam, passing into drab or mottled drab, rusty-brown, and yellowish-brown silty clay loam to silty clay. At about 15 or 18 inches a drab or mottled rusty-brown, yellowish-brown, and drab sticky and plastic silty clay or clay is reached. In the wettest areas the soil is drab or mottled brownish and drab, while along the outer edges of some areas adjoining the Greenville soils the surface soil is dark reddish to almost black. In many of the areas there is a thin covering of fine sand or fine sandy loam. Iron concretions are common throughout the 3-foot soil profile.

The main variation from the typical Lufkin silty clay loam occurs in what is locally known as Saline Prairie. Here the surface soil is deeper, ranging from 12 to 15 inches, and the subsoil frequently has a bluish color, consisting of bluish-gray to blue silty clay loam to very fine sandy loam. There is a wide range in color and texture of the surface soil, though the dominant color usually is brown, and in the upper end of the "prairie" the type resembles the Hannahatchee fine sandy loam, into which it grades. This wide range in color and texture is partly due to overwash material. Along the edge of the area an overwash of brown fine sand from 2 to 4 inches thick is present. Knolls of Ruston fine sand ranging from about 50 to 100 feet in diameter and from 3 to 6 feet in height are scattered over the type. Throughout the "prairie" patches of salty soil occur, which are devoid of vegetation and show a conspicuous whitish incrustation on drying out. There are also a few marshy areas.

The typical Lufkin silty clay loam occurs in small depressions in the southwestern corner of the county, from the vicinity of Bullard west to Saline Creek. These depressions, which usually are associated with the Greenville, Caddo, Orangeburg, Ruston, and Susquehanna soils, are flat and poorly drained, some of them having

no drainage outlets. About 500 acres of this type occur in the Saline Prairie, and the drainage here is poor, owing to the level surface and the plastic subsoil.

The Lufkin silty clay loam is not cultivated, owing to its poorly drained condition on the uplands and to its salt content in Saline Prairie. Most of the typical soil is forested, chiefly with oak, elm, sweet gum, and haw. In the "prairie" there is no timber growth, except on the small, sandy knolls, but where the soil is less salty it supports a growth of grass, which affords good pasturage.

LUFKIN FINE SANDY LOAM.

The Lufkin fine sandy loam is shown on the soil map by inclusion symbol in Lufkin silty clay loam color. The surface soil consists of gray to dark-gray fine sandy loam, underlain at about 10 to 15 inches by mottled drab and yellow or drab, yellow, and brownish, plastic clay. The surface few inches of the soil consists usually of heavy fine sandy loam of a mottled drab and brown color. A few mounds or hummocks of Ruston fine sand occur in areas of this type.

The type is of small extent. The principal area occurs near Union School, and a few smaller areas are found in other parts of the county. The Lufkin fine sandy loam occurs as flat, poorly drained areas on the uplands, locally known as "post-oak flats." Water frequently covers this type for considerable periods after rain.

Owing to its poor drainage, very little of this soil is under cultivation. Corn, the principal crop, yields from about 12 to 20 bushels per acre.

This soil is hard to keep in a good state of tilth. The soil is compact when wet, and clods if cultivated when in this condition. Drainage has been improved in some areas by ditching. Ditching and tiling can advantageously be extended to all the cultivated areas.

HENDERSON CLAY.

The Henderson clay, to a depth of about 6 to 10 inches, is a stiff, impervious clay, ranging from dark greenish drab to dark drab in color. This grades into a greenish-yellow or yellowish-drab, sticky clay. The color of the deep subsoil frequently is grayish, and in places it shows a noticeable mottling of brown. In a few places, where the surface soil has been washed away, the color of the exposed material is greenish yellow, mottled with greenish drab. The soil is high in organic matter. Lime concretions and rock fragments are found throughout the soil section. Small outcrops of light-gray soft limestone frequently occur on the knolls or ridges. Over the remainder of the type this limestone is encountered generally within the 3-foot section. The soil bakes hard, and cracks on drying out.

