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SOIL SURVEY
ROCKWALL COUNTY, TEXAS

BY

H. V. GEIB, Texas Agricultural Experiment Station

Beginning with the 1923 Series, Soil Survey Reports will be issued separately. These reports of the individual areas will be sent to libraries as soon as they are available and should be filed, preserved, and ultimately bound to take the place of the bound volumes of the Field Operations which have previously been supplied by the department. The reports for each year will be consecutively numbered, the last report for a particular year bearing the conspicuous notice: "This number is the final and last Soil Survey Report for the Year 192–."

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CONTENTS

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DESCRIPTION OF THE AREA

Rockwall County is situated in northeast Texas, in the third tier of counties south from the Oklahoma line, which is distant about 60 miles. The eastern boundary is about 140 miles west of the eastern border of the State and about 350 miles northwest of Galveston, the nearest point on the Gulf of Mexico. The county is nearly square, with dimensions of about 13 miles east and west and a little less than 12 miles north and south. It comprises an area of 149 square miles, or 95,360 acres, and is the smallest county of the State of Texas.

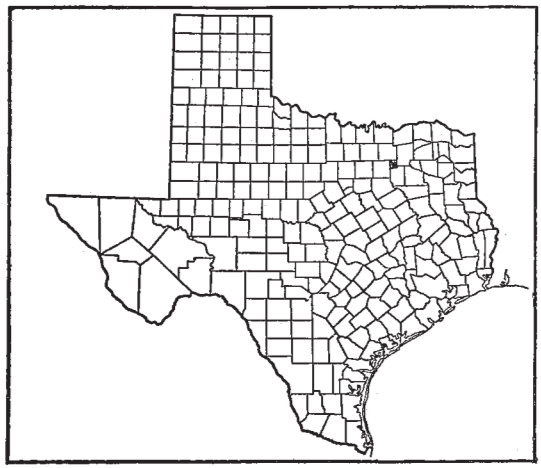


FIG. 5.—Sketch map showing location of the Rockwall County area, Texas

Rockwall County may be divided into three distinct topographic divisions, (1) the valley of the East Fork, (2) a small inclusion of gently undulating to steeply sloping country comprising terraces lying west of this valley, and (3) the rolling uplands lying east of this valley.

The valley of the East Fork extends across the county from north to south, near the western border. It consists of bottom lands lying from 50 to 150 feet below the upland and having a width of 1 to 2 miles. Its floor is flat and subject to periodic overflow, and the soils are composed of alluvial material, some of which has been washed down from the bordering uplands, and the rest from the uplands of the drainage basin to the north.

The western terrace division consists of a narrow, irregular strip of country, extending from the northern boundary southward for a distance of about 8 miles, and varying in width from approximately 1 mile to less than one-fourth mile. The part lying south of Cottonwood Creek and a very small area just north of it comprises an old terrace, probably deposited by the bordering streams before their channels had been cut to their present depths. The land north of Cottonwood Creek is similar to that in the rolling prairie division,

having been formed through decay of the underlying limy clay. The topography of the western terrace division is gently undulating, except at the edge of the bottoms, where the slope is usually steep and where some erosion is taking place. The elevation ranges from 50 to 70 feet above the bordering bottom land.

The rolling upland division extends from the East Fork valley to the eastern boundary of the county and comprises about 80 per cent of the county's area. The topography varies from undulating to rolling and hilly. Near the center of this division the surface is undulating to broadly rolling and attains the highest elevation in the county. Along the edge of the East Fork bottoms it is hilly and broken, deep valleys and gullies having been cut by the waters washing down from the uplands during periods of heavy rainfall. This part of the county has an average elevation of about 100 feet above that of the western terrace division and about 150 to 170 feet above the valley of the East Fork of the Trinity River.

The elevation in the county ranges from approximately 390 feet above sea level, at the point where the East Fork crosses the southern county line, to approximately 620 feet at the highest point, in the north-central part just west of the town of Fate. Rockwall, on the hills at the eastern edge of the valley of the East Fork, has an elevation of about 600 feet. Royse City, in the extreme northeastern part, is 550 feet above sea level, while Chisholm, in the southeastern part, has an elevation of about 500 feet.

The greater part of the county is prairie and treeless. The valley of the East Fork originally supported a heavy forest which extended to the western county line and for a short distance onto the uplands east of the valley, although there were many small treeless spots within this area. At the present time nearly 50 per cent of this bottom land has been cleared and put into cultivation. The proportion of land brought under the plow is greatest where the bottoms are protected by levees. Practically all the forest of the upland bordering the valley has been removed. Along the drainage ways in the central and eastern parts of the county there are still many narrow strips of trees, but these areas are gradually being cleared. The predominant trees of the alluvial bottoms are bois d'arc, elm, and red oak, with some white ash, walnut, pecan, hackberry, and others. On the uplands there are a few scattered bois d'arc, cedar, elm, oak, and other trees.

