SOIL SURVEY OF SAN SABA COUNTY, TEXAS.

By J. O. VEATCH, In Charge, R. F. ROGERS, M. W. BECK, and H. G. LEWIS.—Area Inspected by HUGH H. BENNETT.

DESCRIPTION OF THE AREA.

San Saba County is situated in the central part of Texas. It is bounded on the north and east by the Colorado River; which separates it from Brown, Mills, Lampasas, and Burnet Counties; on the south by Llano and Mason Counties; and on the west by Mason and McCulloch Counties. The town of San Saba is 226 miles by rail southwest of Dallas and Fort Worth. The southern boundary line is 38 miles long and the western 36 miles; the north and east boundary is very irregular, owing to the bends of the Colorado River. The county comprises an area of 1,110 square miles, or 710,400 acres.

San Saba County occupies a part of the Edwards Plateau, which is a dissected region forming the southern extension of the High Plains, or Llano Estacado, of Texas. The greater part of the county lies in a division of the Edwards Plateau which differs from the main part in having a somewhat more mature topography. A few mesa-like remnants of the Cretaceous limestones which underlie the Edwards Plateau to the west appear in this county, suggesting that once the area was entirely covered by these rocks and the surface was a high plain, strictly a part of and probably very similar to the present Edwards Plateau proper.

The present plateau land surface is the result of erosion and weathering since Cretaceous times. The county, as a whole, may
be regarded as a rather maturely dissected plateau. The topography varies in detail from nearly level plains, rolling upland, and valley areas, having smooth slopes, to deeply and sharply dissected areas in which the streams occupy canyonlike valleys. In viewing the country from a distance, however, the local details are unnoticed and the surface presents an even skyline.

The elevation of the upland plain or plateau surface varies from about 1,500 to 1,950 feet above sea level, and the larger streams have cut their valleys 100 to 400 feet deep. The extreme difference in elevation in the county is about 900 feet. The general slope of the country is eastward.

The county may be divided into several distinct minor topographic divisions, which deserve description here on account of their relation to the soils and agriculture of the county.

The San Saba River basin, lying in the central part of the county, forms an interesting physiographic feature. The San Saba River enters the county from the southwest and follows a fairly direct course through a narrow, canyonlike valley in a limestone plateau. About 12 miles west of San Saba it enters a broad valley basin, through which it flows in a meandering course to the Colorado River. The valley attains a maximum width of nearly 5 miles, and consists of nearly level, alluvial plains, occurring as terraces 20 to 75 feet above the present stream channel. This valley area lies 100 to 150 feet below the plateau levels to the north and south. It is bordered on the south by well-defined escarpments and is fairly well delineated on the north, although the slopes here are less abrupt, because of the softer character of the rock formations.

The river and tributary streams were enabled to cut out a broader valley in this part of the county because of the presence here of a formation consisting mainly of soft black shale. This valley was subsequently filled in with detritus carried down from the plateaus, disgorged at the mouths of the streams entering the basin, and spread out as alluvial plains or outwash plains.

Filled-in valleys on a smaller scale but similar in origin exist as tributaries of the San Saba Valley proper, reaching as armlike extensions into the plateaus, and also appear in other parts of the county. The lithologic character of the valley filling differs slightly in the smaller basins, because of the derivation of detritus from local formations and through indigenous streams, while the débris carried down by the San Saba River has a more diverse origin and was transported greater distances.

Nearly all the southern half of the county and the central-western part is a high plateau underlain by hard Paleozoic limestones. The topography in the interior varies from nearly level to deeply rolling, but with rounded slopes, while near the rim of the plateau and near
the Colorado and San Saba Rivers the country is deeply and sharply
dissected by narrow ravines and canyons, with nearly level stream
divides. The greatest area of rough topography is in this division.
The general elevation is 1,500 to 1,950 feet above sea level.

Along the southern boundary of the county there is a lower lying,
rolling plain, which appears as valleylike entrants into the higher
plateau, and which is regarded as the northern edge of the Llano-
Burnet Basin, containing the old crystalline rocks of this region.
This area is separated from the higher plateau by well-defined but
irregular escarpments, 100 to 200 feet high, which are features of
both erosion and faulting. The topography varies from nearly level
to gently sloping, with local steep slopes and abrupt escarpments.
The principal valley area, in which the village of Cherokee is
located, extends about 5 miles above the county line. The bound-
ing escarpment thence swings southward into Llano County and re-
appears in San Saba County about 8 miles west of Cherokee, but
reaches only 1 to 3 miles north of the county line. Farther west it
again extends northward 6 to 8 miles, including the rolling valley
of Deer Creek and its tributaries.

The northern part of the county has on the whole a gently rolling,
mature topography, and, although in places it is somewhat rough
along the larger streams, it is less deeply dissected and rugged than
the limestone plateau region to the south. Remnants of nearly level
gravel plains appear on the high stream divides, suggesting that
probably the whole of the northern part of the county was in com-
paratively recent geological times a smooth plain covered by a veneer
of gravel and sand washed from the high plains to the west. The
general elevation of this part of the county is 1,400 to 1,600 feet
above sea level.

The Colorado River, forming the northern and eastern boundary
of the county, has cut a valley about 150 to 400 feet below the general
upland level. This stream is bordered by alluvial plains of compar-
atively small width on the San Saba side, varying from less than
one-half mile to a maximum of about 2 miles. There is a recent
bottom in process of formation lying 10 to 20 feet above river level,
and above this a broader alluvial plain 35 to 45 feet above the river
and constituting the greater part of the alluvial valley. This plain
is probably late Pleistocene in age. It is subject to overflows only
at long intervals. At still higher levels, 60 to 80 feet, there are
narrow, discontinuous terrace plains of old alluvium. In the south-
eastern part of the county the river occupies a deep gorge, and the
alluvial bottoms are extremely narrow.

The county lies entirely within the drainage basin of the Colorado
River. The San Saba River, which flows northeastward and east-
ward through the central part, is the only other stream of consider-
able size. The Colorado and San Saba Rivers are perennial streams, but most of their tributaries, excepting a few of the larger creeks which are fed by strong springs, are intermittent, and the headwater branches, especially in the limestone plateau section, are merely dry watercourses during the greater part of the year, and trees and grass grow in their beds. Practically the whole county is ramified by the headwater branches of the streams, so that no extensive level or undrained areas remain. The perennial streams have on the whole only a moderate gradient, although there are a few stretches along the Colorado and San Saba Rivers, in their canyonlike valleys in the plateau, where there is a comparatively rapid fall. All the streams are subject to very wide fluctuation in the volume of flow.

The county is forested, and in this respect presents an interesting contrast to the treeless plains to the west and the black prairies on the east. Mesquite, live oak, post oak, and cedar are the predominant trees on the upland, and pecan, elm, hackberry, mesquite, china berry, and cottonwood on the bottom lands and along the streams. The trees on the upland are low and crooked and have no value for lumber. The cedar is extensively cut for fence posts. The pecan produces nuts of good quality, and is the most valuable tree of the county.

Throughout the limestone plateau division permanent supplies of potable water are obtained at depths of 150 to 300 feet, and in the vicinity of Cherokee the water of deep wells rises to within a few feet of the surface. In the northern part of the county, underlain by sandstones and shales, good water is more difficult to obtain, and most of the farms have cisterns to supply water for household use. Water for stock is generally obtained from artificial ponds, or tanks, constructed by building earth dams at the heads of draws or at the bases of hillsides and impounding the run-off. There are a few large perennial limestone springs which supply water suitable for general farm purposes, including irrigation.

The first American settlers reached this region about 1854. San Saba County was organized in 1856. The early settlers came from other counties of Texas to the east and from other southern States. The population at present consists almost entirely of native whites, with a comparatively small percentage of Mexicans. In 1910 the census reported the population of the county as 11,245, or an average of 10.1 persons per square mile. The entire population is classed as rural.

San Saba is the principal town and county seat. There are several smaller towns, chief among which are Richland Springs, in the western part of the county, and Cherokee, in the southern part.

Transportation facilities are supplied by a branch line of the Gulf, Colorado & Santa Fe, which crosses the central part of the county
east and west, connecting with the main line at Temple; and by the
Fort Worth & Brady branch of the St. Louis & San Francisco Rail-
road, which traverses McCulloch County within a few miles of the
northwestern corner of San Saba County. Some farms and ranches
in the southern part of the county are 15 to 25 miles from railroads.

The main public roads radiating from San Saba have been graded
and in places are surfaced with chalky limestone and gravelly clay.
They are kept in good repair. Most of the roads in the more remote
parts of the county and through the areas of grazing land are not
graded and generally are in poor condition for heavy hauling, be-
cause of stones, steep grades, or deep sand.

All parts of the county have telephone service and the farming
sections about San Saba are provided with rural mail delivery.

San Saba is the local market for farm products. Most of the live
stock is shipped to Fort Worth.

CLIMATE.

San Saba County occupies a somewhat intermediate position be-
tween the true semiarid belt of the High Plains and the humid
section of the eastern part of the State, but is on the whole more
seminard than humid. There is a moderate total rainfall, amounting
to a mean of about 25 inches annually, but the distribution from
year to year is irregular. The winter temperatures are on the whole
mild, while the summers are generally characterized by high tem-
peratures. Sudden changes are characteristic, especially during the
winter.

Rainfall is the most important factor influencing crop production
in this area and is almost equally important in determining each
year the success or failure in ranching. The total rainfall is suffi-
cient to insure crops, but is irregular in seasonal distribution and
in the character of the precipitation. The greater part of the rain
falls during the spring and fall months and it is necessary to con-
serve this supply in the soil to insure successful crops. The precipi-
tation during the summer would seem to be sufficient, but much of
the rain comes as local or torrential showers, with consequent high
proportional loss in run-off, and moreover the rate of evaporation in
this region is very high. Droughts are likely to occur at some time
every year. During the summer, especially in July and August, corn
is likely to suffer injury, and during the winter and early spring
fall-sown oats are liable to damage. Hailstorms are of frequent
occurrence, but are purely local in character, and over the county as
a whole rarely cause serious damage. Snowfall is rare.

The native forage grasses of the pastures are affected by the
character and amount of rainfall, as are the cultivated crops, and
the carrying capacity of the grazing lands, therefore, varies from year to year. The rainfall, where impounded in artificial ponds or tanks, is generally sufficient for the supply of cattle on the ranches, but not always, and it is therefore necessary where perennial streams are not accessible, frequently to supplement the tank supply by pumping from deep wells.

The winter temperatures are generally mild, and it is only for very short periods that freezing temperatures are experienced. The county is subject to "northers" during the winter and early spring months. The "norther" is characterized by a very sudden drop in temperature, with high north winds, and may be either dry or accompanied by light rain. These periods are of short duration, 2 or 3 days, and are succeeded by bright, mild weather. Stock does not need winter protection except during these occasional cold periods. Cold spells may be expected as late as April, and it is for this reason that cotton planting is delayed until the middle or latter part of this month.

The average date of the last frost in the spring is April 8 and of the first in the fall, November 5.

The prevailing winds are from the south, except during the winter months. Generally the winds are not as constant and do not have as high velocity as on the treeless and more nearly level plains to the westward. Destructive windstorms are of rare occurrence.

The following table of climatic data is compiled from the records of the Weather Bureau at San Saba:

*Normal monthly, seasonal, and annual temperature and precipitation at San Saba.*

<table>
<thead>
<tr>
<th>Month</th>
<th>Temperature</th>
<th>Precipitation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean.</td>
<td>Absolute max.</td>
</tr>
<tr>
<td>December</td>
<td>48.2 86 7</td>
<td>0.88</td>
</tr>
<tr>
<td>January</td>
<td>49.1 84 8</td>
<td>0.62</td>
</tr>
<tr>
<td>February</td>
<td>49.4 96 11</td>
<td>1.70</td>
</tr>
<tr>
<td>Winter</td>
<td>48.9 96 7</td>
<td>3.20</td>
</tr>
<tr>
<td>March</td>
<td>61.2 98 18</td>
<td>1.40</td>
</tr>
<tr>
<td>April</td>
<td>66.0 100 26</td>
<td>2.42</td>
</tr>
<tr>
<td>May</td>
<td>72.6 101 29</td>
<td>3.65</td>
</tr>
<tr>
<td>Spring</td>
<td>66.6 101 18</td>
<td>7.51</td>
</tr>
<tr>
<td>June</td>
<td>80.8 106 45</td>
<td>2.79</td>
</tr>
<tr>
<td>July</td>
<td>81.5 107 54</td>
<td>3.03</td>
</tr>
<tr>
<td>August</td>
<td>82.9 109 52</td>
<td>0.98</td>
</tr>
<tr>
<td>Summer</td>
<td>81.7 109 45</td>
<td>6.50</td>
</tr>
</tbody>
</table>
Normal monthly, seasonal, and annual temperature and precipitation at San Saba—Continued.

<table>
<thead>
<tr>
<th>Month</th>
<th>Temperature</th>
<th>Precipitation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Absolute maximum</td>
</tr>
<tr>
<td>September</td>
<td>76.3</td>
<td>101</td>
</tr>
<tr>
<td>October</td>
<td>65.6</td>
<td>98</td>
</tr>
<tr>
<td>November</td>
<td>57.2</td>
<td>91</td>
</tr>
<tr>
<td>Fall</td>
<td>66.4</td>
<td>101</td>
</tr>
<tr>
<td>Year</td>
<td>65.9</td>
<td>109</td>
</tr>
</tbody>
</table>

AGRICULTURE.

During the early period of settlement of the county ranching was the sole industry. Ten or fifteen years after the arrival of the first settlers a few small farms were placed under cultivation, mainly on the bottom lands along the San Saba and Colorado Rivers, but it was not until 1880 that farming began to assume considerable importance. The county for the most part remained open range until about 1887, when the erection of wire fences began, and within a very few years practically all the pasture lands had been inclosed.

Wheat and corn were the principal crops at first, with a few minor subsistence crops. The early farmers encountered the discouragements which have been common to this region, such as repeated crop failures from drought and serious damage and deprivations from insect and animal pests. Before the advent of railroads in this part of the State crops were hauled 100 to 125 miles to Austin, and cattle were driven to Fort Worth and other distant markets.

The growing of cotton began about 1880, and the acreage devoted to this crop has gradually increased until it exceeds that of corn. The acreage in wheat has greatly decreased in late years, and at present only a few small patches of this grain are grown for pasturage or feed and very little is marketed. Owing mainly to the prevalence of the boll weevil, the tendency now is toward a decrease in the cotton acreage and a greater diversification of crops, including forage and feed crops, such as sorghum, milo, oats, and cowpeas.

The present agriculture consists of general farming and ranching, principally cattle raising, the two being of nearly equal importance in the value of the products. It is estimated that about 15 per cent of the area of the county is under cultivation, the remainder being utilized mainly for grazing stock. Most of the ranches, however,

1 The census of 1910 reports 13.6 per cent of the acreage in farms as improved land.
include more or less arable land, and small fields are used for growing such crops as sorghum, Johnson grass, and oats for winter feed.

Cotton is the principal money crop. According to the census, 39,190 acres were devoted to cotton in 1909, from which 6,975 bales were obtained. This represents an average yield of only 0.17 bale per acre, but an average for any period of years probably would be between one-fourth and one-third bale. The crop is grown on all the more arable soils and for the most part without irrigation. The Mebane and Rowden are the most popular varieties.

Corn is the principal feed crop. The 1910 census reports 11,142 acres in corn, with a production of 95,503 bushels. Where the crop is grown without irrigation, the yields vary greatly, depending upon the season, ranging from nearly complete failures in years having excessively wet springs or protracted droughts, to as much as 50 or 60 bushels in favorable seasons on the soils best adapted for this crop. On land that can be irrigated successfully the crop is fairly certain, the yields averaging about 40 bushels per acre. The crop is utilized principally for feeding hogs and work stock, only a very small part being sold. The ears are pulled in the field and the stalks are left standing, to be subsequently pastured. Very little value is placed upon the leaves for fodder, and only a very small part of the crop is utilized for ensilage.

Dent corn is grown exclusively, and there are several varieties of both white and yellow dent in use. Strawberry is a widely grown variety, and Bloody Butcher and Southern White Gowd Seed are also common. A small-eared, very hard white corn, probably a strain of the Hickory King, and known locally as Peterkin, seems to withstand droughts better than the larger varieties and is grown to some extent.

Oats have become one of the more important crops of the county during the last 5 or 6 years, having been substituted to a large extent on acreage withdrawn from cotton and wheat. The acreage at present is probably but little less than that of corn. The oats, while utilized mainly for feed on the farms, are also of considerable importance as a sale crop.

The crop is mainly fall sown and only red rust-proof varieties are cultivated. The average yields range from 20 to 50 bushels per acre, but are a little more certain than corn where the latter crop is not irrigated. The plant is liable to rust during wet springs, especially on bottom land, and yields are frequently reduced by droughts and winter freezes.

Oats and Johnson grass are frequently grown in combination, the oats being ready for harvest generally before the Johnson grass is

---

1 The U. S. Census (1910) figures, 89 acres for the county, give an erroneous idea of the present importance of this crop.
high enough greatly to interfere with the work. Sorghum is the principal forage crop. A small acreage is devoted to it on practically all the farms and it is also grown on the ranches for feed to be used in carrying cattle through the winter. Also, where the feeding of beef cattle has been attempted, it has been the chief crop used for silage. This plant withstands drought and can be depended upon to produce good to fair yields upon all of the arable soils of the county. Yields are probably near \(2\frac{1}{2}\) to 3 tons per acre on good land, although it is rather difficult to form an accurate estimate, since it is not generally a sale crop and but few growers take pains to determine the exact tonnage.