The Henderson clay occurs in a few small areas in the southwestern corner of the county. One area lies about 1 mile west of Saline Prairie on the slope toward the Neches River, and the others occur on adjoining slopes. The surface is gently sloping to knolly. The surface drainage is good but internal drainage is deficient, owing to the unfavorable texture and structure of both soil and subsoil.

Only a very small part of the type is cultivated, and this has only recently been cleared. Corn is the only crop grown. It yields about 12 bushels per acre. Most of the type is forested, the timber consisting chiefly of post oak and a scrubby tree locally known as "hog berry."

BIENVILLE FINE SAND.

The Bienville fine sand consists of brown to grayish-brown fine sand, underlain at about 8 inches by light-brown fine sand, which grades below into yellowish-brown fine sand. This type is distinguished from the Kalmia fine sand by the brown color of the surface soil, that of the Kalmia fine sand being gray.

The Bienville fine sand is an inextensive type, developed mainly in and along the bottoms of the Sabine and Neches Rivers and their principal tributaries. Several areas are encountered along West Mud and Mud Creeks.

This type occurs on low hummocks or swells and terraces standing above normal overflow. It represents remnants of former first-bottom deposits, which were laid down when the streams were flowing at higher levels. The surface configuration varies from slightly hummocky to level. Owing to the loose, open structure of the fine sand soil and subsoil, the internal drainage is excessive. This type supports a growth of shortleaf pine, gum, holly, and dogwood.

A small part of the Bienville fine sand has been cleared and is cultivated, principally to corn and cotton. Cowpeas are grown to some extent, in conjunction with corn. This type is said to be a slightly stronger soil than the Kalmia fine sand. Crops are subject to injury by drought during protracted dry periods. Corn yields 8 to 20 bushels, and cotton one-fourth to one-half bale, per acre. Cowpeas give fair yields.

KALMIA FINE SAND.

The Kalmia fine sand consists of a grayish, loose fine sand, overlying at about 6 inches a yellowish-gray to pale-yellow fine sand. It differs from the Bienville fine sand in being lighter colored in both the surface soil and subsoil.

This type occurs on stream terraces, standing 5 to 15 feet above the first bottoms. It frequently is traversed by old stream channels, particularly in the area mapped in the Sabine River bottoms

north of Gumwood. Over this area roughly parallel ridges of Kalmia fine sand alternate with troughs or channels in which the soil resembles the Ochlockonee fine sandy loam and silty clay loam. These troughs vary from 50 to 400 feet in width. They represent narrow strips of first-bottom land, and are subject to overflow in times of high water.

The Kalmia fine sand is relatively unimportant in extent. The principal area of the typical soil is mapped in the Neches River bottoms between Wallace and Lake Bridge Crossings. Less important areas occur along Mud Creek and its main tributaries.

The topography is generally level, low mounds, small depressions, and slight ridges furnishing some local variation in the surface configuration. Owing to the loose and open structure of the surface soil and subsoil, this type possesses good natural drainage. The native vegetation consists of shortleaf pine, blackjack and bluejack oak, holly, and dogwood. Broom sedge and other native grasses furnish considerable pasturage where the forest growth is sparse.

About 25 per cent of this type is farmed, mainly to corn and cotton. Newly cleared land is fairly productive, but yields decline with continued cultivation. Cowpeas are grown to some extent, either in rows with corn or planted between the corn rows at the last cultivation of the corn. The crop usually is cut for forage. Farmers state that the growing of this legume increases the yields of subsequent crops for several years.

A moderately heavy rainfall is needed for best results with crops on this type, as it is inclined to be droughty. Corn yields 8 to 20 bushels an acre and cotton from one-fourth to one-half bale, without the use of fertilizers.

Improved land of this type about $2\frac{1}{2}$ miles west of Troup is valued at about \$20 an acre.