Excepting a small area in the northeastern part of the county, which drains into Sabine Creek and thence into Sabine River, all of Rockwall County lies in the Trinity River basin, and all the streams flow into the East Fork of the Trinity River. Numerous streams and their branches ramify to all parts of the uplands affording excellent outlets for the surface waters. In many places the runoff is rapid and damaging erosion is taking place. Even the rich black soil of the comparatively smooth uplands is being washed away, especially on the slopes, leaving the lighter colored subsoil material exposed.

After heavy rains the water is high in all the streams and the bordering bottoms are often inundated. Water sometimes reaches depths of from 3 to 5 or 6 feet or more over the bottoms along the East Fork of the Trinity at places where there is no levee protection. The

stream itself has a fall of only about 39 feet in the county. If the channel were straight this would mean a fall of about 3¼ feet per mile or approximately 0.7 inch to a hundred feet, but with its present tortuous channel the actual fall is probably not more than half that. The stream bed is usually partly blocked by fallen trees and underbrush, which greatly retards the flow of the stream and thus increases the amount of overflow. This is the only stream in the county which carries water throughout the year, and during seasons of drought it becomes nearly dry. Most of the other streams of the county have a considerably steeper gradient.

Well water is obtained at depths ranging from 100 feet or more on the uplands to 15 feet or less on lowlands bordering streams. The water is not always of good quality, and cisterns are largely used for conserving rain water for domestic purposes. In seasons of protracted drought the cisterns often go dry and drinking water must be hauled from the nearest wells of good water. There are no natural lakes in the county, except a few which occupy old stream channels, that have been cut off from the present watercourses; these are very narrow and are dry the greater part of the year. Tanks or artificial ponds to hold water the year round are easily constructed by damming small watercourses, and these are much used for supplying stock with water.

Rockwall County was formed in 1873 from the northeastern part of Kaufman County. Kaufman County was formed in 1848 from parts of Henderson County, which in turn was formed from Nacogdoches County in 1846. The first settlers came into what is now Rockwall County in the early forties, probably about 1843. They came principally from bordering counties and other parts of eastern Texas and settled on the uplands close to the eastern edge of the East Fork valley, where wood and water were easily available. Most of these settlers came originally from Mississippi, Kentucky, and Tennessee, and were largely of Scotch and Irish descent. Among the first permanent settlers was J. O. Heath, for whom the present town of Heath was named.

Rockwall, the county seat and largest town, was platted and laid off as a village in 1854 and was incorporated as a city in 1893. The name Rockwall is derived from the peculiar rock formation, resembling a subterranean rock wall, which crosses the county at this point, and which is believed by geologists to be the weathered remains of an intrusive dike formed along the line of the Balcones fault.

The population of Rockwall County in 1920 was 8,591. About 20 per cent were negroes. All the population was classed as rural, and the average number of persons per square mile was about 57. The farming population is quite evenly distributed throughout the county except in the valley of the East Fork, where there are practically no settlements owing to the danger from overflow. This bottom land is farmed, as a rule, by people who live on the adjoining uplands. Agriculture is the principal, and practically the sole, industry of the county.

Rockwall has a population of a little over 1,400 and is an important trading center and shipping point. Royse City, in the extreme northeastern part of the county, has a population of about 1,300 and is also an important business and shipping center. Fate, with

a population of about 300, lies midway between these two cities, and is the only other railway shipping point in the county. Blackland, in the east-central part of the county; Munson, on the east county line; and McLendons, Chisholm, and Heath in the southern part of the county, are other small business centers.

The county is crossed by one railroad, the main line of the Missouri, Kansas, & Texas Railway, from Dallas to Greenville and Denison, passing through Rockwall, Fate, and Royse City. This line was constructed in 1886. The Texas & Pacific Railway passes through Forney and Terrell in Kaufman County, not far from the southern line of Rockwall County. Very few farms in Rockwall County are more than 6 or 8 miles from a railroad.

A concrete road (Pl. 1, fig. 1), completed in 1922, crosses Rockwall County, in a general way parallel to the railroad. Where it crosses the East Fork of the Trinity River a concrete viaduct (Pl. 1, fig. 2) has been constructed, which extends from the levee on the east side of the river to the high land on the west side. This highway connects at the west county line with a concrete and asphalt road to Dallas, 25 miles distant, and at the east county line with a surfaced road which, when completed, will extend to Greenville. Passenger cars and freight trucks make regular runs between Dallas and Greenville over this road.

Another concrete road extends from Rockwall to Chisholm, and one from Royse City to Chisholm. The other roads of the county are earth roads. The main roads are usually kept well graded, but some of the less traveled ones become very rough at times. The soil is mostly a heavy, tenacious clay, and in wet periods even the well-graded roads are difficult to travel, becoming at times impassable for cars and nearly so for teams and wagons.