During the last few years milo has been grown on a large number of farms as a feed crop for hogs, cattle, and poultry, and is rapidly assuming a place as one of the more important crops. A considerable part of the crop is thrashed, but probably the greater part is stacked and fed in the stalk. It has been grown successfully on all the soils, except deep sandy types and lower lying bottom-land types. Milo is much more drought resistant and therefore in this county a surer crop than corn, while its feeding value is nearly or quite as high. Dwarf Yellow is the principal variety. Milo has generally given better results than kafir so that very little of the latter grain is planted. Feterita has been grown in place of milo by a large number of farmers apparently with equally good or better grain yields, and seems to have the advantage of somewhat earlier maturity.

Other farm crops of less agricultural importance, because of the smaller acreage, and those grown only occasionally or in an experimental way are, cowpeas, peanuts, alfalfa, Sudan grass, Johnson grass, wheat, millet, barley, sweet potatoes, and watermelons.

Cowpeas are planted on a considerable acreage, the crop being utilized principally as a hog feed. Peanuts have been grown successfully on sandy soils by a few farmers, and the crop could probably be grown more extensively both for use in the fattening of hogs and as a sale crop.

Alfalfa has been grown in an experimental way in a number of places on the bottom lands along the San Saba and Colorado Rivers, but thus far in only one or two instances with any degree of success. Alfalfa has been grown to the west of this area on similar soils near Menard, and also on the Miller series, which includes the soils along the Colorado River, in other parts of the State. With the selection of good seed, careful preparation of the land, and judicious irrigation, avoiding excessive watering, this crop should succeed on the more pervious soils. Most of the hay used as winter feed for cattle is baled, but on the smaller farms is commonly stored loose in barns.
Experiments with Sudan grass have been successful both on the sandy soils of the upland and on some of the bottom land, and because of its advantages over Johnson grass, the number of farmers planting small fields is rapidly increasing.

Various fruits are grown in the county, such as peaches, pears, apples, plums, grapes, and strawberries. The sandy soils have generally been found best adapted to fruit, and on most of the heavier and more calcareous soils the yields have been poor and the plants short-lived, even where irrigation is practiced. Generally sufficient fruit for home use and to supply the local demand is grown, but there has been no specialization in fruit growing and conditions do not appear to be favorable for the development of large commercial orchards.

Comparatively little trucking is carried on. Most of the irrigable land which is favorably located is not, because of the heavy, stiff nature of the soil, well adapted to the growing of early vegetables. Most of the farms have small vegetable gardens to supply the home and the small local demand.

The native pecan trees growing in the alluvial valleys of the perennial streams bear a nut of high quality and are a considerable source of revenue to landowners. In a few localities there has been some attempt to improve the native stock by grafting and the cultivation of selected trees, but the cultivated orchards have not yet attained any considerable commercial importance. The census of 1910 shows a sale of 619,862 pounds of nuts. During the past season (1915) the nuts sold at San Saba for 10 to 16 cents a pound.

The live-stock industry consists principally in the raising of cattle on the native pastures, which are now entirely inclosed and constitute the ranches. A small number of cattle are also kept on the farms that are composed in part of nontillable land suitable only for grazing.

The 1910 census gives the number of cattle in the county as 54,328, with a value of $1,023,669. It has lately been the policy of the ranchmen to improve the grades of the cattle by the introduction of purebred males, and the old longhorns of the open range have almost entirely disappeared. Most of the stock now consists of fair grades of the Hereford, Angus, and Durham breeds. Formerly the cattle were forced to subsist throughout the year entirely on the forage of the pastures and very serious losses were frequently sustained during severe winters. At the present time, however, stock has reached such a high value that the ranchmen have found it profitable to supplement the native forage throughout the winter months by feeding. Cottonseed meal or cake has generally been purchased for winter feeding, but cattlemen are now growing their own
feed to some extent, especially such forage crops as Johnson grass and sorghum.

Most of the pastures have a carrying capacity of one cow and calf or one steer to 8 to 12 acres, although the value of the pasturage varies greatly during different years and success in cattle raising is almost as dependent upon the distribution of the rainfall as is farming. The most valuable grass of the pastures is the curly mesquite. A species of *Andropogon*, locally known as broom sedge, originally covered the southern part of the county and, according to early settlers, attained a very rank growth, but has not withstood the close grazing in the inclosed pastures and has been largely superseded by the curly mesquite and other grasses, although on some of the sandy land of the northern part of the county it still remains the principal grass. A grass locally known as "needle" grass, probably a species of *Aristida*, and wild rye are common and afford considerable early spring grazing. Rescue grass has lately spread over the uncultivated bottom lands of the larger streams and has become an important addition to the winter forage. In addition to the above there are a large number of other grasses and weeds which have some value, and also certain shrubs and trees. The scrubby and brushly live oak which is so abundant on some of the limestone soils affords a great deal of winter roughage and in addition protection during severe winter weather. The prickly pear is present in nearly all of the pastures and in some situations and on certain soils appears in great profusion. Most ranchmen regard it as injurious to pasture, although when the spines and bristles are burned off cattle can eat it, and it affords sufficient sustenance to prevent starvation when the grasses and other forage have been exhausted. The mesquite tree is a common growth on nearly all the pasture land, and is generally considered an advantage, since stock browse to some extent on the leaves, while the seed pods, although the crop is extremely uncertain, are an important source of feed.

It seems certain that there has been some, though as yet no great, decrease in the original carrying capacity of the pastures. This decrease has resulted mainly from overstocking and premature grazing, thus preventing the grasses from maturing and reseeding themselves, while the prevention of fires has permitted an increase in such growth as cat claw, shin oak, and species of bushy cacti, which greatly depreciate the grazing value of the land.

Fully 75 per cent or more of the area is wholly unsuited for profitable farming both by reason of the topography and the character of soil, but is by nature well adapted for stock raising. Stock raising is therefore likely to remain a permanent industry in the

---

1 Probably *Hilaria cenchroides*. 
county, but it is realized that if it is long to remain a profitable industry steps will soon have to be taken to improve the pastures. There is a possibility of the introduction of new forage plants or of reseeding the pastures. The presence of rescue grass, which has been accidentally introduced and has become a winter forage plant of value, offers a suggestion that other valuable plants might be successfully introduced, for example, bur clover. However, from investigations by the Department of Agriculture of western pastures and the native forage plants of the United States, the opinion is expressed that there are comparatively few localities where new plants can be profitably introduced or where reseeding is practicable, and that the problem is one of restoration of the lands to their original condition or of maintenance of the indigenous plants.\(^1\) On some of the western public ranges a system of deferred grazing\(^2\) has been put into practice, and since most of the ranches here are already subdivided into two or more pastures a similar plan might be practicable. At the present time about the only plan of improvement is an attempt to renovate the pastures by burning off small areas in the late winter or early spring.

Most of the stock raised is sold as yearlings or as 3-year-old steers for feeders or to be shipped in the spring to more northern pastures.

A small number of beef cattle are finished for the market by feeding sorghum silage alone or supplementing this with cottonseed meal, milo, and other feeds. Thus far cattle feeding has been attended with only moderate or poor success. However, since such crops as sorghum and milo can be grown here with a fair degree of certainty of good yields every year, there is no reason why, with further experience and knowledge of the proper ration and feed requirements of stock, the production of finished beef should not become a profitable industry. There is reason to believe from the present experiments and comparison of the soils with other areas that such crops as alfalfa, Sudan grass, and peanuts can also be successfully grown in the area, and these crops should afford valuable additional forage.

Hog raising is carried on principally on the farms, although cattlemen are finding it profitable to inclose pastures with hog-proof fences and raise hogs along with the cattle, since on most of the pasture land hogs can find sufficient feed, especially during a mast year, for subsistence, without detriment to its value for grazing cattle. On the farms hogs are fattened principally on cowpeas and corn and to some extent on milo, while oats and occasionally wheat and barley are used for winter pasture.

---

\(^1\) Native Pasture Grasses of the United States. Bul. 201, U. S. Dept. of Agr., p. 3.

Fair grades of Duroc and Berkshire breeds are kept on many of the farms, but most of the animals on the ranches are inferior stock. According to the census of 1910 there were 9,916 head of hogs in the county, valued at $41,208.

Sheep raising has decreased in importance during the last few years, mainly on account of the uniformly high price of cattle, and at the present time the number of sheep on the ranches is quite small in comparison with that of cattle.

Goats are raised only in small numbers, although a very large part of the rougher pasture land is excellently adapted for the grazing of these animals.

The poultry industry is of sufficient importance to deserve mention, especially the raising of turkeys. Eight to ten carloads of turkeys annually are shipped from San Saba. Milo is the principal feed for poultry.

Dairying is carried on to a small extent in connection with general farming, but at the present time is a comparatively unimportant industry. Most of the farmers keep a few milk cows for the home supply and market a small amount of butter. There is a small creamery at San Saba, but there is scarcely sufficient milk sold to meet the local demand.

Farming in this county has not yet become a highly specialized industry, and there has consequently been no close study on the part of farmers of the adaptation of soils to certain plants or varieties of plants. However, in general good judgment has been displayed in the selection of the soils best suited for farming under the climatic and other conditions which prevail, and a recognition of those best adapted for purely grazing purposes, and for stock raising. It is generally recognized that the sandy soils of the county are best suited for fruit, cotton, and such crops as cowpeas and peanuts, while the heavier soils, both of the upland and bottom lands are better adapted to the production of oats, milo, and such forage crops as sorghum and Johnson grass. The sandy loams of the upland soils which have a clay subsoil and the lighter textured bottom lands are generally regarded as likely to produce the most successful yields of corn.

The greater part of the farming is carried on without the aid of irrigation. In this region of uncertain rainfall and high evaporation the secret of successful farming on all of the heavier types of soils is in so handling the soil as best to conserve moisture. Most of the farmers have knowledge of the value of deep fall plowing and frequent cultivation to preserve a mulch, but are not always consistent in practice.

The deeper sandy soils, however, retain moisture, because of the naturally loose condition of the surface, and in cultivating these soils
it is more essential that they be handled in such a manner as to prevent blowing and shifting by winds and washing during heavy rainstorms.

Plowing in preparation for spring crops begins in the early fall and continues through January and February. Little is to be gained by fall plowing of the deeper sandy soils. There is no common practice of plowing at any certain time, nor much uniformity in the time of planting or plan of cultivation, these being determined by the season, which is very uncertain, the character of the soil, and the kind of farming carried on.

Irrigation is carried on along the San Saba and Colorado Rivers. The water is obtained from the streams principally by pumping with gasoline engines and is distributed from flumes. The irrigation is confined mainly to the lower bottoms or the land lying 25 to 40 feet above the stream channels. In a few more favorable localities, higher lying alluvial-terrace land has been watered in this manner. Corn is the principal crop grown under irrigation; cotton is irrigated only to a very small extent and the general opinion seems to be that the small or doubtful increase does not justify the additional expense.

It is difficult to obtain accurate estimates of the cost of irrigation, as very few persons have kept any careful account, other than the money spent for gasoline. The cost varies from year to year, depending upon the number of times necessary to water the land, the height to which the water is pumped, and the price of gasoline. The cost, during the ordinary year and with fuel at a moderate price, is probably $3 to $5 an acre. There are years during which the money invested in irrigation does not seem to be justified, but on the whole it is regarded as good insurance against the complete or nearly complete failures which sometimes result on the dry-land farms.

Conditions are favorable throughout the county for irrigating small orchards and gardens from wells equipped with windmills. There are also several large permanently flowing limestone springs which are so situated that they can be used for irrigation.

The stream waters are free from injurious quantities of alkali salts at all times of the year. The principal mineral in the spring waters is calcium carbonate.

The equipment of the average farm consists principally of the common implements necessary for the cultivation and harvesting of the staple crops, corn, oats, and cotton. Moldboard walking plows are used on the sandy soils, while riding disk plows are found more efficient in cultivating the heavier soils. Gasoline farm tractors are used to some extent for breaking land on the more level river-valley farms. Most farmers own binders for harvesting oats, and binders for corn and milo are coming into common use.
Dipping vats for protection against the tick are now regarded as a necessary part of the equipment of a ranch or farm where cattle raising is the principal industry. The pastures are for the most part inclosed with 3 to 5 strands of common barbed wire, but much of the more recent fencing is done with woven wire.

Farm buildings still have to some extent a pioneer appearance, and there are only a few conspicuous examples of large, well-cared-for farm homes and painted barns such as may be seen in older agricultural regions. The winters being generally mild and dry, there is less necessity of large barns for stock protection and storing farm products than in regions having a more severe climate.

The cultivation of the staple crops varies to some extent with the season and also according to the soils. Corn is commonly cultivated three times during a season, but on the heavier soils where dry-land farming is practiced, if any early drought sets in cultivation is frequently neglected because of the feeling that the labor will be lost. Riding cultivators are generally used on the river-valley lands and nearly level cultivation is practiced. Shallow cultivation is necessary after each rain or after each watering where the farm is equipped for irrigation. On the sandy soils the corn is planted in deep furrows with a lister and the middles gradually worked toward the corn.

The method of planting cotton and the cultivation vary according to the soil as with corn. On the heavier soils frequent cultivation is necessary to conserve moisture, but on the whole grass and weeds are much less troublesome than in the more humid parts of the State. Riding cultivators are used, and no great amount of hoeing is necessary except on fields infested with Johnson grass.

Oats are generally sown broadcast. A combination seeder and disk harrow is in common use.

No definite or well-established system of rotation of crops is followed. The plan of farming is very flexible and the crops grown and the proportional acreage devoted to any of the staple crops vary from year to year, according to the season, price, and amount of stock on hand to be fed. On some of the bottom land best suited for corn, this crop may be grown continuously for several years on the same field or only occasionally alternated with oats and cotton. Oats are commonly disked in after corn and cotton. Cowpeas are planted in corn on some farms and may also be alternated with corn as a separate crop where hog raising is carried on.

The common wages for farm laborers is about $20 per month with board and washing. However, very little hired labor is employed on the average small farm. Ranch hands receive from $25 to $40 per month. Practically all of the labor employed is white and Ameri-
can. The few Mexicans in the county are engaged mainly in clearing land and in herding sheep.

There is a wide range in the size of the land holdings. Most of the farms which are operated by owners and where the growing of farm crops is the principal industry vary from 50 to 200 acres. The ranches, generally embracing some cultivated land, for the most part range in size from 2,000 to 40,000 acres. According to the census of 1910, there were 1,530 farms in the county with an average size of 429 acres. It is evident, however, that a considerable percentage of the farms of the census classification are composed mainly of pasture land and locally would be classed as ranches.

According to the census of 1910 44.5 per cent of the farms were operated by tenants. The share basis of renting prevails, the landlord receiving one-third of the corn and one-fourth of the cotton, while the tenant furnishes stock, implements, and labor. Only a very small percentage of the farm land is rented for cash, the price being about $3 per acre for desirable land. Large tracts of pasture land are leased at the rate of 50 to 75 cents an acre, depending upon the character and condition of the forage rather than upon location.

The selling price of the average farm land ranges from $20 to $40 an acre depending upon the character of the land and the location. Some of the more favorably located irrigable bottom land is held at as high as $75 an acre. Most of the pasture land has a value of about $10 an acre.

**SOILS.**

San Saba County lies in the southern part of the Great Plains soil province. The area is characterized by a diversity of soils, which bear a close relation to the rocks of equally diverse character underlying them, to local topographic differences, and to the geologic and physiographic history of the region.

The rocks underlying the area are mainly of marine-sedimentary origin and consist of limestones, sandstones, and shales, together with some unconsolidated or loosely consolidated alluvial and fluviatile deposits of sand, gravel, and clay. Old crystalline rocks occur, but their outcrop occupies but a relatively small proportion of the area.

The older rock formations are Cretaceous, Carboniferous, Cambro-Ordovician, Cambrian, and pre-Cambrian in age; the younger fluviatile or alluvial deposits belong to the late Tertiary (?) and Pleistocene periods.

The strata have undergone extensive block faulting in places, but there is an absence of complex folding accompanied by faulting and,

---

1 Llano-Burnet Folio, and Professional Paper 71, pp. 427-428, publications of the U. S. Geological Survey, are quoted as authority for the age of the rock formations.
although the strata have regional dips or inclinations, the beds in
their relation to the soils may be considered as practically horizontal,
with the exception, of course, of the old pre-Cambrian crystallines.

There are four fairly well marked geologic and topographic divi-
sions in the county, with corresponding broad differences in soils and
native vegetation.

Constituting the first division is the northern third of the county,
which includes an area extending southward along the Colorado
River to a point a few miles below the mouth of the San Saba
River, is an old, rather maturely eroded and generally well-drained
plateau. The underlying rocks are mainly Carboniferous (Coal
Measures) in age and consist of a succession of thin beds of fine-
grained sandstone and soft shale. The plateau formerly was covered
by a plain of fluvialite deposits of sand, gravel, and clay, probably
late Tertiary in age, and these deposits locally have influenced the
character of the soils, notwithstanding the fact that they have largely
been removed by erosion, and exist only as remnants on the more
nearly level stream divides. The rocks, as well as the soils, are less
calcareous than in the other divisions of the county. The soils are
fine sandy loams or clay loams, according as the sandstones or shales
have been the principal source of the soil material, although the sandy
soils greatly predominate. The prevailing reddish color in the
subsoil is an indication of good drainage.