TRINITY CLAY.

The Trinity clay to a depth of about 4 to 6 inches consists of a dark-drab to nearly black silty clay, occasionally mottled with brown or rusty brown. This is underlain by a drab or mottled drab and yellowish-brown, plastic, heavy clay, passing below into lighter drab clay with little or no mottling. The soil cracks or crumbles on drying out. When wet, it is extremely tenacious and sticky, and travel over roads in areas of this soil is very difficult in rainy seasons. The Trinity clay differs from the Ochlockonee clay in that it is darker colored in the soil and stiffer in the subsoil.

Near the larger tributaries of the Sabine River a thin covering of fine sandy loam occurs over small areas. This is also true of a narrow strip adjoining the river, especially where it makes extreme

bends. This thin layer consists of recently deposited material. It is very shallow, and usually does not materially affect the soil texture. There are also places adjoining the stream where the surface soil is much shallower than typical or has been entirely washed away, exposing the stiff clay subsoil.

Only one area of Trinity clay is mapped in Smith County. This consists of a strip ranging in width from a few yards to over 1 mile, in the Sabine River bottom, extending from the International & Great Northern Railway crossing to the northwestern corner of the county. The type is flat to nearly level, and much of it is poorly drained. It is an alluvial soil, composed of sediments laid down by overflows, with some wash from the calcareous soils about the headwaters of the Sabine River. It is subject to overflow and, on account of its level surface and retentive nature, it remains wet for a long period after each heavy rain or overflow. Near the stream the surface in places has a "hog-wallow" appearance and is often dissected by old sloughs.

Practically none of the Trinity clay is cultivated at present, owing to the probability of overflow each year. In places a narrow strip of this type is included in a field with an upland soil, and it is said to yield exceptionally well when crops are not injured by overflow. Most of the type is forested, chiefly with oak, elm, and gum.

The value of this type is based largely upon its forest growth and ranges from \$10 to \$30 an acre.

HANNAHATCHEE FINE SANDY LOAM.

The Hannahatchee fine sandy loam is a bottom-land soil of rather wide textural variation. It is prevailingly a reddish-brown, heavy fine sandy loam, underlain at about 12 inches by a dark-brown or dark reddish brown, heavy fine sandy loam to clay loam which passes below into mottled brown and reddish-brown fine sandy clay or clay loam, with some yellowish and grayish mottling in the lower part. In some included areas the soil is brown at the surface.

Variations from the typical soil occur along the smaller streams and along the margins of bottom-land areas adjoining the larger streams. In the former situations the soil is lighter in texture throughout the 3-foot section, and in the latter it is a sandy clay loam, with a rather plastic, sandy clay in the deep subsoil. The typical soil differs from the Ochlockonee fine sandy loam in being redder in color and better drained.

The Hannahatchee fine sandy loam is of small extent, the most important area lying along County Line, Duck, Saline, and Little Saline Creeks, Allen Branch, and some of the tributary streams of West Mud and Rock Creeks. A few smaller areas are encountered along some of the other streams of the county.

The type occupies first bottoms and is nearly level. It is traversed along some of the larger streams by the channels of a few old sloughs. All of it is subject to overflow during the rainy season, but natural drainage is good between inundations, owing to the sandy nature of the material.

This soil is of alluvial origin. Its location indicates that a large part of it represents wash from the Greenville soils. The intensity of the reddish color in the surface soil increases as the Greenville soils are approached.

There are very few fields made up of the Hannahatchee fine sandy loam exclusively, but about one-fourth of the type is cultivated in connection with adjoining upland soils. The uncultivated part is practically all in forest, consisting chiefly of gum and oak. Many farmers are diking and straightening the streams to protect areas of this soil from overflow. This effort is warranted, as the type has proved to be a strong agricultural soil.