Practically all the county is served by rural mail delivery. Telephones are in general use. A large number of radio receiving sets have been installed by farmers. Churches and schools are located in all sections of the county. The larger towns have well-constructed, modern high schools.

CLIMATE

Rockwall County has a mild and healthful climate. The winters are short, but marked by occasional sudden changes of temperature caused by the southerly extension of blizzards or cold waves in the north and west. These come in the form of north winds, locally called "northers," accompanied frequently by rain, which occasionally changes to sleet, and sometimes to snow. These cold periods are usually of short duration, generally lasting only a few days. The summer is long and high temperatures are reached, but owing to the dry atmosphere and an almost constant southerly breeze the heat is less oppressive than in some localities farther east and north.

The mean annual temperature at Dallas[1] is 65° F. The average temperature for the three winter months is 46.4° F.; for the spring, 64.6° F.; for the summer, 82.7° F.; and for the fall, 66.1° F. The lowest recorded temperature is —10° F., but only on rare occasions

[1] Climatic data from Dallas station, Dallas County, no Weather Bureau station being located in Rockwall County.

and for very short periods does the thermometer register below 20° F. The highest recorded temperature is 115° F. The average date of the last killing frost in the spring is March 18, and of the first in the fall, November 18. The date of the latest recorded killing frost in the spring is May 1, and of the earliest recorded in the fall, October 8.

Rockwall County lies in the humid part of the State. The precipitation is, however, decidedly variable, with periods of too abundant rain and periods of drought. Most of the soils in the county are heavy. For this reason even a soil which may be termed reasonably well drained and has good surface drainage may become too wet for the best growth of crops in rainy seasons. In dry seasons, on the other hand, the soil becomes too dry for maximum yields of all crops or even for fair yields of some crops. Thus in some years the rainfall is insufficient for the production of corn and in such years the yields of other crops are materially lowered. Long periods of dry weather sometimes occur in the fall and early winter, causing injury to wheat and winter oats, and lack of rain in winter and spring produces conditions unfavorable to the growth of both winter and spring oats, as well as to many other early crops. Periods of drought in June and July frequently injure corn. An overabundance of rain late in the spring may delay the planting of corn and cotton or may drown or wash out the crop after it is planted. Such a severe setback may result in the crop maturing so late in the summer that it will suffer greater injury from summer droughts or from insect pests.

The average annual precipitation at Dallas is 37.74 inches, which is nearly all in the form of rain. The average annual depth of snowfall is 2.7 inches. Some winters pass without any snow, but two or three light snowfalls during the winter are not unusual. The greatest precipitation recorded for any one year (1888) was 59.53 inches, when 10.16 inches of rain fell during June and 13.67 inches during August. The minimum precipitation recorded for any one year (1909) was 17.98 inches. Prolonged severe droughts are rare, and periods of excessive rainfall are not frequent. Local hailstorms, confined to small areas, sometimes occur, and occasionally hard winds do some damage. The heavy rains cause some damage by washing the soil.

The question of rainfall is one which causes more uneasiness in farming operations here than any other factor affecting the growth of crops. The boll weevil, boll worm, leaf worms, and other insect pests often damage crops to a very considerable extent, but such conditions are more or less controllable. Some farmers make a careful study of climatic conditions and attempt to facilitate the production of certain crops by early planting, by special preparation of the soil, by the selection of seed, and by choosing varieties best adapted to their particular soil and climatic conditions. Drought-resistant and disease-resistant strains are preferred by these careful farmers whenever such strains are procurable.

The fruit crop is occasionally ruined in Rockwall County by late frosts or by the blooming of trees before the period has passed during which freezing temperatures are likely to occur.

The following table gives the normal monthly, seasonal, and annual temperature and precipitation, as recorded by the Weather Bureau station at Dallas:

Normal monthly, seasonal, and annual temperature and precipitation at Dallas, Dallas County

[Elevation, 512 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1909)	Total amount for the wettest year (1888)	Snow average depth
	° *F.*	° *F.*	° *F.*	*Inches*	*Inches*	*Inches*	*Inches*
December	46.7	85	8	2.56	2.58	4.27	0.3
January	45.2	95	2	2.54	.33	1.69	1.4
February	47.3	93	−10	2.48	1.35	4.92	.8
Winter	46.4	95	−10	7.58	4.26	10.88	2.5
March	56.4	98	16	3.44	1.22	4.06	.1
April	64.7	98	30	4.09	1.01	7.20	T.
May	72.7	103	36	4.09	1.05	5.17	.0
Spring	64.6	103	16	11.62	3.28	16.43	.1
June	80.7	108	48	3.84	4.41	10.16	.0
July	84.1	108	57	3.02	T.	1.54	.0
August	83.4	115	52	3.28	1.58	13.67	.0
Summer	82.7	115	48	10.14	5.99	25.37	.0
September	77.3	107	40	2.79	.32	2.01	.0
October	66.1	100	26	2.67	2.22	.50	.0
November	55.0	92	15	2.94	1.91	4.34	.1
Fall	66.1	107	15	8.40	4.45	6.85	.1
Year	65.0	115	−10	37.74	17.98	59.53	2.7