In this part of the county, post oak is the characteristic tree
growth and the section is known locally as the “post-oak sandy
country.” Other characteristics of the flora, including the grass
growth, together with the color and prevailing sandy nature of
the soils, serve to distinguish this from other divisions of the county.
The soils of this section belong mainly in the Windthorst series.

The high plateau area embraced in the southern half and west-
central part of the county is a second well-defined soil division. This
section has a general elevation of 1,500 to 1,900 feet above sea level
and is characterized by a deeply dissected and rugged topography
near the rim of the plateau and the larger streams, with rolling or
nearly level areas back from the escarpments. It is underlain
entirely by limestones, mainly of the Cambro-Ordovician and Car-
boniferous ages, with a few mesalike remnants of Cretaceous lime-
stones. The Cambro-Ordovician rocks consist mainly of grayish,
hard magnesian-crystalline limestone and marble, which are locally
cherty. The Carboniferous limestones are superimposed upon the
Cambro-Ordovician formation, and occupy the northern and eastern
rim of the plateau. They consist of grayish and dove-colored hard
limestones, which are locally cherty. They are, on the whole, more
calcareous than the older rocks and contain darker colored chert,
which exists to a greater extent as concretionary nodules and in
many places is calcareous. The weathered products of these rocks are seldom more than 3 feet in thickness and the soils are predominantly stony. The soils are prevailingly darker in color and more calcareous than those of the plateau division of the northern part of the county, but because of their thinness and stony character, conditions which are clearly related to their physiographic position and the hardness of the rock, are not so well adapted to farming. In further contrast, the predominant tree growth is live oak, while the rougher slopes on the rim of the plateau support a dense, low growth of cedar. The grass growth differs in the species that predominates, there being notably a more luxuriant growth of curly mesquite. The soils of this division are included principally in two series, the San Saba, comprising the darker brown and black soils, and the Crawford, which embraces most of the stony and cherty soils with red subsoils.

The rolling valley areas which lie along the southern line of the county, and which may be regarded as the northern extension of the Llano-Burnet Basin, form a third soil division, of much smaller extent than the two already described. The country lies 100 to 200 feet lower than the plateau to the north, and represents a still more maturely eroded region. The division includes the older sedimentary formations, Cambrian in age, which consist mainly of hard, thin-bedded glauconitic limestone, for the most part arenaceous in character; soft, grayish, fine-grained, calcareous sandy shales; and glauconitic and ferruginous sandstones, together with arenaceous sandstones containing but a small percentage of lime. In this division are also included the old pre-Cambrian rocks, mainly hard, fine-grained, acidic gneisses, with some granite and more basic igneous rock intrusions. Because of the diverse character of the rocks, the differences in chemical composition and hardness, which, together with faulting, have produced a variety of topographic forms, the soils are more variable than in other parts of the county, and this within very small areas. Sandy and stony soils predominate. The soils of this division are included mainly in the Pontotoc, Harley, and Tishomingo series, the last named embracing the soils from the crystalline rocks. The same species of native plants are found as in both the other divisions described, but in the area as a whole there is a diversity of forms, rather than a predominance of a few species.

The fourth division is the river-valley land, including the San Saba River basin in the central part of the county and the alluvial flood plain and terraces of the Colorado River. In these areas the land surfaces are nearly level plains, much younger, lower, and less changed by weathering and erosion than those of the other divisions; while the geologic formations are comparatively recent, and the alluviums, being derived from a variety of sources, have a more heterogeneous character, which is transmitted to the soils. The de-
posits in the valleys consist of sand, gravel, silt, and clay, for the most part unconsolidated and comparatively thin. In the San Saba Valley detritus was carried down from the plateau to the west and spread out in the valley, forming a nearly level plain about 2 to 4 miles in width, while at the same time some of the tributary valleys were filled in with alluvium of more local origin, as a result of which slight differences in the soils may be observed. Thus the soils of the valleys on the south side of the San Saba show greater influence from limestones and black shales, while those on the north side exhibit greater influence from the Coal Measures sandstones and shales.

The base of the older alluvial deposits along the San Saba consists of assorted sand, gravel, and boulders of chert, flint, and limestone, in places cemented into a firm conglomerate. The upper part of the deposits consists of grayish or brownish coarse sandy clay and silt, weathered dark red, brown, or black at the surface, according to drainage conditions. Small, angular fragments of pink felspar and granite are abundant. The alluvium is highly calcareous, in places a marl, and the soils likewise generally contain high percentages of calcium carbonate. The alluvium has a maximum thickness of about 30 feet, and the terrace plains lie 40 to 60 feet above the level of the San Saba River.

The streams flowing through this older plain cut out lower valleys and formed terraces of darker colored and finer alluvium, while a third flood plain is in process of development, but has not yet attained any considerable width. The late Pleistocene alluvium reaches a thickness of 10 to 25 feet and is composed mainly of brownish and grayish, calcareous silt and clay, with a thin bed of limestone and chert gravel at the base.

The soils from the older terrace-plain and outwash-plain deposits are classed with the Miles and Abilene series, and those from the latest Pleistocene and recent alluvium with the Frio series. That the age and elevation of the terraces bear a relation to differences in the soils, finds confirmation both in the character of the native vegetation and in the growth of cultivated plants.

The alluvial valley of the Colorado River is comparatively narrow. The alluvium is principally late Pleistocene in age, and forms a nearly level terrace plain about 40 feet above the level of the river. Recent flood plain only 10 to 20 feet above the river is in process of formation, but, as along the San Saba, is not yet of importance in relation to the soils. Older terraces of reddish sandy clay and gravel, probably of the same age as those along the San Saba, occur at elevations of 60 to 80 feet, but are narrow and are not continuous. The lower lying deposits consist of 30 to 40 feet of silt, clay, and fine sand, with a thin gravel bed at the base. The alluvium differs
notably from that of the San Saba and local streams in having a peculiar chocolate or chocolate-red color. The material has its source in the regions to the west, and the color and other characteristics of the alluvium seem to have been dominantly influenced by detritus from the Permian or "Red Beds" formations, which outcrop 50 to 100 miles to the northwest. The higher terrace alluvium does not have quite the same lithologic character as the lower, but it differs in source of material from the higher terraces of the San Saba River, and the soils are therefore classed with a different series. The soils along the Colorado River are mapped with the Miller and Bastrop series.

In the stream-valley areas are found the large trees and those not found at all or but sparingly on the higher land, such as the pecan, cottonwood, elm, sycamore, and willow.

Upland, or residual, soils, exclusive of the nonagricultural Rough stony land, cover about 75 per cent of the total area of the county. Clay and clay loam soils predominate, with fine sandy loams next in importance. The greater percentage of the upland is occupied by soils so stony that they are poorly adapted to cultivation. With the exception of the sandy residual soils of the northern part of the county, and a few other small areas, the soils are calcareous and prevailing dark at the surface. They are on the whole fairly well supplied with organic matter, and it is believed that the productivity of the more arable land depends mainly on proper tillage.

For the purpose of mapping, the soils are separated into series, on the basis of common origin and similar characteristics of color, topography, and drainage. Each series is divided into soil types, which differ in texture of the material, or the relative quantities of different-sized particles, as sand, silt, and clay. Brief descriptions of the several series encountered in the county are given here, while detailed descriptions of the types and of the agriculture in relation to each type will be found in subsequent pages.

The upland soils of the county are grouped in eight series: The Windthorst, Crawford, San Saba, Darnoc, Pontotoc, Harley, Tishomingo, and Brackett series.

The types in the Windthorst series have light-brownish to reddish-brown soils and reddish subsoils. The lower part of the soil section in places is yellowish or mottled with yellow. The soil material is mainly residual from sandstone and shale, but is locally influenced by old-alluvial deposits of gravel and sand. This series is important in San Saba County because of its large extent and the high agricultural value of some of the land.

The Crawford series embraces the greater part of the residual soils of limestone origin. These soils are characterized by the reddish-brown to nearly black color of the surface material, and the dark-red
color and stiff structure of the subsoil. In this county they are derived from the Cambro-Ordovician, Carboniferous, and Cretaceous limestones. The rocks differ in lithologic character, and there may be corresponding soil differences, but the soil color is the same and this was used as the chief basis of differentiation.

The San Saba series also comprises soils residual from limestone. The types in this series are characterized by black or dark brownish soils, and brownish or very dark gray subsoils. These soils typically are calcareous. They are derived from the same limestone formations as the Crawford, but differ from the latter in having a darker color and in containing higher percentages of calcium carbonate. Locally, as the soil becomes more cherty a reddish cast appears in the subsoil, and in the mapping sharp distinctions can not be made from the Crawford. The San Saba series is important in this county. It occupies nearly as large an area as the Crawford and constitutes a large part of the most valuable pasture land.

In the Darnoc series are included types with brown or dark olive brown to black soils and greenish-yellow, greenish-brown, or olive-colored subsoils. These soils are calcareous, and stiff and compact in structure. The material is residual from soft, somewhat calcareous, black, carbonaceous shale, with only a minor influence from limestone and sandstone. The topography is steeply sloping to nearly level. The drainage is good.

The Pontotoc series includes residual soils derived from calcareous rocks consisting of sandy limestones and calcareous, ferruginous sandstones, both of which contain notable percentages of glauconite. The parent rocks in this county belong to Cambrian formations, mapped in the Llano-Burnet folio of the United States Geological Survey as the Wilberns, Cap Mountain, and Hickory sandstone formations. The characteristic soil color is reddish brown or brown. The subsoil is dark red or brownish red. The surface drainage generally is good.

The types in the Harley series are characterized by the light-brown to brown color of the surface soils and the yellow, greenish-yellow, or yellowish-brown color of the subsoil. Where a clay subsoil is present it is typically stiff or only moderately friable. The soils are derived mainly from sandstones, and are less calcareous than the associated Pontotoc soils. Black concretions are commonly present in both surface soil and subsoil. These soils occur in relatively low situations and oxidation apparently has not advanced so far as in the Pontotoc soils.

The types in the Tishomingo series are characterized by a reddish-brown or brownish-red color of the surface soil and a red or dark-red color of the subsoil. The subsoil, where the soil material is deep, is a moderately stiff, gritty clay, which in this county assumes
a yellowish or greenish color in the lower part and passes into the partially decomposed underlying rock at about 3 feet. The soil is residual from acidic gneiss and schist in which there are small bodies of granite and dark-colored, more basic igneous rocks. The topography is rolling, with smooth slopes, becoming rough and rugged in the areas of stony soil. The land is well drained.

The Brackett series includes soils having a grayish or light brownish color at the surface and a grayish or whitish, highly calcareous subsoil or substratum. In this county the soil color has mainly resulted from erosion, the original darker colored, residual-soil accumulations having been removed nearly to the depth of the underlying substrata of disintegrated chalky limestone or other calcareous rocks.

The alluvial soils of the county have been correlated in six series, the Miles, Abilene, Simmons, Frio, Miller, and Bastrop.

The Miles soils are derived from old Pleistocene, and possibly late Tertiary, fluvialite deposits, spread out as a veneer over old, high plateau surfaces and occurring also both as broad valley-filling areas and as terraces along streams. In this county the detritus composing the alluvium is derived mainly from limestones, with some influence from sandstones and shales, and has been washed from the Edwards Plateau and the High Plains. The types of this series are characterized by a dark reddish brown or dark-brown color of the soil and a red color in the subsoil. The soils are calcareous and a tough, calcareous clay hardpan is characteristic of the series. A whitish or salmon-colored, chalky or marly substratum and hard calcareous grit, with the character of "mortar beds," are commonly encountered at depths of 3 to 5 feet.

The Abilene types differ from the Miles in having a slightly darker color. The surface soils are brown to nearly black and the subsoil brown. The two series are similar in physiography and origin, the darker color of the Abilene apparently being due to poorer drainage conditions.

The Simmons series is similar in origin to the Miles and Abilene, but comprises soils of still poorer drainage than the Abilene. The soil material characteristically is black—grayish black at the surface and slaty black or brownish in the subsoil.

The lower lying alluvial soils along the San Saba River and local streams where the soil material has been dominantly influenced by limestones or other calcareous strata are included in the Frio series. The soils are black or light brown and are characteristically calcareous. They occupy both recent bottoms and late Pleistocene terraces subject to occasional overflow.

The Miller series embraces the bottom-land soils along the Colorado River. The soils have a peculiar chocolate or chocolate-red
color, and in this county are generally calcareous. The alluvium has been derived to a large extent from the sandstone and shale soils of the Permian and other Red Bed areas to the west.

The Bastrop series includes the soils of the terraces along the Colorado River. These soils are characterized by their reddish color. They differ from the Miles soils in the source of the material, in being less calcareous, and in the absence of the chalky or “mortar-beds” stratum in the subsoil or substratum.

Rough and excessively stony areas that have no value for farming are mapped as Rough stony land. They have a low value as grazing land.

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

Areas of different soils.

<table>
<thead>
<tr>
<th>Soil</th>
<th>Acres.</th>
<th>Percent</th>
<th>Soil</th>
<th>Acres.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crawford stony clay</td>
<td>110,016</td>
<td>15.5</td>
<td>Miller silt loam</td>
<td>6,409</td>
<td>0.9</td>
</tr>
<tr>
<td>San Saba stony clay</td>
<td>109,440</td>
<td>15.4</td>
<td>Crawford clay</td>
<td>5,896</td>
<td>0.8</td>
</tr>
<tr>
<td>Rough stony land</td>
<td>79,856</td>
<td>10.4</td>
<td>Tishomingo sandy loam</td>
<td>3,264</td>
<td></td>
</tr>
<tr>
<td>Crawford gravelly clay loam</td>
<td>61,568</td>
<td>8.7</td>
<td>Light-colored phase</td>
<td>2,304</td>
<td>0.8</td>
</tr>
<tr>
<td>Windthorst fine sandy loam</td>
<td>55,827</td>
<td>7.9</td>
<td>Pontotoc clay loam</td>
<td>4,808</td>
<td>0.6</td>
</tr>
<tr>
<td>Windthorst stony fine sandy loam</td>
<td>55,232</td>
<td>7.8</td>
<td>Miles sandy loam</td>
<td>4,544</td>
<td>0.6</td>
</tr>
<tr>
<td>San Saba clay</td>
<td>36,224</td>
<td>5.1</td>
<td>Heavy phase</td>
<td>768</td>
<td>0.5</td>
</tr>
<tr>
<td>Windthorst clay loam</td>
<td>29,928</td>
<td>4.1</td>
<td>Light phase</td>
<td>192</td>
<td></td>
</tr>
<tr>
<td>Frio silty clay loam</td>
<td>21,120</td>
<td>3.0</td>
<td>Frio silt loam</td>
<td>3,712</td>
<td>0.5</td>
</tr>
<tr>
<td>Pontotoc sandy loam</td>
<td>19,392</td>
<td>2.7</td>
<td>Frio loam</td>
<td>3,456</td>
<td>0.5</td>
</tr>
<tr>
<td>Abilene clay loam</td>
<td>14,272</td>
<td>2.0</td>
<td>Miller fine sandy loam</td>
<td>2,880</td>
<td>0.4</td>
</tr>
<tr>
<td>Brackett silt loam</td>
<td>13,622</td>
<td>1.9</td>
<td>Abilene loam</td>
<td>2,816</td>
<td>0.4</td>
</tr>
<tr>
<td>Darnoc clay</td>
<td>13,504</td>
<td>1.9</td>
<td>Miller clay</td>
<td>2,624</td>
<td>0.4</td>
</tr>
<tr>
<td>Harley sandy loam</td>
<td>12,288</td>
<td>1.7</td>
<td>Simmons clay loam, colluvial phase</td>
<td>1,024</td>
<td>0.1</td>
</tr>
<tr>
<td>Miles clay loam</td>
<td>11,840</td>
<td>1.7</td>
<td></td>
<td>710, #90</td>
<td></td>
</tr>
<tr>
<td>Frio fine sandy loam</td>
<td>10,752</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miles loam</td>
<td>5,320</td>
<td>1.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simmons clay</td>
<td>7,049</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Includes area of Windthorst gravelly clay loam.
2 Includes area of Pontotoc stony loam.
3 Includes area of Abilene gravelly clay.
4 Includes area of Darnoc stony clay.
5 Includes area of Harley stony sandy loam.

Windthorst STONY FINE SANDY LOAM.

The surface soil of the Windthorst stony fine sandy loam consists of a light-brownish fine sandy loam, underlain by reddish and yellowish, stiff clay. The soil layer is generally thin, and large sandstone fragments are strewn over the surface, while rock outcrop is common. In the more eroded areas the fine sandy loam surface soil has been entirely removed, leaving a clay or clay loam soil, so that the type as mapped includes considerable Windthorst stony clay loam and clay which can not satisfactorily be separated.
This type occupies narrow ridges, steep slopes, and, in general, areas of rougher or more rolling topography, in association with the Windthorst fine sandy loam and other types. It is mapped principally in the northern part of the county, both in small areas and in extensive areas along the Colorado River where the plateau has been minutely dissected by tributary streams. The total area is slightly less than that of the fine sandy loam.

Much of the type is unsuited for farming, and is utilized as grazing land. It is fairly valuable for this purpose, but probably does not furnish quite so good grazing as the rough limestone soils to the south. Post oak is the predominating tree growth with some mesquite, blackjack, stunted elm, and a few other trees. Algerita, chaparral, a species of acacia, and various species of cacti are common. Broom sedge forms a greater portion of the forage grasses than on the limestone soils. The type has a value of $5 to $10 an acre as grazing land.