Corn and cotton are the principal crops grown, with occasional small patches of cane, oats, and grasses for pasturage and hay. The type is said to be better adapted to corn than to cotton, and it is very largely used for the former crop. The yields range from about 15 to 40 bushels per acre. Moderate yields of cotton are obtained in dry years. Grasses, including Bermuda grass, furnish good pasturage a large part of the year. This type ranges in value from about \$15 to \$30 an acre.

OCHLOCKONEE FINE SANDY LOAM.

The Ochlockonee fine sandy loam consists of stream bottom-land material of rather wide textural variation. The dominant soil is a brownish-gray to brown or dark-brown loamy fine sand to fine sandy loam, underlain at about 10 inches by brownish fine sandy loam to sandy clay, usually mottled with rusty brown, or in places with yellowish and grayish colors. Near the larger streams and in low-lying areas and depressions where drainage between overflows is poorest, the subsoil is in places a sticky fine sandy clay, intensely mottled, while along the smaller streams the texture varies to loamy fine sand or loam.

The Ochlockonee fine sandy loam occurs along most of the streams in the county. As mapped, it frequently includes small areas of Kalmia and Bienville fine sand, too small to be of importance. Such areas are encountered mainly in the Neches River bottoms.

The surface of this type is nearly level, with a slight slope in the direction of the stream flow. Between the frequent short periods of overflow drainage is fair, except in depressions.

A large part of the Ochlockonee fine sandy loam is forested with sweet gum, post oak, red oak, willow oak, water oak, maple, elm, and ironwood.

The soil contains much organic matter, and is productive where protected from overflow, except in years of abnormally heavy rainfall during the growing season. The most important crops grown are corn, cotton, and sugar cane, with Bermuda grass for pasturage and hay. In favorable years, where the fields are protected from overflow corn yields from 40 to 65 bushels, cotton as much as 1 bale, and sugar cane as much as 200 gallons of sirup per acre. Corn does much better than cotton on unprotected areas. Fertilizers are seldom used. Bermuda grass and other grasses furnish good pasturage through the greater part of the year.

In some sections of the county considerable attention has been given to the improvement of this type, notably along Village, Mud, Muse, and Simpson Creeks. In these sections the creeks have been straightened and diked, and lateral ditches constructed where needed to carry off excess surface water. Farmers who have made such improvements report that average yields have been increased as much as 50 and in some cases 100 per cent, and that this is one of the surest yielding soils in the county. The value of this improved land is high. A very large part of the type could be improved in the same way.

Owing to its adaption to forage crops and grass, this soil in the larger areas could be successfully used for cattle raising.

OCHLOCKONEE SILTY CLAY LOAM.

The Ochlockonee silty clay loam is a brown or mottled brown, rusty-brown, and drab silty clay loam, grading at about 8 or 10 inches into mottled brown, yellowish, and drab silty clay which shows more yellowish and drab and less brown in the lower part. Lenses or strata of gray fine sandy loam and fine sand a few inches in thickness are often encountered in the subsoil. A few small areas of Ochlockonee fine sandy loam are included with this type.

The Ochlockonee silty clay loam is an important bottom-land soil. It occurs along the Neches River and along the lower courses of South Prairie, Harris, Mud, and West Mud Creeks and their principal tributaries.

The surface is comparatively level. Local variation in the surface features is caused by the presence of a few small mounds and a number of meandering abandoned stream channels and cut-offs. This type is subject to frequent short periods of overflow. The drainage is slow, owing to the level surface and to the retentive

nature of the subsoil, which causes the water table to stand relatively high for long periods after the subsidence of overflows.

The greater part of this type still supports a forest of pin oak, water oak, sweet gum, swamp maple, elm, ash, and ironwood. In some places swamp pine is mixed with the more common trees. Native grasses furnish good pasturage between overflows.

Owing to the probability of damaging overflows during the growing season only a very small acreage of this type is cultivated. Corn, cotton, and sugar cane are the only crops grown. Corn does fairly well, yielding from 15 to 40 bushels per acre. Cotton does best in seasons of moderate rainfall. Yields range from one-third to one-fourth bale per acre. Sugar cane is grown for sirup. This soil does not produce so good a quality of sirup as the fine sandy loam of the same series. Yields range from 100 to 250 gallons of sirup per acre. Several small areas are in Bermuda grass, which makes good pasturage. When cut for hay this grass yields about 1 ton per acre.

Much of this type is capable of cultivation if protected from overflow. The main stream channels can be straightened and lateral ditches constructed to provide for a more rapid and complete removal of excess drainage water. This and the diking of the cultivated areas have been successfully employed in reclaiming a considerable area of the Ochlockonee fine sandy loam type. In view of its adaptation to forage crops and grass, cattle raising probably would be successful on this type.

OCHLOCKONEE CLAY.

The surface soil or the Ochlockonee clay is a brown to mottled brown and drab silty clay, which grades at a depth of about 2 to 5 inches into yellowish, plastic silty clay or clay, usually mottled with light drab. The subsoil becomes more compact and more conspicuously mottled with drab as the depth increases. Occasionally red mottlings are present in the lower subsoil. This soil is very sticky when wet, but assumes a granular structure on drying.

Near the main streams the type usually is somewhat lighter textured than is common in the surface soil, and in some instances there is a covering of 1 or 2 inches of brownish fine sand. Areas of Bienville fine sand commonly are associated with this type, and some of these, which are too small to be mapped separately, are included.

The Ochlockonee clay is the most extensive bottom-land soil in the county. It occupies the greater part of the Sabine River bottoms from the International & Great Northern Railway to the northeastern corner of the county. One small area occurs in the Neches River bot-

tom, and here the surface soil is somewhat darker and deeper than typical. A few old stream channels and "hog wallows" in places vary the otherwise nearly flat surface. The type is subject to deep overflow and, owing to the generally level surface and the impervious nature of the soil and subsoil, drainage is poor.

Owing to the probability of overflow, this type is not cultivated. It supports a forest of large red oak, pin oak, post oak, elm, and gum, with some holly, swamp pine, and swamp maple. A little pasturage is afforded between overflows.

In its present condition the type is valued chiefly for its timber growth. Its value ranges from \$10 to \$30 an acre.

There seems to be no reason why hay could not be produced on this type, and cattle raising would apparently be successful.

MEADOW.

Meadow includes narrow strips of first-bottom land, where the soil is so variable in both texture and color that satisfactory separation into types can not be made. The material is dominantly a fine sand or fine sandy loam of black, gray, yellow or reddish-brown color, or mottled gray, yellow, and brown. Where the adjoining soils are gravelly, considerable fine gravel frequently is distributed throughout the 3-foot section. The soil is partly colluvial, but mainly of alluvial origin.

This soil occurs principally along the smaller streams of the county. It is poorly drained and is subject to overflow. Permanently marshy areas are shown on the map by symbol. All but the marshy areas are in forest, consisting of sweet gum, pin oak, water oak, maple, elm, and ironwood.

Some of the Meadow has been cleared and is used for pasture and the production of Bermuda-grass hay. A part could be successfully utilized for forage crops and corn, as well as for pasturage for cattle.

SUMMARY.

Smith County is situated in the northeastern part of Texas. It has an area of 892 square miles, or 570,880 acres.

The topography is gently rolling to moderately hilly. The elevation ranges from about 300 to 600 feet above sea level. The Sabine River, which forms the entire northern boundary, receives the drainage of the northern half of the county. The southern part is drained by the Neches River and its tributaries.

Smith County was organized in 1846. In 1910 the population was 41,746, three-fourths of which was rural. Tyler, the county seat, with

a population of about 10,400, is the largest town. Troup, with a population of 1,126, ranks next in importance.

The International & Great Northern Railway and the St. Louis Southwestern Railway, by their main and branch lines, provide direct transportation to the principal outside markets. The county is well supplied with public roads, which are being extensively improved.