WINDTHORST FINE SANDY LOAM.

The surface soil of the typical Windthorst fine sandy loam consists of a light-brown to light reddish brown loamy fine sand or moderately coherent fine sandy loam, underlain at about 10 to 20 inches by orange-red to brick-red, hard, brittle clay, which is mottled or streaked with greenish yellow or drab in the lower part of the 3-foot section. There is generally a rather sharp transition from the sandy surface soil to the clay subsoil, which is rather compact and impervious, and in places a moist or saturated layer occurs at the line of contact. Bedrock commonly is encountered at depths of 30 inches to 4 feet. This type on the whole is notably less calcareous than the alluvial soils or the residual soils of other series.

There are several variations of this type, which differ from the typical in color and in the depth of the surface fine sandy loam, depending upon local topography and the lithologic character of the underlying rock, which consists of alternating, nearly horizontal, thin beds of only moderately hard, fine-grained, sandstone and soft shale. The variations are of little importance from an agricultural standpoint.

In many of the shallow depressions along drainage ways where there has been somewhat poorer drainage, the soil has a light yellowish brown color, and the subsoil a dull-yellow or mottled drab and reddish color. Spots of deep soil, where the fine sandy loam or loamy fine sand is 24 to 36 inches in depth, are distributed throughout the type, occurring as colluvial accumulations at the base of slopes and also on the higher land where sandstone has supplied almost all the soil material. Some of the larger areas of deep soil occur near
Shiloh Church and Bethel School, and along the Bowser-Richland Springs public road. On the other hand, on some narrow ridges and in other areas subject to erosion the sandy soil covering is only 4 to 8 inches in thickness, and in some instances the soil resembles the clay loam type.

The Windthorst fine sandy loam is confined mainly to that part of the county lying north of the Gulf, Colorado & Santa Fe. It occurs both in rather large areas and in widely distributed small areas in various topographic positions. The land is moderately rolling and generally well drained.

This type, because of its large extent and its adaptation to a wide range of crops, is the most important farming soil of the county. Probably 70 per cent of it is under cultivation. The uncleared land is included in the pastures consisting mainly of the stony fine sandy loam and clay loam types of this series. Post oak and mesquite are the principal trees. The grass growth, consisting mainly of broom sedge, needle grass, and some curly mesquite, is fair, and the land has a somewhat higher grazing value than its associated types.

Corn and cotton are the leading crops. The corn is utilized almost entirely on the farms; cotton is the chief cash crop. In the last few years, however, owing to the prevalence of the boll weevil, there has been a tendency to reduce the cotton acreage and devote more attention to forage crops. Sorghum is the principal hay and forage crop. Cowpeas are grown both in corn and as an independent crop, with a fair degree of success. It has been demonstrated on several farms that peanuts can be grown with good yields of both hay and nuts. Sudan grass grown in an experimental way has given heavy yields of hay in addition to furnishing pasturage. A small acreage is utilized on some farms for the production of milo, but on the whole the type is probably not so well adapted to this crop as the heavier residual and alluvial soils. Oats are grown for grain and hay for work stock, but the crop is unimportant in comparison with corn and cotton.

This type seems to be better adapted to fruit growing than most of the other soils of the county. Peaches are grown with a fair degree of success, considering the climatic conditions, and there are a few trees or moderate-sized orchards on nearly every farm. There are also several farms on which apple trees have made a thrifty growth and have borne fruit with more certainty than peach trees. Plums do well nearly every year, while pear trees are fairly thrifty and rarely fail to produce some fruit.

The average yield of corn is about 20 to 25 bushels per acre, and of cotton between one-fourth and one-third bale per acre. Owing to the high moisture-retaining capacity of the soil, crops withstand
drought well and are a little more certain than on most of the other residual upland soils or even on the unwatered bottom land. In places the soil in unusually wet seasons becomes unfavorably moist and soft. In general the soils having fine sandy loam surface covering 10 to 20 inches thick have been found to have the highest agricultural value.

The soil is easily cultivated, owing to its light texture and loose structure. It generally holds an abundance of moisture, and in places during unusually wet seasons there is so much water in the soil that plant growth is affected and the land becomes so soft and boggy that farming operations are interfered with. The extra labor of deep fall plowing and frequent shallow cultivation to preserve soil moisture is not so necessary as on the heavier lands. In the deeper and sandier areas the soil drifts to some extent, and in breaking the land it is purposely left in as rough a condition as possible. On the steeper slopes under cultivation precautions are necessary to prevent washing of the loose soil by heavy rains.

Farms composed mainly of this type, but generally including also small areas of the less valuable clay loam and stony fine sandy loam, have a selling price of $20 to $30 an acre, depending upon the proportion of the more arable land and the condition of improvements.

Diversified farming seems to offer the best opportunities for success on a soil of this character, which is adapted to a wide range of crops. The more extensive growing of such crops as cowpeas, peanuts, and sweet potatoes should not only prove profitable in conjunction with hog raising, but the first two crops are also highly beneficial to the soil. Dairying should prove successful on the more favorably situated farms.

WINDTHORST CLAY LOAM.

The Windthorst clay loam typically consists of a dark reddish brown, moderately friable clay loam underlain at a depth of a few inches by red to brownish-red, stiff clay, which characteristically becomes a more yellowish red or mottled red and greenish yellow at depths of 18 to 24 inches. A thin veneer of fine sandy loam or sandy loam, 1 to 4 inches deep, frequently is present and imparts a friable character to the soil. Over a nearly equal area, however, the sandy loam veneer has been removed by wash, and there is a layer, only 2 or 3 inches thick, of reddish-brown clay loam or clay soil overlying the raw clay of the subsoil. Sandstone rock or unaltered sandy shale is encountered at depths of 18 inches to 4 feet, and in the more eroded areas the underlying rock, but little altered by weathering, occurs at depths of only 6 or 8 inches.

Some of the land is moderately stony from residual fragments of sandstone and does not differ greatly from the stony fine sandy
loam type. There are also some included areas of soil that has a grayish or yellowish color, both at the surface and in the lower part of the soil section, and a more compact, silty texture and dead or baked appearance. Soil of this character occurs notably along the headwater branches of Mountain and Wilbarger Creeks south of Holt. In short, numerous color and other variations were noted; but, in view of the minor agricultural importance of the type as a whole, the labor necessary to map them as separate phases of the type did not seem to be justified.

The Windthorst clay loam occurs in small areas throughout the northern part of the county, in association with other types of the series, and also in the sandstone and shale areas of the central-eastern part of the county along the Colorado River.

The type occupies moderately smooth slopes along stream valleys and occurs as eroded and gullied areas along the headwater branches of the small streams. It commonly occurs also as thin bands forming the slopes of mesalike hills or plateaus, the tops of which are occupied by the Windthorst fine sandy loam or stony fine sandy loam.

With the exception of a few scattered fields of small size, no attempt has been made to place this land under cultivation, and it is on the whole not so well adapted to farming as the sandy types. The soil has a tendency to clod when plowed and does not withstand drought.

The type is utilized mainly for pasture. There are many nearly barren, gullied areas, and its capacity for grazing probably is but little greater than that of the stony fine sandy loam areas. The tree growth is mainly post oak and mesquite. Chaparral, cat claw (a species of acacia), and cactus are abundant in places. This land has a value of about $10 an acre.

WINDTHORST GRAVELLY CLAY LOAM.

Areas of the Windthorst gravelly clay loam are indicated on the soil map by gravel symbols on the color for the Windthorst clay loam. This soil is a friable, reddish-brown sandy clay loam, underlain at 6 to 10 inches by dark-reddish sandy clay of stiff or tough structure. The surface material characteristically is a sandy loam to a depth of 2 to 4 inches, carrying upon the surface or in the level areas incorporated with the soil to a depth of 6 to 10 inches both fine sand and coarse gravel, consisting mainly of chert but including other rocks, particularly granite. The lower subsoil is typical of the Windthorst series.

In places the surface soil is influenced by, or largely derived from, old Tertiary or Pleistocene alluvium, and in some instances the soil is mapped, rather arbitrarily, as Windthorst, rather than a shallow
phase of the Miles clay loam. The soil occupies nearly level, plateau-like divides or erosion remnants of the old alluvial plain of the northern part of the county. In general, the topography is smoother and less eroded than that of the gravel-free clay loam type, but there are a few moderately steep slopes. The gravelly clay loam occurs only in small areas.

It is more arable than the clay loam, and a greater proportion is under cultivation, although most of it is utilized for pasture. Its agricultural value seems to be about the same as, or but little inferior to, that of the Miles clay loam, and it is utilized for the same crops. The land is characterized by a rather open growth of trees, consisting mainly of mesquite and post oak, and a fairly good growth of forage grasses.

**CRAWFORD STONY CLAY.**

The surface soil of the typical Crawford stony clay consists of a dark chocolate brown or dark reddish brown clay, or clay loam passing quickly into clay, and the subsoil, beginning at about 3 to 5 inches, of a dark reddish brown or dark-red, stiff clay loam or clay. Limestone or an impenetrable mass of chert fragments occurs at depths of about 8 to 20 inches. In the smoother or level areas the immediate surface material is normally a dark-red or dark reddish brown clay. In many places there is considerable silt in the immediate surface material. Fragments of limestone, usually flattish, are abundant, and generally there is a large quantity of angular chert gravel mixed with the soil from the surface downward. Rock outcrop is also common.

The type is in general uniform, but includes small areas of clay loam and clay, comparatively free from large stones. In some places the soil is much darker than typical and differentiation from the associated San Saba stony clay is difficult.

This soil has been derived through processes of weathering mainly from cherty magnesian limestone and marble. It rarely shows effervescence when tested with acid, and is probably less calcareous than the San Saba stony clay. The smaller particles of chert are white or grayish, have a dense, compact structure, and seem to be almost pure silica, but are stained reddish or yellowish on the exterior by iron oxide.

This type occupies the greater part of the high plateau of the central and southern parts of the county, extending in a broad belt from the Colorado River almost to the western boundary of the county.

The topography is generally deeply rolling, and the hills and valley slopes, although very stony, appear rounded and smooth from a distance. A small part of the type adjoining the large streams is
sharply dissected by tributary branches and has a rugged and rough topography. The general elevation of the type varies from about 1,400 to 1,800 feet above sea level.

The Crawford stony clay has a greater area than any other soil in the county. The type, with the possible exception of a few small areas on level stream divides, is not considered suitable for farming. It is, however, one of the most valuable pasture soils of the county, and is well adapted to stock raising. Most of the land has a very open tree growth consisting almost entirely of live oak, distributed as lone trees of large size or as isolated clumps of smaller trees. Cat claw, a species of acacia growing to a height of 3 to 6 feet, is the most common shrub. There is very little cactus. In some sections there is a fairly dense growth of live-oak brush, and on some of the rougher and stonier slopes post oak and blackjack are common. Curly mesquite is the principal forage grass. Broom sedge at one time grew luxuriantly, reaching a height of 6 feet or more, and is still found to some extent in the dry, gravelly beds of the branches and on the rougher slopes.

The land is used almost entirely for pasturing cattle, but is also suitable for hogs and sheep. Its carrying capacity is one cow and calf to about eight acres, although the value of the pasture varies from year to year, depending upon the distribution of the rainfall.

Hogs generally do well on the pastures, especially in years when mast is abundant, and do not injure the grass growth nor decrease the carrying capacity of the land for cattle.

The type is valued at $10 to $15 an acre, and rents for 50 to 75 cents an acre. It is for the most part included in large ranches ranging from 2,000 to 20,000 acres in size.

CRAWFORD GRAVELLY CLAY LOAM.

The Crawford gravelly clay loam consists of a surface layer of dark-brown or black, silty gravelly loam 1 to 3 inches in thickness, overlying a dark reddish brown, stiff gravelly loam to clay loam which grades at 6 to 10 inches into dark-red or blood-red, stiff gravelly clay. The depth of the soil material ranges commonly from 20 inches to 3 feet. Chert gravel, consisting of angular particles, forms a large percentage of the soil material, and in places the subsoil is simply a mass of gravel mixed with a small quantity of red clay.

This type as mapped includes narrow strips of colluvial and alluvial soil along the small streams, as well as small areas of gravel-free clay loam and loam. The soil derived from some of the Carboniferous limestones and from the Cretaceous rocks, as in the
greater part of the areas west and northwest of Richland Springs, probably differs from the soil as typically described in the character of the chert gravel and in lime content, but these differences are not important.

The most extensive areas of this type are mapped southwest of Richland Springs and farther south along Deep Creek and the San Saba River. Near the latter stream considerable stony clay loam and other material is included. The principal area of nearly gravel free clay loam is 1 to 3 miles southeast of Richland Springs.

The topography of most of the areas is rolling to nearly level, and the land is generally well drained. Most of the smaller areas are associated with the stony clay type and occupy the more nearly level parts of the stream divides or occur on the more gentle slopes of the small-stream valleys.

The Crawford gravelly clay loam is one of the more extensive soils of the county, but only a very small percentage of it is under cultivation. It is utilized chiefly for pasture. Most of the land would probably be droughty under cultivation, and the abundance of chert gravel would interfere with tillage. The more nearly level and gravel free areas give good yields of oats, cotton, sorghum, and milo in favorable seasons.

The type supports a luxuriant growth of grasses and may be a little superior to the stony clay in grazing value. The tree growth is rather open and consists mainly of live oak, with some post oak, mesquite, and elm.

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

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Fine</th>
<th>Coarse</th>
<th>Medium</th>
<th>Fine</th>
<th>Very</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>446605, 446606, 446615</td>
<td>Soil</td>
<td>1.9</td>
<td>2.8</td>
<td>2.3</td>
<td>20.7</td>
<td>17.8</td>
<td>31.9</td>
<td>22.6</td>
</tr>
<tr>
<td>446606, 446604, 446616</td>
<td>Subsoil</td>
<td>1.1</td>
<td>1.8</td>
<td>1.9</td>
<td>17.4</td>
<td>14.7</td>
<td>32.3</td>
<td>30.7</td>
</tr>
</tbody>
</table>

The following samples contained more than one-half of 1 per cent calcium carbonate (CaCO₃): No. 446603, 11.72 per cent, and No. 446604, 14.56 per cent.

CRAWFORD CLAY.

The Crawford clay consists of a dark-red to dark reddish brown clay which gradually changes in color with depth and passes at 6 to 10 inches into dark-red or blood-red, stiff clay. There is commonly a veneer of 1 to 4 inches of clay loam on the surface, which gives the soil a somewhat friable and workable structure. Some areas are
moderately stony, from fragments of limestone, or contain rock outcrop, and these are shown on the soil map by symbols.

This type is residual from the weathering of chert-free limestone or marble, and differs from the Crawford stony clay in the absence of chert as well as in the somewhat heavier texture of the soil. Some of the type derived from the Cretaceous limestone has probably even a more compact and stiffer structure than that derived from the Paleozoic limestones, and in places at depths of 2 to 3 feet has a chalky substratum.

The type occurs in a number of areas, none of which is more than a square mile in extent, in the southern part of the county, both to the west and to the east of Cherokee. Small areas are mapped also in the vicinity and to the west of Richland Springs.

The total area is comparatively small, and the type is of minor agricultural importance. It is valued chiefly for pastures, and for the most part is included in large ranches composed mainly of other types. A few small fields are under cultivation. The soil is stiff and rather difficult to handle, but in favorable seasons of well-distributed rainfall it produces good crops of oats, corn, and cotton. It is probably best adapted to drought-resisting crops such as sorghum, Johnson grass, milo, and feterita.

The grass growth is good and the land has about the same pastureage value as the Crawford stony clay and San Saba stony clay.

SAN SABA STONY CLAY.

The typical San Saba stony clay soil is a black or very dark brown clay which becomes slightly lighter in color with depth, and grades into brownish, stiff clay where the soil layer reaches any considerable thickness. The soil is generally calcareous, the lime occurring both as minute particles of limestone distributed through the soil and also as larger whitish accretions. The residual clay is generally thin and the hard bedrock of limestone is encountered at 6 to 24 inches. In flat, imperfectly drained areas, such as that north of Cherokee, both the soil and subsoil are black down to bedrock, which is reached at about 10 to 15 inches. The color is not so dark on the better drained slopes, and whitish chalky material is found in the lower subsoil in places. The surface is excessively stony, both from detached fragments of limestone and from projecting boulders and ledges. In places considerably more than half the surface is occupied by flattish fragments of rock, while other more nearly level areas are comparatively free from loose fragments, but are marked by projecting boulders that have been rounded by weathering.

In some areas where the soil is very thin and stony, the soil varies toward a friable, granular clay loam or even loam, but as the land
has a similar vegetation and a grazing value not materially different from the main type, separation of the lighter areas was not considered important. This lighter textured soil is dark brown rather than black.

As the underlying limestone becomes cherty, the soil assumes more the character of the Crawford stony clay, and it is not possible accurately to differentiate these two types in some of the more inaccessible areas.

The San Saba stony clay is confined principally to the limestone-plateau region of the central and southern parts of the county. It occurs in extensive tracts, and its total area is but little less than that of the associated Crawford stony clay. The topography is nearly level to rolling. In some of the more rolling areas broad, shallow valleys have been formed and there are comparatively few stream branches, and the slopes while very stony are not especially steep or rugged. Smaller areas near the northern limit of the plateau and adjacent to the San Saba and Colorado Rivers have been deeply incised by tributary creeks, resulting in the formation of canyonlike valleys and minor plateaus or mesas surrounded by steep escarpments.