The climate is characterized by relatively mild winters and long, warm summers. It is favorable for a widely diversified agriculture. Plowing can be done during every month of the year. The average growing season is a little over 8 months. The mean annual temperature is about 66° F., and the mean annual precipitation about 38 inches.

Three-fourths of the area of the county is in farms. About 32 per cent of the improved land is devoted to cotton and about 25 per cent to corn. Cotton is the money crop, corn being grown chiefly for feed for the work stock. Oats, rye, cowpeas, peanuts, and sorghum are grown to some extent for forage. Irish and sweet potatoes are produced for local consumption. Sugar cane for sirup is a special crop of some importance. Peaches, strawberries, blackberries, dewberries, and tomatoes for early market are receiving increasing attention in various parts of the county. The raising of live stock and dairying offer good opportunities.

The use of commercial fertilizers is increasing. But little attention is given to the systematic rotation of crops. Sufficient farm labor usually is available. About 46 per cent of the farms are operated by the owners, the remainder by tenants. The average land value was about \$11 an acre in 1910, according to the census.

The soils are typical of the inner or higher portion of the Gulf Coastal Plain. They form two general groups, the upland soils and the lowland, or alluvial, soils. The alluvial division comprises the first-bottom soils, subject to overflow, and the second-bottom, or terrace, soils, lying above normal overflow. More than 75 per cent of the upland consists of fine sands, fine sandy loams, and gravelly sandy loams, with subsoils ranging from fine sand through fine sandy clay to stiff, heavy clay. The clay soils are comparatively insignificant in extent, but the clay loams and gravelly clay loams are fairly extensive. The greater part of the first-bottom soils consists of clay and silty clay loam, but the fine sandy loams have an important distribution. The second-bottom, or terrace, soils are sandy and rather small in extent.

The Greenville series comprises the red upland soils. These soils are found principally in the southwestern part of the county. The gravelly sandy loam and gravelly clay loam are the principal types,

but owing to their relatively rough topography a smaller proportion of these types is cultivated than of the fine sandy loam and clay loam. The Greenville soils are desirable for the staple crops of cotton and corn. The fine sandy loam and gravelly sandy loam are considered the best soils of the county for early peaches, tomatoes, and vegetables.

The Orangeburg series is represented by the fine sandy loam type. This soil is of relatively small extent, but is practically all cultivated. It is considered a very desirable soil for cotton, corn, fruit, and truck.

The Ruston series is represented by the fine sand, gravelly sandy loam, and fine sandy loam types. The fine sandy loam is the most extensive soil in the county, and is the most valuable member of this series. It is used principally for general farm crops, but a small part is devoted to peaches, berries, and truck. The fine sand is of moderate extent. It is the least productive member of the series, and is not extensively cultivated. The gravelly sandy loam is also of moderate extent. The smoother areas are well adapted to cotton, peaches, and tomatoes.

The Norfolk fine sand is one of the most extensive soils of the county, but is not considered very productive. Cotton and corn are the chief crops, but peaches, berries, and sweet potatoes are locally important on this type. The Norfolk fine sandy loam is moderately extensive, and is utilized for a variety of staple and special crops with good results.

The Susquehanna fine sandy loam is an extensive type. Under favorable conditions it produces good crops of cotton, corn, and forage. The prevention of erosion is an important problem in handling this type. The gravelly sandy loam of this series is rather widely distributed over the county. At present only the smoother areas of this type are cultivated. Cotton is the chief crop, but the soil is well adapted to early tomatoes. The Susquehanna clay is not extensive, and is of low agricultural value.

The Caddo fine sandy loam is a poorly drained soil of moderate extent. It is devoted chiefly to corn and cotton.

The Lufkin fine sandy loam and silty clay loam are poorly drained soils of small extent. They are used mainly for pasturage.

The Henderson clay is an inextensive soil of little agricultural importance.