The San Saba stony clay is poorly adapted to farming, on account of its stoniness, but is one of the most valuable pasture soils of the county. The greater part of the land is forested, but large areas in the southern part of the county are devoid of trees or have only a very scattered growth. Along the northern and eastern margins of the plateau the rougher slopes and plateau escarpments support a dense growth of cedar, this type constituting the principal soil of the so-called "cedar brakes" of the county. In these rough areas there is a thick growth of live oak, chaparral, stunted elm, cat claw, Mexican persimmon, and cactus, in addition to the cedar. The land does not have so high a pasturage value for cattle as the more open and smoother areas to the south and west, but affords good pasturage for hogs and goats. The cedar is extensively utilized for posts, and the sale of cedar-cutting privileges has been a source of income offsetting to some extent the lower pasturage value of the land.

Back from the cedar brakes the characteristic growth is live oak, either as fair-sized trees or as dense brush. Mesquite is generally present, and there are scattered areas of shin-oak brush. The soil supports a heavy turf of grasses, principally curly mesquite, notwithstanding its thin and excessively stony character. The grazing value of the land is about the same as that of the Crawford stony soils. The grass may not be quite so good on the whole as on the Crawford types, but there is probably more forage and better protection for cattle in the winter. Hogs do well on the pastures and
with protection from wolves hog raising can be made a source of profit in connection with cattle ranching.

The land has a sale value of $10 to $15 an acre, and a rental value of 50 to 75 cents an acre.

**SAN SABA CLAY.**

The typical San Saba clay consists of dark-brown to black, moderately friable clay, which gradually passes at a depth of about 4 to 8 inches into a dark-brown stiff clay. This becomes slightly lighter in color with depth, the lower subsoil usually being a brown, stiff clay. In the lower, more poorly drained situations the subsoil frequently is black, although the lower part generally is brownish. The surface soil is plastic and sticky when wet, but commonly is loose and granular when dry. The material is generally calcareous. Lime is present in the form of small, chalky particles of limestone and whitish accretions of calcium carbonate. Bedrock is generally reached at about 15 to 36 inches, although in places where the soil represents colluvial accumulation in drainage depressions the depth is somewhat greater. In places a soft chalky substratum is present, but over most of the areas the soil layer rests upon hard limestone.

This soil is distinguished from the San Saba stony clay in being comparatively free from large rock fragments at the surface and from rock outcrop. There are, however, some gravelly areas, where the surface is thickly strewn with subangular chert gravel, stained brownish or yellowish, which seems in some areas to be residual from the weathering of the underlying rock and in other areas to represent residual remnants from former overlying terrace deposits. The more important of the gravelly areas are shown on the soil map by symbol.

Small areas of black clay and clay loam in drainage depressions associated with the Pontotoc soils of the southern part of the county are included with this type, on account of the black color, although in source of material these areas are more closely related to the Pontotoc.

The San Saba clay is rather widely distributed in small areas throughout the limestone plateau region of the southern two-thirds of the county, with a few isolated areas in the northwestern part near the McCulloch County line. Small areas, which can not satisfactorily be mapped separately, occur throughout the more extensive areas of the stony clay type.

The San Saba clay occurs in flat to gently rolling upland areas, and is also encountered on gentle slopes and benches in the stream valleys. The drainage is generally adequate for successful crop production.

Practically all the type is arable land, although only a small percentage is under cultivation, owing mainly to the fact that it is in-
cluded in large pastures composed mainly of the less arable, stony types. Cotton and corn are grown to a small extent, fair yields being obtained where the land is properly cultivated. The soil, however, is probably best adapted to such crops as sorghum, Johnson grass, oats, milo, and feterita. Small fields are cultivated on a number of the ranches to provide winter forage for cattle and feed for the horses.

The soil is sticky when wet and tends to plow up cloddy when either wet or very dry, but the clods pulverize upon exposure, and a fairly good tilth can be maintained.

The uncleared land supports a comparatively open to dense growth of mesquite, with much less live oak than is present on the stony clay type. Many of these areas, however, were treeless, open glades, or prairies at the time of the first settlement of the county. The soil supports a luxuriant growth of grasses and is highly valued as grazing land.

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

**Mechanical analyses of San Saba clay.**

<table>
<thead>
<tr>
<th>Number.</th>
<th>Description</th>
<th>Fine gravel</th>
<th>Coarse sand</th>
<th>Medium sand</th>
<th>Fine sand</th>
<th>Very fine sand</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>444603, 444613, 444623, 4446111</td>
<td>Soil.........</td>
<td>0.5</td>
<td>1.5</td>
<td>1.2</td>
<td>9.6</td>
<td>11.3</td>
<td>53.0</td>
<td>23.9</td>
</tr>
<tr>
<td>444604, 4446014, 444620, 4446112</td>
<td>Subsoil.....</td>
<td>0.7</td>
<td>1.6</td>
<td>1.1</td>
<td>9.5</td>
<td>11.2</td>
<td>53.7</td>
<td>57.1</td>
</tr>
</tbody>
</table>

The following samples contained more than one-half of 1 per cent calcium carbonate (CaCO₃); No. 444603, 1.90 per cent; No. 444604, 2.93 per cent; No. 444625, 5.29 per cent; No. 444626, 11.45 per cent; No. 4446111, 11.26 per cent; and No. 4446112, 22.49 per cent.

**Darnoc Clay.**

The Darnoc clay type is characterized by the dark olive brown to black color of the surface soil and the greenish-brown or dark olive green to light greenish yellow color of the plastic, stiff clay subsoil. The friable surface layer is generally only 3 to 8 inches deep. The soil is very hard and compact when dry, and sticky when wet. The subsoil generally becomes greenish yellow or slaty drab in the lower part and grades into soft but only partially weathered shale at depths of 3 to 6 feet. Usually the material to a depth of 3 or 4 feet is calcareous.

This type is residual from soft black, carbonaceous shale, which carries a few thin layers of impure limestone and sandstone. The shale itself frequently is calcareous. At the base of the shale formation the limestone increases in extent and the residual soil assumes more the character of the San Saba clay, so that it is difficult in places to make a sharp distinction between the two types. Both rounded and angular chert and limestone gravel are strewn over the
surface in many places, but is not incorporated with the soil to any appreciable depth. Most of the gravel has rolled down from higher adjacent slopes, or represents the remnants of former overlying wash-plain deposits. In places the gravel attains the size of cobbles and is so abundant that it interferes with cultivation.

The principal occurrence of this type is in the Wallace Creek and San Saba River valley basins in the central part of the county. Small areas are coincident with the geographic distribution of the parent black-shale formation, which follows the northern rim of the limestone plateau eastward to the Colorado River and thence extends southward along the river for a distance of 8 to 10 miles.

The type occurs on smooth, gentle slopes and sloping benches at the base of plateau and terrace-plain escarpments. The plateau-escarpment slopes merge on the one hand with the alluvial bottom land and terrace plains along the streams, while on the other hand as the elevation increases the land becomes rougher and stonier, and adjoins belts of stony, less arable soils. The slopes are sufficient to effect good surface drainage.

Only a small part of the type has been placed under cultivation, and its chief use is for pasture. Where properly farmed good yields of oats, corn, milo, cotton, and sorghum are obtained. The chief objections to this land for farming are the stiff, intractable character of the surface soil and its tendency to bake and crack in dry periods unless carefully handled.

The uncleared land supports a thick growth of mesquite and an undergrowth of chaparral, algerita, and various species of cactus. In many places prickly pear, bushy cacti, and chaparral brush have grown up in such profusion that the grazing value of the land has been greatly depreciated.

On account of its occurrence in comparatively narrow bands, there are few farms or ranches composed entirely or even in large part of this type. Its value for farming probably is less than that of the adjacent terrace and bottom-land soils, and its pasturage value is lower than that of the stony limestone soils.

The following table gives the average results of mechanical analyses of samples of the soil and subsoil of the Darnoc clay:

### Mechanical analyses of Darnoc clay.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>444615, 444633...</td>
<td>Soil.........</td>
<td>1.8</td>
<td>1.6</td>
<td>0.8</td>
<td>4.3</td>
<td>3.6</td>
<td>30.1</td>
<td>57.6</td>
</tr>
<tr>
<td>444616, 444634...</td>
<td>Subsoil.....</td>
<td>1.1</td>
<td>1.2</td>
<td>.5</td>
<td>5.3</td>
<td>5.1</td>
<td>32.3</td>
<td>54.3</td>
</tr>
</tbody>
</table>

The following samples contained more than one-half of 1 per cent calcium carbonate (CaCO₃): No. 444645, 5.63 per cent; No. 444616, 0.72 per cent; No. 444633, 7.81 per cent; and No. 444634, 12.61 per cent.
Areas of the Darnoc stony clay are shown on the map by stone symbols in the color of the Darnoc clay. The stony clay does not differ materially from the clay in color and structure. It occurs on the steeper and rougher slopes, in association with the clay, and differs from that type chiefly in its rougher topography. The surface is strewed with large fragments of sandstone, resulting from the breaking down of thin sandstone beds in the underlying shales or, in some situations where this soil occupies the steep escarpment slopes of mesalike hills, capped with sandstone or coarse conglomerate, from the rolling down of fragments from these strata. In many places the surface has been subjected to destructive erosion, the land being deeply gullied and the soil layer being very thin.

The stony clay areas, where not barren from erosion, are covered with mesquite and a dense growth of chaparral, algerita, cat claw, prickly pear, and species of bushy cacti. The land on the whole is poorly adapted to farming, and has a lower grazing value than the contiguous rough limestone soils or the Windthorst stony fine sandy loam.

The Pontotoc sandy loam consists of a reddish-brown to brownish-red loamy sand which becomes somewhat heavier with depth and grades into dark-red or hematite-red, moderately friable sandy clay to stiff clay at 8 to 18 inches. The surface soil, while quite loose and friable when dry, shows a tendency to crust in cultivated fields after rains. The soil does not seem to be calcareous, but the subsoil is moderately so in places. The subsoil as a rule is not quite so stiff and impenetrable as that of most of the residual types. In many places it assumes more of a yellowish or brownish color at about 3 feet and is splotched with black stains of iron oxide. The depth to bedrock is seldom more than 4 feet.

The type as mapped is not everywhere typical, but the variations are not of sufficient importance in this county to be shown separately. There are some stony areas, however, which are indicated by symbol. The soil of these areas is generally thin, and the clay subsoil is not everywhere present. The stones consist of both limestone and sandstone, and either are residual from the weathering of the underlying rocks or have rolled down from stony escarpments over the bench-like slopes at their base. A variation in which the surface soil has a very intense, dark hematite red color is included, the soil material being derived from the more highly ferruginous and less calcareous rocks. The sandy loam in places rests directly upon the bedrock without any clay loam or clay subsoil.
The Pontotoc sandy loam occurs along the southern line of the county, in the irregular valley areas which represent the extension of the Llano-Burnet Basin region into this county. The larger areas lie near Cherokee, near Pontotoc (Mason County), and in the Deer Creek valley in the southwestern part of the county. The areas conform with the distribution and strike of certain rock formations, and occur for the most part as irregular strips.

The topography is nearly level to gently rolling. All the land is sufficiently well drained for farming. Some of the stonier areas, however, occupy rather steep slopes and are of little value for any purpose other than grazing.

The total area of this soil is small, but the greater part is arable and under cultivation, so that the type is relatively important in the agriculture of the county.

Corn and cotton are the principal crops. Cowpeas give fairly good results and are grown to a considerable extent as forage for hogs. Sorghum for forage is grown in small patches on most farms. Oats and other small grains do not seem to give as good results as on the heavier soils of the county. Fruit trees make a fairly thrifty growth and seem to bear about as well as on the sandy soils of the northwestern part of the county.

The yields of corn in favorable seasons average about 20 to 25 bushels per acre, and of cotton about one-third bale. In recent years the boll weevil has seriously damaged the cotton crop.

The soil is easily plowed and withstands droughts fairly well. There is some shifting of the soil during heavy rainstorms, and in places the furrows on the lower slopes of fields are so filled with sand that young corn is damaged.

The cultivated land is valued at $20 to $30 an acre. Most of the type lies 15 to 25 miles from railway lines.

**PONTOTOC STONY LOAM.**

Areas indicated by stone symbols in the color used for the Pontotoc sandy loam represent the Pontotoc stony loam. The soil is a brown or reddish-brown, loosely coherent, granular loam, which generally contains a rather high percentage of fine or very fine sand. The soil material is characteristically thin, resting upon bedrock at 4 to 10 inches, but wherever the mass has any considerable thickness there is a thin subsoil layer of dark-red or reddish-brown clay. The surface is strewn with small, platy fragments of limestone, and over a considerable proportion of the area the soil layer is scarcely sufficient to conceal the underlying parent rock, so that the type is stony from rock outcrop rather than from detached fragments incorporated in the soil. The soil is generally calcareous, and prevail-
ingly it is darker than, or not as red in color as, the sandy loam type. It is derived mainly from thin-bedded, glauconitic sandy limestones.

The Pontotoc stony loam occurs in the southern part of the county in association with the sandy loam. The land is rolling or moderately hilly, but only a small part is very rough or broken. Only a few spots of the deeper soil, an acre or two in extent, have been placed under cultivation, and on the whole the soil is considered as having a low value for farming, mainly on account of the thinness of the soil layer. The land is rather thickly covered with brushy live oak, with some of the more open areas characterized by large trees. There is considerable chaparral, Mexican persimmon, algerita, and wild privet. Bear grass (yucca) is a common growth on the more barren areas. Both prickly pear and some species of bush cactus are present, but are not abundant. There is a fair growth of grasses, which, with the oaks, affords considerable forage for cattle. The grazing value of this land probably is a little lower than that of the San Saba and Crawford stony types.

**Pontotoc Clay Loam.**

The Pontotoc clay loam consists of a dark reddish brown to nearly black, moderately friable clay loam which grades at 8 to 10 inches into reddish-brown to brown, rather stiff clay. The soil prevailing is darker than the Pontotoc sandy loam, but nearly everywhere has a reddish cast, and the soil material is derived from the same sandy glauconitic formations.

The type occurs in small areas associated with the sandy loam and stony loam types, the largest individual areas being mapped near Cherokee. Several areas were mapped along West Deep Creek. Small areas in the southwestern part of the county in Deer Creek Valley are included with the Pontotoc and Harley sandy loams.

This soil occurs at the base of gentle slopes of small valleys and in shallow drainage depressions at the head of some of the streams. Owing to its topographic position, it includes some colluvial material. The slope is very gentle, and the run-off is less rapid than on the sandy loam.

The greater part of the land is under cultivation, and where properly handled is probably a little more productive and durable than the sandy loam soils of this part of the county. Corn and oats are the principal crops. Oats give better results than on the sandy soils. Sorghum and milo give fair yields.

The clay loam is locally referred to as "tight" land. It does not "shed," or scour, very readily in plowing.
The typical Harley sandy loam consists of a light-brown loamy sand, becoming slightly heavier with depth and underlain at about 10 to 24 inches by yellow or greenish-yellow sandy clay, in places mottled with orange and reddish colors. The subsoil is generally very tough and compact, more so in the lower than in the upper part. In the more poorly drained spots there are black accretions of iron oxide near the bedrock. The Harley soils apparently contain less lime than the associated Pontotoc soils.

Over a considerable part of the area the sand or sandy loam rests directly upon the sandstone bedrock at 15 to 30 inches, without any intervening clay subsoil. On the other hand, there are small areas of deep loamy sand, 20 to 36 inches in thickness. This variation occurs near Cold Creek School, along the southern boundary of the county. Much of this type as mapped in the southwestern part of the county can not be sharply differentiated from the Pontotoc soils.

The Harley sandy loam is found only in the southern part of the county, where it is closely associated with, and has much the same mode of occurrence as, the Pontotoc sandy loam. The land is nearly level or but gently sloping. It is for the most part sufficiently well drained for farming, although there are a few boggy places at the heads of drainage ways or at the base of slopes where seepage water accumulates in unusually wet springs.

The greater part of the type has been placed under cultivation. Corn and cotton are the principal crops. A smaller acreage is utilized for forage crops, such as sorghum. Hog raising is carried on as an industry on a large proportion of the farms, cowpeas and corn being grown for feed. Cowpeas are planted in corn at the time of the second cultivation, and are also grown separately.

This soil apparently has nearly the same productiveness as the Pontotoc sandy loam, although the latter is generally considered slightly superior. Corn yields average about 20 bushels per acre and cotton yields about one-third bale.

The soil withstands drought and is easily cultivated. It shows a tendency to crust after rains and on the steeper slopes some shifting of the soil takes place during heavy rains. The deep sandy areas without a clay subsoil seem to be less durable and productive.

Cultivated land of this type is valued at $20 to $30 an acre.

Peanuts could probably be successfully grown and would be a valuable additional feed and forage crop.

Harley Stony Sandy Loam.

Areas of the Harley stony sandy loam are shown on the map by stone symbols in the color used for the Harley sandy loam. The
surface soil of these areas has the characteristic light-brown color of the Harley series, and is generally a loamy sand, but the soil layer is nearly everywhere thin and rests upon disintegrated sandstone at depths of 6 to 15 inches, without any intervening clay subsoil. Where the soil has any considerable thickness there is at the line of contact with the bedrock, a wet layer of grayish or yellowish color, containing black iron-oxide accretions and sandstone gravel. The surface is strewn with rock fragments and is characterized by projecting bowlders and ledges of brownish or yellow sandstone. Some of the areas in the Deer Creek valley in the southwestern part of the county are underlain by glauconitic sandy limestone and calcareous sandstone. These are with difficulty distinguished from the Pontotoc soils.

The Harley stony sandy loam occupies the more hilly areas and the rougher and steeper slopes in areas of the sandy loam. The soil is poorly adapted to farming and is utilized entirely for pasture. The tree growth consists principally of post oak and mesquite, with some black-jack oak. The type is considered inferior to the stony limestone soils for grazing.

**Tishomingo Sandy Loam.**

The Tishomingo sandy loam consists of a reddish-brown, rather heavy sandy loam, underlain at 6 to 15 inches by red clay. The subsoil is a coarse, gritty, moderately stiff clay. It generally grades into partially disintegrated bedrock at about 3 feet, becoming yellowish in color and more friable with depth. Small fragments of vein quartz commonly are scattered over the surface. In eroded places on slopes the red clay is turned up in plowing, and small spots of clay loam soil are included with the sandy loam type as mapped.

The Tishomingo sandy loam occurs along the southern county boundary, the principal area lying a few miles south of Cherokee. The topography is rolling, with relatively smooth slopes, and the drainage is good. The type is of minor agricultural importance because of its small extent. About 50 per cent of it is under cultivation. The staple crops of cotton, corn, and oats are grown. The soil seems to have about the same productiveness as the associated Harley and Pontotoc soils in favorable seasons, but it is not so easily maintained in good tilth and is perhaps not quite so retentive of moisture. The uncleared land supports a rather open growth of post oak, blackjack, and mesquite. The type affords only fair pasturage.

A rough and stony variation of this type is shown on the soil map by stone symbols. The soil of this variation is generally very thin, and in addition to the blocks of vein quartz and granite scat-
tered over the surface, barren rock-outcrop areas are common. The land is utilized entirely for grazing, and no attempt has been made to place any of it under cultivation. The tree growth consists mainly of post oak, blackjack, and mesquite. The grass growth is poor, and the pasturage is of low value.

*Tishomingo sandy loam, light-colored phase.*—The surface soil of the light-colored phase of the Tishomingo sandy loam is a brownish loamy sand or sandy loam, 10 to 20 inches deep. This grades through a thin layer of heavy sandy loam or sandy clay loam into a yellow, very stiff and rather impervious, gritty clay. The underlying gneiss or schist rock is encountered at a depth of 3 to 5 feet. In places the sandy loam rests directly upon the bedrock, the heavy clay subsoil being absent. There are also small areas in which angular, gravelly fragments of vein quartz are scattered over the surface.

The principal area of the phase is about 4 miles south of Cherokee, near the old village of Taylerville. The soil is of relatively little importance because of its small total area.

The land is nearly level, but generally has sufficient slope to provide adequate surface drainage, although crops may be injured in places by excessive moisture during unusually wet springs.

The land is easily cultivated and retains moisture well through periods of drought. The greater part of the phase is farmed. Corn and cotton are the staple crops, while cowpeas are grown to some extent as forage for hogs. The soil has about the same productivity as the Harley sandy loam, with which it is closely associated and which it resembles in color and structure. The uncleared land supports an open growth of post oak and mesquite.

**Brackett silt loam.**

The Brackett silt loam consists of a grayish or pale-brownish silt loam, underlain at 4 to 15 inches by white or yellowish, chalky, decomposed limestone. The surface soil is generally looser or more friable than that of other types derived from calcareous rocks. A large part of the type is moderately gravelly from angular fragments of limestone.

The soil varies slightly with topographic position and the character of the underlying rock. In places in the extreme southern part of the county on very gentle slopes at the base of hills, where the soil material has been derived from thin-layered, shaly, calcareous rocks, there is frequently a subsoil of yellowish, friable clay loam extending to a depth of 10 to 20 inches. Where the type is derived from Cretaceous rocks the soil is a brownish, friable silt loam or granular loam resting upon whitish, friable, chalky limestone at 3 to 8 inches. The
type includes some areas of colluvial wash from adjoining higher lying stony slopes.

The type is widely distributed in small, irregular areas throughout the southern and central parts of the county, where the underlying rock is limestone. Most of the land is gently sloping or nearly level.

The type is comparatively inextensive, and only a small part of it is farmed, chiefly for the production of forage crops such as sorghum and Johnson grass. The soil is easily cultivated, but is not very retentive of moisture.

Most of the land is characterized by a rather open growth of mesquite, but in places there is a bushy growth of live oak and shin oak. The grass growth is good and the land is valued chiefly for pasture.

Stony areas of this type are shown on the map by stone symbols. They occupy steep, eroded slopes and areas of rougher topography. The soil material is very thin, and the surface is strewn with large fragments of limestone. Over much of the area the surface material consists simply of chalky, disintegrated limestone. This stony soil forms about 50 per cent of the area of the type. It is considered practically worthless for farming. Much of the land is characterized by a dense, brushy growth of shin oak and live oak. Cedar is abundant in places, and bear grass and Spanish dagger are common. The grass growth is rather scant, except in some darker colored areas, which are really shallow phases of the San Saba soils.

MILES SANDY LOAM.

The typical Miles sandy loam consists of a reddish-brown or brownish-red sandy loam underlain at about 8 to 12 inches by red sandy clay. The surface soil commonly is coherent and shows a slight tendency to crust; the subsoil has the compact, stiff structure characteristic of the Miles series, but does not seem to be on the whole quite so calcareous at shallow depths as the loam and clay loam. There are a few small spots that are moderately gravelly at the surface.

The type occurs in small areas on the terrace plains of the San Saba River Valley, and to a small extent on the plateau to the north. It occurs in the higher parts of the terraces, on low knolls and inconspicuous ridges. The drainage is good. The total area is small, and the type is of relatively little agricultural importance. The greater part of it, however, is under cultivation, the staple crops, corn, cotton, and oats being grown, with yields equal to those obtained on the loam and clay loam types. The soil is easily tilled, and holds moisture, especially in the deeper areas, perhaps a little better than the heavier types. Fruit trees make a better growth than on the heavier soils.
A part of this type as mapped consists of the Miles fine sandy loam. This is a brown or pale reddish brown fine sandy loam, underlain at 10 to 15 inches by dull-red or orange-red, stiff clay. The soil is loosely coherent when dry, but varies toward a very fine rather than a medium sand and shows a tendency to crust after rains. The subsoil resembles that of the Windthorst series in color and structure, and rests upon sandstone and shale bedrock or residual clay at depths of 3 to 5 feet. An intervening thin gravelly layer may be seen in places in subsoil exposures, but this is not everywhere present. This soil is not quite typical of the Miles series in origin and other characteristics, as there seems to be a much greater local influence from the sandstones and shales that underlie the Windthorst series.

The principal areas of the Miles fine sandy loam occur along Richland Creek, 20 to 40 feet above the stream level. The surface is comparatively level and smooth, but the soil is fairly well drained. Other small areas having a similar topographic situation occur along Jerry's Branch, 6 to 8 miles northwest of San Saba.

The fine sandy loam has a small total area, but the greater part is under cultivation. It is devoted to the same crops and produces about the same yields as the Windthorst fine sandy loam, which it closely resembles in color and structure. Cotton, corn, and oats are the principal crops. The areas where the fine sandy loam covering is more than 8 or 10 inches in thickness are the most productive and most easily tilled. The uncleared land supports a rather open forest growth, consisting principally of post oak and mesquite.

The average results of mechanical analyses of samples of the soil and subsoil of the typical Miles sandy loam are given in the following table:

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Fine gravel</th>
<th>Coarse sand</th>
<th>Medium sand</th>
<th>Fine sand</th>
<th>Very fine sand</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>4446001, 444663, 444690, 4446141...</td>
<td>Soil.........</td>
<td>1.6</td>
<td>8.3</td>
<td>5.4</td>
<td>48.7</td>
<td>20.1</td>
<td>14.6</td>
<td>9.2</td>
</tr>
<tr>
<td>444602, 444674, 4446100, 4446142...</td>
<td>Subsoil.....</td>
<td>2.0</td>
<td>5.3</td>
<td>3.3</td>
<td>26.2</td>
<td>15.9</td>
<td>21.3</td>
<td>25.0</td>
</tr>
</tbody>
</table>

**MILES LOAM.**

The Miles loam typically consists of a dark reddish brown, friable loam underlain at 6 or 8 inches by a reddish-brown clay loam which grades within a few inches into red, stiff, gritty clay. The surface soil is friable and contains a rather high percentage of medium sand, although spots of silty loam are present. The subsoil characteristically is calcareous and consists of the compact, impenetrable, hardpan clay typical of the series. A salmon-colored or whitish, highly
calcareous sandy clay or marl, more friable than the subsoil, is encountered in places at a depth of 3 to 4 feet and is exposed on eroded slopes.

The soil as mapped is not uniform in texture throughout, but varies both toward the sandy loam and the clay loam, and in some places really represents loamy phases of those types. Gravelly areas, indicated by symbol on the soil map, are encountered on the more eroded slopes near the terrace escarpments, as in the case of the clay loam type, and also in some of the higher areas where the alluvium is thinner and has been subject to greater erosion. Where the soil is derived from the old outwash-plain deposits on the stream divides in the northern part of the county there are many places where the calcareous substratum is not present, but residual clay from sandstones and shales, a Windthorst substratum, is encountered at 3 to 4 feet.

This type is confined mainly to the San Saba River Valley, and is closely associated with and similar in mode of occurrence to the Miles clay loam. The land is nearly level to very gently undulating, but has good surface drainage. In several of the areas the soil of the more nearly level and higher land is a loam, while that of the slopes is a clay loam. There has been greater erosion in the gravelly areas, and they are marked by somewhat steeper slopes.

The total area of the Miles loam is a little less than that of the clay loam, but apparently a greater proportion, probably 50 to 60 per cent, of the type is under cultivation. The same crops are grown and the same methods of farming followed on the two types. There is no notable difference in the native vegetation of the two soils.

The loam, because of its lighter texture and looser structure, can be plowed with less difficulty than the clay loam, and for the most part sheds readily from a mold-board plow. Most of the land is too high above the river level or too far from a stream for profitable irrigation by pumping.

Farms near San Saba composed mainly of this soil and the Miles clay loam are valued at $40 to $50 an acre.

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

### Mechanical analyses of Miles loam.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>444600, 444689,........</td>
<td>Soil.........</td>
<td>1.9</td>
<td>8.5</td>
<td>5.0</td>
<td>20.6</td>
<td>25.8</td>
<td>22.6</td>
<td>13.7</td>
</tr>
<tr>
<td>444610, 444690,........</td>
<td>Subsoil......</td>
<td>4.9</td>
<td>5.4</td>
<td>2.8</td>
<td>13.6</td>
<td>12.8</td>
<td>25.4</td>
<td>35.2</td>
</tr>
</tbody>
</table>
MILES CLAY LOAM.

The Miles clay loam prevalently consists of a reddish-brown, moderately friable clay loam which grades at 8 to 12 inches through reddish-brown, stiff, gritty clay into dark-red clay. The subsoil is generally calcareous, and at a depth of 18 to 24 inches it is extremely tough and compact, having the nature of a clay hardpan. The substratum, beginning at depths between 3 and 5 feet, is lighter in color, more calcareous, and frequently of the nature of marl and in places indurated, while at the base of the alluvial material from which the soil is derived a bed of calcareous gravel or conglomerate occurs. Over much of the area of the type this gravel bed lies near the surface as a result of erosion, and a gravelly variation of the type occurs. The gravel consists mainly of rounded and subangular chert and flint, but in places there is nearly an equal proportion of limestone, and there is also a considerable percentage of fine gravel and coarse sand consisting of feldspar and granite. The gravelly areas are shown on the map by symbol.

Much of the type as mapped has a covering of 2 to 4 inches of sandy loam, but in cultivation red clay loam or clay is mixed with the lighter layer, so that agriculturally it is more properly a clay loam than sandy loam. Where the soil is more poorly drained and darker in color it closely resembles the Abilene clay loam, so that a sharp distinction in mapping can not everywhere be made between the two types. In the higher areas the soil commonly is thinner, and the highly calcareous subsoil or substratum is not everywhere present.

The largest areas of this type occur in the valley of the San Saba River in the vicinity of San Saba. It occupies parts of the broad alluvial-terrace plains lying 40 to 60 feet above the level of the stream. The type is closely associated with other soils belonging to this and the Abilene and other series, and is widely distributed in small bodies. Small isolated areas, generally gravelly and associated with the Windthorst soils, occur on the stream divides between the San Saba and Colorado Rivers, at elevations of 125 to 150 feet above the river levels.

The surface as a rule is nearly level or characterized by very low slopes, but the land is sufficiently well drained for farming. The immediate subsoil is dense and impervious, but where the material has any considerable thickness there is a more pervious substratum. Narrow strips of the type along the margin of the terrace plains or their escarpments are more subject to erosion, and in places are washed and gullied.

Probably less than half the type is under cultivation. The uncultivated land supports a rather open growth of mesquite, with some
post oak and live oak. Thorny shrubs like algerita, chaparral, and various cacti are present but are notably less abundant than on the heavier and darker colored terrace soils. The grass growth is good.

Where the type is farmed, corn, oats, and cotton are the principal crops. Considerable milo is grown, and small patches of the minor crops, such as sorghum, wheat, and millet. Corn yields vary greatly, depending upon the season, but the average yield is probably near 20 bushels per acre. The yield of oats averages about 30 bushels, and of cotton about one-third bale per acre. The average productivity probably is somewhat below that of adjacent bottom lands. The production of fruit, especially peaches, has not been generally successful, probably because of the tough, hardpanlike subsoil or the excessive content of lime. The gravelly variation is of lower agricultural value than the predominating gravel-free soil, and scarcely any of it is under cultivation.

On account of its heavier texture, the soil is somewhat more difficult to plow and keep in good tilth than the sandy loam and loam types. Most of the land lies too high above the river and creek levels or too far from the streams to be profitably irrigated, except in one or two localities where the San Saba River has swung entirely across the lower alluvial bottom and cut into the higher terrace.

Deep fall plowing and thorough pulverization by harrowing are needed for the improvement of crop yields. All the land is suitable for farming, and with proper cultivation to conserve moisture, small grains, such as oats and milo, sorghum, and Sudan grass can profitably be grown.

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>444607, 444603...</td>
<td>Soil..........</td>
<td>2.7 Per cent.</td>
<td>7.3 Per cent.</td>
<td>4.8 Per cent.</td>
<td>22.9 Per cent.</td>
<td>19.3 Per cent.</td>
<td>21.7 Per cent.</td>
<td>21.1</td>
</tr>
<tr>
<td>444608, 446106...</td>
<td>Subsoil.......</td>
<td>2.6 Per cent.</td>
<td>6.5 Per cent.</td>
<td>3.7 Per cent.</td>
<td>16.8 Per cent.</td>
<td>16.5 Per cent.</td>
<td>21.3</td>
<td>32.3</td>
</tr>
</tbody>
</table>

**Abilene Loam.**

The surface soil of the Abilene loam is a dark reddish brown to dark-brown loam, compact in structure and having a dead, baked appearance when dry. The subsoil, which is encountered at depths between 6 and 12 inches is a dark brownish red or dull reddish brown clay, slightly mottled with greenish yellow or drab at a depth of about 3 feet. A distinguishing character of this type is its ex-
SOIL SURVEY OF SAN SABA COUNTY, TEXAS.

Extremely tough and impenetrable subsoil. A considerable proportion of the area mapped as this type has a brownish very fine sandy loam surface soil, looser in structure than the typical, but with the same character of subsoil.

This type occurs in three or four low-lying, flat areas in the valley basin of small streams in the central and eastern parts of the county. The principal area occurs near China Creek School, 5 or 6 miles northwest of San Saba. The terrace plains appear to be topographically and geologically a part of the terraces along the San Saba River occupied by the Abilene and Miles soils, but in some places the material seems to be the equivalent of the later Pleistocene deposits of the San Saba River bottoms. There is, however, a difference in lithologic character, due to the fact that the principal source of the parent material of this type is local sandstone and shale. The type lies 10 to 15 feet above the creeks traversing the valleys and is normally above overflow.

The Abilene loam has a small total area, and it is estimated that less than one-half the type is under cultivation. In favorable seasons and with careful cultivation corn, oats, and cotton give yields equal to those obtained on the Windthorst fine sandy loam and on other terrace soils, but the average yields for a period of years probably are lower. The soil tends to bake and become compact, and it is rather difficult to maintain a good tilth. The sandier areas are easier to cultivate and more productive, the differences in fields between the darker colored, heavier spots and the lighter, sandier spots being apparent.

The uncleared land supports a growth of mesquite, scattered post oak, live oak, and small elm, with an undergrowth of chaparral and cactus. It affords only fair pasturage.

The following table gives the average results of mechanical analyses of samples of the soil and subsoil of the Abilene loam:

**Mechanical analyses of Abilene loam.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>444697, 4446335,...</td>
<td>Soil.........</td>
<td>.2</td>
<td>.07</td>
<td>.08</td>
<td>15.8</td>
<td>22.8</td>
<td>41.3</td>
<td>18.5</td>
</tr>
<tr>
<td>444698, 4446139,...</td>
<td>Subsoil......</td>
<td>.1</td>
<td>.05</td>
<td>.05</td>
<td>9.7</td>
<td>16.4</td>
<td>34.3</td>
<td>38.5</td>
</tr>
</tbody>
</table>

**ABELINE CLAY LOAM.**

The Abilene clay loam consists of a brown to dark-brown clay loam, underlain at 6 to 10 inches by a brown, chocolate-brown, or salmon-colored clay, which assumes a more reddish brown cast and
becomes tougher with increasing depth. Both the soil and subsoil are calcareous, and a reddish or salmon-colored marly substratum is generally present, the material having the same lithologic character as that underlying the Miles series. The subsoil is extremely stiff and impenetrable at depths of about 15 to 24 inches. The soil merges on the one hand into the Miles clay loam and on the other into the Simmons clay, according to whether the land is better or more poorly drained. There are minor variations from the typical soil of the San Saba Valley terrace plains in nearly all the areas mapped in the valley basins of the small streams. These variations are due to the fact that a greater proportion of the soil material is of local origin. Besides these minor variations there are included small areas of typical Simmons clay loam and Abilene loam.