The Bienville fine sand and the Kalmia fine sand are relatively inextensive types. They constitute the second-bottom soils of the county and are situated above overflow. They are used to a small extent for the staple crops.

The Trinity clay is an inextensive first-bottom soil, derived largely from the dark-colored calcareous soils outside the county. It has not been developed for agriculture, owing to its liability to deep overflow.

The Hannahatchee fine sandy loam is a first-bottom soil of small extent, but is very desirable for corn and cotton.

The Ochlockonee series represents the more extensive first-bottom soils. The fine sandy loam is most extensively cultivated. It is considered well suited to corn, sugar cane, and cotton. Good yields are obtained in years of low average rainfall or where the type is protected from overflow. The silty clay loam and clay require the same improvement as the fine sandy loam for agricultural development.

Meadow consists of alluvial material of a heterogeneous nature. It is inextensive and of little agricultural value. It is best used for pasture and the production of hay.



[PUBLIC RESOLUTION—No 9.]

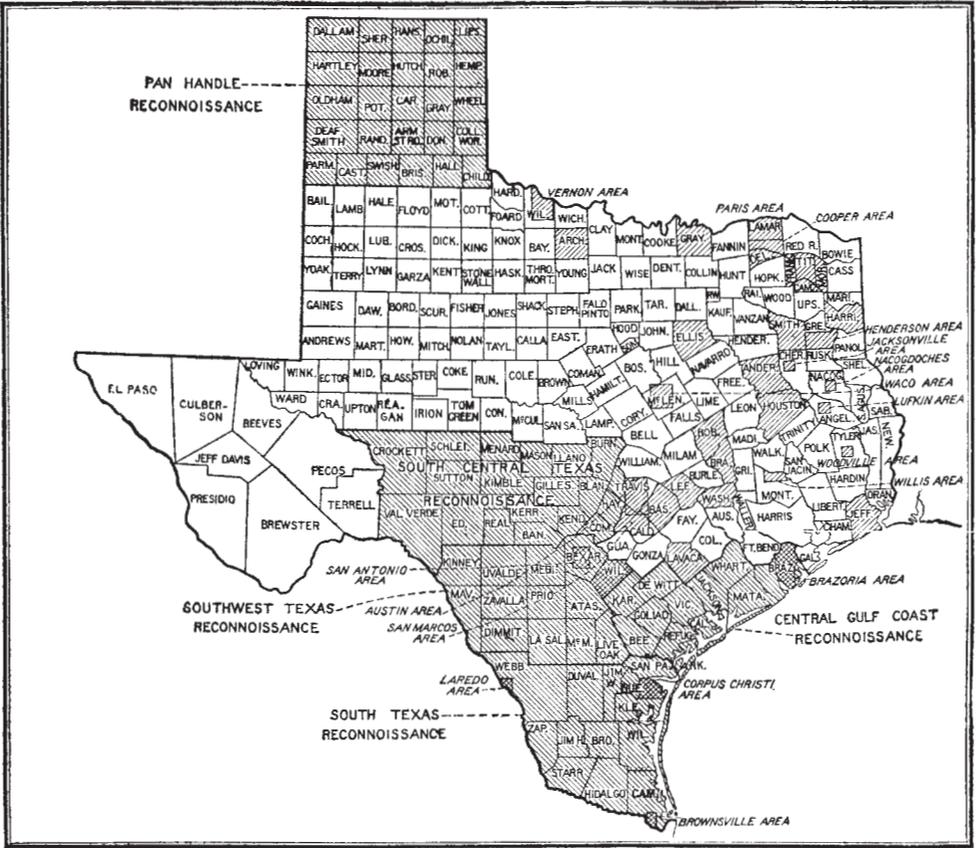
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative from the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]



Areas surveyed in Texas.

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Office of the Assistant Secretary for Civil Rights
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Washington, D.C. 20250-9410;
- (2) fax: (202) 690-7442; or
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