The type is confined mainly to the central part of the county, where it occurs in small areas on the broad terrace plains of the San Saba River and some of its tributaries. On the whole it has slightly poorer drainage and lies at somewhat lower elevations than most of the areas of the closely associated Miles soils, but the land is seldom too wet for successful farming. The topography is nearly level and farm tractors can be used successfully in the areas along the San Saba River. Except in a very few places, the land lies too high above the river or is too distant for profitable irrigation.

The total acreage of this type is somewhat greater than that of the Miles clay loam, a greater proportion is under cultivation, and it seems to have a little higher farming value. The uncleared land supports a rather open growth of mesquite and a good growth of grasses.

Corn, oats, and cotton are the principal crops, with smaller acreages in milo and forage crops, principally sorghum. The average yields are about the same as on the nonirrigated bottom lands; that is, 25 to 30 bushels of corn, 25 to 40 bushels of oats, and one-third bale or more of cotton per acre. Sorghum gives heavy yields.

On account of the stiff structure of the soil and its sticky character when wet, some difficulty is experienced in plowing and cultivating the land. Disk plows commonly are used in preference to the moldboard plow. The cultivation of the included loam areas is less difficult.

Ordinarily improved farms along the San Saba River, composed mainly or in part of this type and the associated Miles or Simmons soils, have a value of $40 to $50 an acre.

The results of the mechanical analyses of samples of the soil and subsoil of the Abilene clay loam are shown in the following table:
Mechanical analyses of Abilene clay loam.

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Fine gravel</th>
<th>Coarse sand</th>
<th>Medium sand</th>
<th>Fine sand</th>
<th>Very fine sand</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>416011</td>
<td>Soil.........</td>
<td>1.1</td>
<td>3.4</td>
<td>2.4</td>
<td>17.9</td>
<td>18.4</td>
<td>50.7</td>
<td>26.1</td>
</tr>
<tr>
<td>416012</td>
<td>Subsoil.....</td>
<td>1.5</td>
<td>2.3</td>
<td>2.2</td>
<td>15.9</td>
<td>18.9</td>
<td>51.7</td>
<td>26.7</td>
</tr>
</tbody>
</table>

The following sample contained more than one-half of 1 per cent calcium carbonate (CaCO₃): No. 416012, 2.01 per cent.

ABILENE GRAVELLY CLAY.

Areas shown on the map by gravel symbols in the color for the Abilene clay loam represent the Abilene gravelly clay. This is a dark-brown to nearly black, stiff clay grading at 6 to 8 inches into a brown or dark reddish brown, very stiff, gritty clay. At 3 or 4 feet the material has a grayish or yellowish color and is highly calcareous. There is generally a bed of coarse gravel at the base of the deposits. The surface is thickly strewn with chert gravel, but the gravel fragments do not seem to be incorporated with the soil to any great depth. The gravel for the most part is rather coarse, including cobbles 4 to 6 inches in diameter.

A few small areas of brown to black gravelly loam and clay loam soil, capping high, isolated knobs and ridges, and derived from remnants of older fluvialite deposits which originally covered the plateau of the northern part of the county, are included with this type.

The principal areas of the Abilene gravelly clay occur on terraces in the Wallace Creek and San Saba River valleys, 5 to 6 miles southwest of San Saba. They lie 30 to 40 feet above the creek level and 40 to 50 feet above the river. The surface for the most part is nearly level, or has only a moderate slope. Only a small part of the land is under cultivation. The gravel, together with the stiff structure of the soil, makes tillage rather difficult.

Mesquite is the principal tree growth. There is a good growth of grasses and the land is valued chiefly for pasturage.

SIMMONS CLAY LOAM, COLLUVIAL PHASE.

The Simmons clay loam, colluvial phase, consists of a dark-gray to nearly black clay loam or sandy clay loam, underlain at 8 or 10 inches by a black or bluish-black clay which passes into dark-gray or mottled drab and yellow, stiff clay. In the more poorly drained spots the soil is a grayish, compact silty clay having a baked or dead appearance.

This soil occupies shallow drainage depressions at the heads of streams and simply represents light-colored Tishomingo and Harley material altered by poor drainage conditions. The soil is influenced to some extent by wash of finer soil material from adjacent slopes.
The only areas large enough to warrant mapping occur in the vicinity of Cherokee. The total area is very small.

Only a few small spots of this soil are farmed, and these are in connection with adjoining soils. The land has a low agricultural value, on account of the hard, compact character of the soil and the poor drainage. The land supports a growth of mesquite and post oak, with an undergrowth of chaparral and cactus.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Simmons clay loam, colluvial phase:

Mechanical analyses of Simmons clay loam, colluvial phase.

<table>
<thead>
<tr>
<th>Number.</th>
<th>Description</th>
<th>Fine gravel</th>
<th>Coarse sand</th>
<th>Medium sand</th>
<th>Fine sand</th>
<th>Very fine sand</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>44675</td>
<td>Soil</td>
<td>1.2</td>
<td>6.5</td>
<td>5.6</td>
<td>20.8</td>
<td>13.7</td>
<td>20.0</td>
<td>21.1</td>
</tr>
<tr>
<td>44676</td>
<td>Subsoil</td>
<td>.9</td>
<td>4.2</td>
<td>3.8</td>
<td>15.8</td>
<td>9.3</td>
<td>23.6</td>
<td>42.6</td>
</tr>
</tbody>
</table>

The following sample contained more than one-half of 1 per cent calcium carbonate (CaCO₃): No. 44676, 3.63 per cent.

SIMMONS CLAY.

The typical Simmons clay consists of a black or very dark brown clay which grades at about 8 to 12 inches into dark-gray or black, tough, impervious clay. There is no sharp line of demarcation between surface soil and subsoil. This type characteristically is calcareous in the lower part of the soil section, and in most places shows evidence of a high lime content at the surface. The soil is sticky and tenacious when wet and clods, but when dry breaks down into an ashy, pulverulent surface layer an inch or two in thickness.

There are many hummocky and "hog-wallow" areas, in which the soil on the hummocks is brownish and calcareous and that in the intervening depressions is black. The brown spots resemble the Abilene soils, while the darker soil in the hog-wallow depressions consists of typical Simmons clay. Cultivated fields in the hummocky areas have a spotted brown and black appearance.

In origin and formation the Simmons clay does not greatly differ from the Abilene and Miles soils, the darker color being due to slightly poorer drainage. In small areas in the valleys of some of the smaller streams there are minor variations, the valley filling being composed of alluvium mainly of local origin.

The type is confined mainly to the alluvial terrace plains of the San Saba River valley, lying for the most part 40 to 60 feet above the present river level. The largest areas are mapped a few miles north of San Saba and 5 to 9 miles southwestward in the valley of Wallace Creek.
The land is nearly level or flat, with shallow depressions. Most of the areas are sufficiently well drained for farming, but over much of the lower lying land water stands in ponds after heavy rains, and artificial drainage is necessary for successful farming.

It is estimated that more than 50 per cent of this type is under cultivation. The tree growth on the uncleared land is almost entirely mesquite. Corn, oats, and cotton are the principal crops. A smaller acreage is utilized for milo, feterita, sorghum, and other forage crops. Small patches of millet, barley, and wheat occasionally are grown.

The yields vary widely, depending upon the season and the methods of cultivation. On the more carefully cultivated land, corn yields average about 25 bushels per acre, oats 30 to 40 bushels, and cotton one-third bale or more. Sorghum for forage generally gives heavy yields, and milo probably gives better results than on most of the other soils of the county.

This type is difficult to handle, except under the most favorable moisture conditions, as the land is extremely hard when very dry and is sticky and tenacious when wet. Heavy teams are required for plowing, and disk plows can be used more satisfactorily than moldboard plows.

Improved land of this type is valued at $35 to $45 an acre, the price varying with the improvements and location.

This type is generally recognized as a very durable productive soil, although there have been many instances of failure in farming it. Success in handling the type lies in proper methods of cultivation—deep plowing under favorable moisture conditions and thorough shallow cultivation to prevent the formation of deep cracks and the loss of soil moisture.

**Frio Fine Sandy Loam.**

The typical Frio fine sandy loam consists of a moderately coherent light-brown fine sandy loam which becomes slightly heavier with depth and passes into a brown or dark-brown, compact fine sandy loam or sandy clay loam at 10 to 20 inches. In places a yellowish or drab sandy clay is encountered at about 3 feet, but the subsoil is generally less plastic and stiff than that of the residual Windthorst soils, from which the material of this type has been largely derived. When wet most of the soil has a much darker shade, appearing in places nearly black.

The soil is variable in character, and as mapped includes spots of very fine sandy loam and some heavy silt loam, the latter variation generally being darker and showing a greater tendency to become compact and crust under cultivation than the typical soil.
Along some of the smaller branches where the adjacent slopes are largely occupied by areas of deep Windthorst fine sandy loam the soil is lighter brown or yellowish brown in color and is a fine sandy loam to a depth of 20 to 36 inches. On the other hand, some areas are slightly reddish, being influenced by wash from near-by exposures of the red clay material of the Windthorst series. A small area of colluvial material is included. There are also a few poorly drained, darker spots, which show faint whitish incrustations of alkali salts, plant growth here being affected either by the "alkali" or by the greater tendency of the soil to bake and crust.

The areas mapped with this type along the San Saba River are really a sandy loam type, consisting of a grayish or light-brown, loose sandy loam, grading at 8 to 10 inches into a light-brown, moderately compact, sandy clay loam. A large part of the surface soil is a loamy sand rather than a sandy loam, especially where the material has been deposited in hummocks by comparatively recent floods. A rather large percentage of the sand is composed of limestone particles, with minute fragments of ground-up mussel shells. The principal areas of the sandier soil occur 10 to 16 miles southwest of San Saba, where the alluvial valley is much narrower than to the east. The soil occupies the lower lying land in the bends of the river and generally is contiguous to the stream, while the heavier soils occur back from the stream and nearer the bluffs.

The Frio fine sandy loam is of alluvial origin, and is the principal bottom-land soil along the small creeks of the northern part of the county. The bottoms are generally very narrow, and are subject to occasional overflow. Most of the land is sufficiently well drained for farming.

A considerable part of this type is under cultivation. Corn and cotton are the principal crops on the Frio fine sandy loam. Corn produces 20 to 30 bushels and cotton about one-third bale per acre. The agricultural value of this soil on the whole is probably lower than that of the residual type. Fruit trees do not give quite as good results, but oats probably give slightly higher yields. The methods of farming are much the same as on the upland sandy soils. There are no farms composed entirely of this soil, and it is farmed generally in connection with associated types of the Windthorst series.

The sandy areas along the San Saba River are of only local agricultural importance. They are devoted mainly to corn, oats, and cotton, and fair yields are obtained both with and without irrigation. Owing to its loose, open structure, the soil of these areas is easily cultivated. It is probably better suited to such crops as peanuts, sweet potatoes, and melons than the heavier bottom-land types.
The uncleared land of the Frio fine sandy loam supports a rather thick growth of elm, live oak, post oak, and mesquite. Greenbrier is characteristic, and broom sedge is the principal grass.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the typical Frio fine sandy loam, collected along the San Saba River:

**Mechanical analyses of Frio fine sandy loam.**

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Fine gravel</th>
<th>Coarse sand</th>
<th>Medium sand</th>
<th>Fine sand</th>
<th>Very fine sand</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>446641</td>
<td>Soil</td>
<td>0.2</td>
<td>4.0</td>
<td>7.6</td>
<td>41.6</td>
<td>17.0</td>
<td>17.4</td>
<td>12.4</td>
</tr>
<tr>
<td>446642</td>
<td>Subsoil</td>
<td>0.2</td>
<td>2.0</td>
<td>4.3</td>
<td>32.2</td>
<td>17.2</td>
<td>24.2</td>
<td>20.1</td>
</tr>
</tbody>
</table>

The following samples contained more than one-half of one per cent calcium carbonate (CaCO₃): No. 446641, 19.70 per cent; and No. 446642, 24.70 per cent.

**Frio Loam.**

The Frio loam consists of a dark-brown, mellow silty loam underlain at a depth of 6 to 10 inches by a dark-brown or dark ashy gray, moderately compact silty clay loam. The subsoil becomes lighter brown with increase in depth, but has about the same texture throughout the 3-foot section. It is moderately friable, rather than plastic, and is somewhat more pervious and penetrable than the subsoil of the heavier types both of the bottoms and of the upland. In many places the subsoil is a light, granular loam, but on the whole it is a little heavier and more compact than the surface material.

The soil grades into sandy loam on the one hand and silt loam on the other, so that in places it is difficult to draw definite boundaries. The soil material throughout the 3-foot section effervesces freely with acid, apparently containing considerable lime.

This type is confined mainly to the San Saba River bottoms west of San Saba. An area is mapped along Richland Creek near Richland Springs, and a few other bodies of small extent and minor agricultural importance occur along other streams throughout the central and southeastern parts of the county. The surface is generally level, but in many places along the San Saba River it is slightly undulating and hummocky. The bottoms along the river are 20 to 30 feet above the stream level, and along Richland Creek they are 10 to 15 feet above. The land is seldom overflowed in either location.

The total area of this type is very small. The greater part is under cultivation, corn, oats, and cotton being the principal crops. The soil seems to be about as productive as the Frio silty clay loam
and silt loam. The loam, however, is more easily plowed and kept in good tilth. Irrigation is practicable, and some of the type near Sloan School, about 14 miles southwest of San Saba, has been under irrigation for 30 years or more. At this place ribbon cane has been grown under irrigation for a number of years, and an excellent quality of sirup produced.

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

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Fine gravel</th>
<th>Coarse sand</th>
<th>Medium sand</th>
<th>Fine sand</th>
<th>Very fine sand</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>444639.</td>
<td>Soil.........</td>
<td>0.3</td>
<td>4.6</td>
<td>5.7</td>
<td>21.1</td>
<td>30.6</td>
<td>30.8</td>
<td>14.5</td>
</tr>
<tr>
<td>444640.</td>
<td>Subsoil.....</td>
<td>0.0</td>
<td>2.8</td>
<td>4.2</td>
<td>22.6</td>
<td>30.3</td>
<td>32.4</td>
<td>17.9</td>
</tr>
</tbody>
</table>

The following samples contained more than one-half of 1 per cent calcium carbonate (CaCO₃): No. 444639, 21.13, and No. 444640, 31.52 per cent.

**Frio Silt Loam.**

The Frio silt loam consists of a brown to dark-brown silt loam, which passes at about 8 to 12 inches into brown or chocolate-brown silty clay loam of moderately friable structure. Both the surface soil and subsoil effervesce freely with acid, apparently being notably calcareous.

The type as mapped includes near the banks of the streams small areas of loam and sandy loam and elsewhere much soil closely approaching a silty clay loam in texture. Also in places there are narrow strips of coarser and sandy soil, resulting from colluvial wash from the higher lying terraces occupied by the Miles soils.

The Frio silt loam occupies the greater part of the bottom land along the San Saba River for a distance of 6 to 8 miles west of San Saba. Elsewhere it does not occur in areas large enough to be mapped on the scale used in the survey. The land is nearly level, but the elevation of 25 to 30 feet above the river level insures sufficient natural drainage for farming. The topography is favorable to the use of farm tractors, and practically all the type is irrigable.

The total area of this type is small, but the greater part is under cultivation. The uncleared land supports a rather open growth of pecan, elm, hackberry, and china berry near the river and a rather thick growth of mesquite on the drier land. Good pasturage is afforded in both winter and summer. The crops grown, the yields, and the farming methods are about the same as on the silty clay loam type of this series. The silt loam, being lighter in texture and naturally somewhat looser and mellower, is easier to till than
the clay loam. It has a slight tendency to crust and bake under irrigation, however, and cultivation is necessary after each watering. Where fields have been pastured for any length of time with horses and cattle the surface soil becomes compacted and slightly puddled, and the soil when subsequently plowed is cloddy.

**FRIO SILTY CLAY LOAM.**

The typical Frío silty clay loam consists of a brown to dark-brown silty clay loam underlain at about 6 to 8 inches by a more compact, brown or dark-brown silty clay loam, which is lighter brown below. The subsoil is moderately friable, or at least not very compact. Both the surface soil and subsoil seem to be decidedly calcareous. In places fragments of shells and whole shells of fresh-water molusks are abundant and influence the character of the soil.

The type as mapped is fairly uniform, but in places along old sloughs or in depressions along the outer margin of the bottoms narrow strips of clay soil are included. There are also some lower lying areas in the bends of the San Saba River which have a thin covering of grayish or brownish sand deposited by recent overflows.

The silty clay loam is the most extensive type of the Frío series. It occupies practically the whole width of the lower alluvial valley of the San Saba River from the vicinity of San Saba eastward, and occurs along nearly all the smaller streams of the county which have their headwater branches in limestone areas. A rather extensive area occurs along Richland Creek. Most of the type along the San Saba River lies 25 to 30 feet above the river level, and is overflowed only at wide intervals. The surface is nearly level, but, excepting a few depressions, the slope is sufficient for good drainage. On the whole the topography is favorable and the land sufficiently accessible to the river for irrigation by pumping. Along the smaller streams the bottoms are narrow, lie at a lower elevation above the streams, and are subject to more frequent overflow than those along the river.

This is one of the valuable farming soils of the county. It is estimated that 75 per cent or more of the type along the San Saba River and Richland Creek is under cultivation, and the greater part of this is or can be profitably irrigated. Along the smaller streams, however, a much smaller proportion of the land has been cleared. The uncleared land is forested with a fairly large growth consisting mainly of pecan, elm, hackberry, and china berry, while on the outer edges of the bottoms mesquite is the principal growth. This land affords good pasturage for cattle and hogs in both winter and summer.

In the cultivated areas corn, oats, and cotton occupy the greatest acreage. Considerable milo is grown, and small patches of the
minor crops, such as millet, barley, and wheat. Sorghum is the principal hay and forage crop. Corn is the only crop regularly or generally irrigated.

The ordinary yields of corn are 25 to 30 bushels on dry-land farms and 40 to 50 bushels on irrigated land. Cotton yields vary widely from year to year, ranging from less than one-fourth bale to 1 bale per acre, depending upon the season and the damage done by the boll weevil. The average yield per acre for a period of years probably is a little more than one-third bale. The average yield of fall-sown oats probably is between 25 and 30 bushels per acre, although under favorable conditions yields of 50 to 60 bushels are obtained.

Under favorable moisture conditions this soil is easily plowed, but when wet it is slightly sticky and does not scour readily from a moldboard plow, for which reason disk plows are generally used. Under irrigation the soil has a tendency to puddle and bake, so that light harrowing is necessary after each watering to maintain a loose surface tilth.

Bottom-land farms composed mainly of this type, but including silt loam and loam soils of about the same agricultural value, have a selling price of $40 to $60 an acre, depending upon the improvements, location, the stand of pecans, and whether or not they can be irrigated.

Irrigable bottom land of this and other arable soils along the San Saba and Colorado Rivers seems to offer better opportunities than any other land in the county for hog raising and dairying. Alfalfa can probably be grown successfully under irrigation, and sorghum is a reasonably sure crop for dry forage or for ensilage. Deep fall plowing is advantageous in improving the moisture-holding capacity of the soil. For best results in farming it is necessary to maintain a loose surface soil by frequent cultivation and harrowing.

**Miller fine sandy loam.**

The typical Miller fine sandy loam consists of a chocolate-brown or reddish-brown, coherent fine sandy loam showing no material difference in color or structure to a depth of 30 or 40 inches, except in a few places, where the subsoil is a chocolate-red, friable silt loam or silty clay loam. The soil material commonly becomes slightly heavier and more compact with depth, and is underlain by the chocolate-red clay loam or clay which composes the bulk of the Colorado River alluvium.

The Miller fine sandy loam contains fragments of mussel shells, which have been ground up in transportation, and generally effervesces freely with acid. In some areas a salmon-colored, or even grayish, loose sand is encountered at depths of 20 to 36 inches. The
sand of the alluvium, however, occurs in lenses which are thin and of small extent.

This type occurs on low, leveelike ridges along the banks of the Colorado River throughout its course in the county. It forms narrow, elongated strips and at no place occupies the entire width of the broader bottoms. The land is in places rather uneven and hummocky, but the topography does not constitute a serious obstacle to successful farming. The drainage is good. The soil is easily cultivated because of its light texture and retains moisture at least as well as the heavier types. It is generally farmed in connection with the Miller silt loam and devoted to the same crops. It is probably not quite as productive as the heavier soils where the latter are properly cultivated and is not so favorably situated as the silt loam for irrigation.

Improvement in farming on this type could be effected by the adoption of some more systematic crop rotation. A soil of this character offers good opportunities for the extensive growing of such crops as cowpeas, peanuts, and sweet potatoes in connection with the raising of hogs.

**MILLER SILT LOAM.**

The Miller silt loam is a chocolate-red to chocolate reddish brown silt loam to a depth of 10 to 15 inches, where a more compact silt loam or silty clay loam of a chocolate-red color is encountered. The type is rather uniform, and in many places there is little difference in color or texture to a depth of 3 feet or more. The soil effervesces freely with acid, indicating a rather high percentage of lime.

The principal variations from the typical soil are in texture, much of the material closely approaching a fine loam, while small spots of clay loam occur in depressions. In places a thin layer of sand occurs in the subsoil, but in general the substrata of alluvium consists mainly of clay or silt to a depth of 30 or 35 feet.

The Miller silt loam is the principal bottom-land soil along the Colorado River. The land is nearly level or slightly undulating. It is sufficiently well drained for farming, and the topography and elevation are favorable for irrigation. The greater part of the alluvial plain lies 35 to 45 feet above the normal level of the river, and is seldom overflowed.

The bottoms on the San Saba side of the river do not attain any considerable width, the maximum being but little more than a mile, while the average width is less than one-half mile. The type, therefore, does not have a very large total area, but it is one of the more valuable soils adapted to farming and practically all of it is under cultivation, with a considerable proportion irrigated.
Corn, oats, and cotton are the chief crops on most of the farms. Cotton is the cash crop, very little of the other crops being sold. Sorghum is the principal forage crop. Occasionally small fields of wheat are grown. Most of the farmers raise some stock, usually hogs and cattle, in conjunction with general farming.

The average yield of corn is about 30 bushels per acre on unirrigated and about 40 to 45 bushels on irrigated land. Oats yield about 30 or 35 bushels per acre, and cotton averages about one-third bale. The yields show wide variations, and in some instances yields twice as large as the average are obtained in favorable years. Droughts cause serious reductions in corn yields where irrigation is not given, and the boll weevil injures the cotton crop. Oats are injured by rust in wet springs.

This soil is easily plowed, but tends to crust slightly after rains and frequent harrowing is necessary to maintain a loose surface soil and conserve moisture.

The selling price of farms composed mainly of this type, but including other soils of the Miller series, is about $40 an acre.

Improvement in yields can be effected on this type by deep plowing, more careful cultivation to conserve soil moisture, and the adoption of some systematic crop rotation. The more extensive growing of cowpeas should prove profitable. Under irrigation alfalfa could probably be grown successfully.

**MILLER CLAY.**

The Miller clay is a chocolate-colored or dark chocolate red silty clay. With a normal moisture content it is plastic and rather stiff. There is little change in color or structure with depth, but the material has a little more reddish cast below 8 to 12 inches. A few areas of heavy black clay, somewhat more sticky than the typical, are included with the type as mapped. The darker surface color of these areas probably is due to poorer drainage, as they occur for the most part in depressions along the outer margin of the bottoms. There is also some influence locally from soil material washed from adjacent bluffs.

This type is confined to the Colorado River bottoms, occupying the lower lying areas and sloughlike depressions next to the bluff lines. It also extends in strips along the lower courses of tributary creeks, where it has been deposited by backwater from the river.

The Miller clay is of smaller extent than the silt loam, and a smaller proportion is under cultivation. The soil is durable and productive where carefully handled, but is rather difficult to break when very dry and hard to keep in good tilth. Its topography and location with reference to the river are in most places less favorable
for irrigation than in the case of the broader silt loam bottoms. The uncleared areas support a large growth of pecan, cottonwood, elm, and live oak. The pasturage both for cattle and hogs is good.

**Bastrop fine sandy loam.**

The typical Bastrop fine sandy loam consists of 3 or 4 inches of light-brown loamy fine sand, underlain by reddish-brown fine sandy loam, which gradually changes into rather compact, red to light chocolate red clay at a depth of 12 to 20 inches. The subsoil is rather stiff when moderately moist, but somewhat friable when drier. It frequently has a brick-red color, and in places an orange-red color in the lower subsoil, rather than the chocolate-red characteristic of the Miller soils, and apparently is less calcareous than those soils, the samples tested showing little or no effervescence with acid.

This type includes a few areas in which the soil is somewhat coarser than typical and carries considerable chert and flint gravel. These areas are indicated on the soil map by symbol. In some small areas of the highest bottom land along the Colorado River, lying slightly above the level of the highest recorded overflows, the soil is the same as the Miller soils, except in elevation.

The Bastrop fine sandy loam is confined to the Colorado River Valley, where it occupies narrow, discontinuous and eroded terraces, lying for the most part 60 to 80 feet above the river. The land is nearly level or has only a moderate and smooth slope. It is mainly too high above the river for irrigation.

The total area is small, but the land is adapted to farming and is fairly productive. Probably more than one-half the type is under cultivation. Corn, cotton, and oats are the principal crops. The deeper areas retain moisture well and are easily tilled. The crop yields are about as sure as and probably but little lower than those obtained on the lower bottom lands. The more extensive production of such crops as cowpeas and peanuts should prove profitable on this type.

**Bastrop fine sandy loam, heavy phase.**—The heavy phase of the Bastrop fine sandy loam consists of chocolate-brown clay loam or sandy clay loam, underlain at 6 to 10 inches by chocolate-red clay. In most places the surface material to depths of about 1 to 4 inches is a fine sandy loam, and in places the subsoil is a sandy clay.

This soil occurs on the slopes and eroded parts of the terraces along the Colorado River in close association with the typical Bastrop fine sandy loam. The total area is very small, and the phase is of minor agricultural importance. The greater part of the land is under cultivation and utilized for the staple crops—corn, oats, and
cotton. Plowing is somewhat more difficult than on the deeper fine sandy loam soils of the terraces and adjoining bottoms, and under the ordinary methods of farming this soil does not withstand drought quite so well. In favorable seasons, however, the phase is very productive.

*Bastrop fine sandy loam, light phase.*—The Bastrop fine sandy loam, light phase, consists of a grayish to light-brown, loose fine sand which passes below into pale-yellowish or light-gray, loose fine sand. Included areas have a light-reddish subsoil, and some have a slightly reddish surface soil, as near the contact with soils of the Miller series. A yellow or mottled yellowish and red fine sandy clay substratum occurs in some included patches. This may be in part or entirely residual from the underlying sandstones and shales.

The only area of this phase large enough to be shown satisfactorily on the soil map occurs in the Shaw Bend of the Colorado River, where the type occupies a sloping terrace 60 to 100 feet above the river level. Only a small part of the phase is under cultivation, and it seems to be less productive than the Miller soils or the typical Bastrop.

**ROUGH STONY LAND.**

The areas shown on the soil map as Rough stony land have no value for farming and comprise the roughest and least valuable parts of the pasture lands, such as rock bluffs and areas that are nearly barren of soil as a result of erosion.

The largest areas of Rough stony land are in the southeastern part of the county, where the short tributaries of the Colorado River have deeply and sharply dissected the limestone plateau, and in the central-western and southwestern parts, where the San Saba River has cut an extremely narrow and gorgelike valley and the dissection by tributary streams has resulted in the formation of a number of minor plateaus or mesalike hills with steep, precipitous slopes.

In the southern part of the county Rough stony land includes the more precipitous limestone bluffs of the streams, the plateau escarpments facing the Llano-Burnet Basin, and knobs or hills so strewn with large rock fragments or so washed as to be nearly barren of soil. In some sections this rough land supports a thick growth of cedar, and in others a sparse growth of chaparral, cactus, yucca, and scrubby live oak.

In some of the larger areas along the San Saba River and in the southwestern part of the county there are on the tops of the plateaus or mesas considerable areas of level or rolling land which, though generally quite stony, support a good growth of grass. These areas consist mainly of San Saba and Crawford stony clay and clay.
In the northern part of the county Rough stony land includes the sandstone and shale bluffs along the Colorado River and the steeper and more gullied clay slopes of mesalike hills within areas of the Windthorst soils. The areas in this section of the county support a growth of small mesquite, and chaparral, algerita, cat claw, and various species of cacti. There is some grass on the less eroded slopes, but on the whole the grazing value of the land is very low.

SUMMARY.

San Saba County lies in the central part of Texas. It has a total area of 1,110 square miles, or 710,400 acres. The county occupies a part of the southern extension of the High Plains region of the State, and physiographically is a maturely dissected plateau. Locally the topography varies from rolling or nearly level to deeply dissected, steep, and precipitous. The general elevation ranges from about 1,200 to 1,900 feet above sea level.

In 1910 the population of the county was 11,245, an average of about 10 persons per square mile. All the population is classed as rural. San Saba is the principal town and county seat.

Transportation facilities are furnished by branch lines of the Gulf, Colorado & Santa Fe and the St. Louis & San Francisco Railroads, the latter, however, not touching San Saba County. Some farms and ranches in the southern part of the county are 15 to 25 miles from a railroad. The main public roads radiating from San Saba are generally kept in good condition, but in the more remote parts of the county the roads are poor.

The climate is semiarid. The mean annual rainfall amounts to about 25 inches, but the precipitation is irregular in distribution. The winters are mild, and the summers are hot and dry. The mean annual temperature is about 66°F.

Agriculture is practically the only industry, and general farming and ranching are of about equal importance. Cotton, corn, and oats are the crops most extensively grown, cotton being the principal money crop. Sorghum is the chief forage and hay crop. Milo is grown to some extent, and Johnson grass, cowpeas, peanuts, wheat, millet, and barley are crops of minor importance. Fruit, such as peaches, pears, plums, apples, grapes, and dewberries, is grown for home use and to supply local markets, but conditions are not favorable for extensive fruit growing on a commercial scale. Cattle raising is the principal industry on the ranches.

The county includes a wide diversity of soils. They are mainly residual in origin. Soils derived from alluvial deposits cover about one-seventh of the area. Clay and clay loam soils predominate, with
fine sandy loam next in extent. The greater part of the upland is excessively stony and poorly adapted to farming. With the exception of some of the sandy types, the soils are prevalingly dark in color at the surface and moderately to highly calcareous. In addition to Rough stony land, 34 soil types, one represented by a phase, are mapped. These are classed with 14 soil series.

The Windthorst soils, derived from sandstones and shales, cover nearly one-fifth the total area of the county. The fine sandy loam of this series is the principal upland soil adapted to general farming. The stony areas of the Windthorst soils are suitable only for grazing.

The Crawford and San Saba soils, which are residual from limestone, constitute the greater part of the pasture land. Together they occupy 45.5 per cent of the area of the county. Stony clays and clays predominate. The Crawford series is characterized by a dark-red color in the subsoil, the San Saba by its black or dark-brown color and higher lime content.

The alluvial soils are generally well drained and productive. The bottom-land soils along the Colorado River and along most of the local streams are classed with the Frio series. These soils cover only a small part of the county, but are valuable farming types. They can be irrigated along the rivers and some of the larger creeks and are durable and adapted to a wide range of crops.

Soils occupying old-alluvial terraces or derived from alluvium in isolated filled-in valleys occupy a considerable total area and are nearly equal in agricultural importance to the bottom-land types. Such soils are classed with the Miles, Abilene, Simmons, and Bastrop series, according to origin and peculiarities of color.

The areas of Pontotoc, Harley, and Tishomingo soils along the southern boundary of the county comprise moderately productive farming lands. The stony tracts are suitable only for grazing. The Darnoc soils are residual from shales. They are characterized by a greenish-black to olive-brown color, a stiff structure, and a high lime content. Only a small part of the land is under cultivation. The Brackett soil, characterized by its grayish color and chalky subsoil, is of value only for pastures.

In general, the sandy soils are more easily cultivated and more retentive of moisture through periods of drought than the heavier soils, because of the naturally loose condition of the surface material. Successful farming on the clay and clay loam types requires deep plowing under proper moisture conditions and frequent shallow cultivation to maintain a surface mulch. With proper cultivation, the heavier soils are generally more productive and durable than the lighter textured types.

The sandy soils seem best suited to a diversified system of farming. They are adapted to such crops as cowpeas and peanuts, and hog
raising should prove profitable in connection with the growing of these crops. A variety of forage crops can be grown successfully and dairying might be profitable on the more favorably located farms.

The heavier soils are generally well adapted to the production of small grain, milo, and sorghum, and in the irrigated areas corn is a fairly successful crop. Alfalfa could probably be grown on the more pervious soils under irrigation. It would seem that with such sure crops as sorghum for ensilage, and milo, with several possible crops for hay, including Sudan grass and alfalfa, there are good opportunities for the profitable feeding of beef cattle combined with the raising of hogs.
Accessibility Statement

This document is not accessible by screen-reader software. The U.S. Department of Agriculture is committed to making its electronic and information technologies accessible to individuals with disabilities by meeting or exceeding the requirements of Section 508 of the Rehabilitation Act (29 U.S.C. 794d), as amended in 1998. Section 508 is a federal law that requires agencies to provide individuals with disabilities equal access to electronic information and data comparable to those who do not have disabilities, unless an undue burden would be imposed on the agency. The Section 508 standards are the technical requirements and criteria that are used to measure conformance within this law. More information on Section 508 and the technical standards can be found at www.section508.gov.

If you require assistance or wish to report an issue related to the accessibility of any content on this website, please email Section508@oc.usda.gov. If applicable, please include the web address or URL and the specific problems you have encountered. You may also contact a representative from the USDA Section 508 Coordination Team.

Nondiscrimination Statement

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA’s TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the
Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by:

(1) mail: U.S. Department of Agriculture
          Office of the Assistant Secretary for Civil Rights
          1400 Independence Avenue, SW
          Washington, D.C. 20250-9410;

(2) fax: (202) 690-7442; or

(3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.