AGRICULTURE [2]

The first settlements were made in Rockwall County about 1843. They were located along the eastern edge of the bottom of the East Fork of the Trinity River. Here material for building houses and fences could be easily obtained, as the bottoms and adjacent lands were heavily forested. Wells could reach water at less depth at the edge of the bottoms than on the higher elevations. The raising of cattle was the principal industry at first, though small lots were fenced off and corn, wheat, sorgo (sweet sorghum), and vegetables were grown. Some hogs were raised, but they were allowed to run wild in the woods and were mostly of the "razorback" type.

The county was all free range at this time, but with the introduction of barbed wire about 1874 more fencing was done, larger areas were rapidly placed under cultivation, and the extent of free range decreased. A little cotton and considerable corn and wheat were grown prior to the Civil War. These products were for the most part hauled to Dallas until 1873, when the Texas and Pacific

[2] More detailed information concerning economic conditions of Rockwall County may be obtained from "An Agricultural Economic Survey of Rockwall County, Tex. A Typical Black Land Cotton Farming Area," by L. P. Gabbard. Bul. No. 327, Texas Agr. Ex. Sta., College Station, Tex.

Railway was built through Forney and Terrell, in Kaufman County, after which much of the produce was taken to those places. A cotton gin was built in the western part of Rockwall County about 1866, after which the cotton acreage increased rapidly.

While the first settlers established themselves near the East Fork bottoms, settlements gradually extended to the prairies farther east. The farmers soon realized that the black soils of these open prairies were highly productive, and with the advent of wire fencing their settlement was rapid.

At the present time the leading industry of the county is agriculture, which consists mainly of general farming. Stock raising and feeding usually are engaged in to a small extent, in conjunction with the production of the general farm crops. Cotton is the principal crop. Corn and oats rank next in importance, and wheat, sorgo, and hay are also grown. The forage crops are grown in small quantities, and in some sections a small acreage is devoted to rye, barley, and peanuts. Most farmers grow a few potatoes and have small gardens for vegetables and berries for home use. Many also have small orchards of peaches, pears, and other tree fruits.

The following table gives the acreage and production of the principal crops in Rockwall County, as reported by the Federal census for the years 1879 to 1919, inclusive:

Acreage and production of principal crops of Rockwall County, as reported by the census for the years 1879 to 1919, inclusive

Crop	1879		1889		1899		1909 [1]		1919	
	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production
	Acres	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*
Corn	6,715	88,713	11,286	305,979	17,416	659,710	15,015	261,756	11,226	378,929
Oats	961	26,305	1,705	48,694	5,893	261,300	2,456	45,786	6,638	273,941
Wheat	2,515	20,966	851	8,285	2,516	34,610	142	1,345	3,995	58,342
Barley	16	78	2	30			5	50	77	2,322
Potatoes			6	513	82	5,441	37	2,166	21	1,138
Sweet potatoes	3	225	44	6,650	72	5,949	26	2,674	10	1,542
		Tons		*Tons*		*Tons*		*Tons*		*Tons*
Hay (all kinds)	814	776	2,605	3,196						
Wild hay					1,038	1,064	1,385	695	761	783
Tame hay					1,042	1,356	725	660	1,021	1,933
Grains cut green					6	10	18	20	548	624
Legumes cut for hay					74	68	225	220	3	4
Silage crops									30	185
Coarse forage					34	98	257	319	761	1,853
		Bales		*Bales*		*Bales*		*Bales*		*Bales*
Cotton	5,786	2,630	18,826	5,047	32,816	13,754	41,950	13,262	42,024	9,788
	Trees	*Bushels*	*Trees*	*Bushels*	*Trees*	*Bushels*	*Trees*	*Bushels*	*Trees*	*Bushels*
Apples					866	37	228	34	76	53
Peaches			10,742	12,263	20,198	636	6,654	1,045	4,837	4,087
Pears							465	86	696	492
Plums and prunes							927	141	714	357
						Pounds		*Pounds*		*Pounds*
Nuts (principally pecans)							423	860	1,204	30,811
					Vines		*Vines*		*Vines*	
Grapes					360	2,295	147	997	630	3,110
							Acres	*Quarts*	*Acres*	*Quarts*
Blackberries and dewberries							2	150	3	1,894

[1] The small acreages and low yields of corn, oats, and wheat in 1909 were doubtless due to the fact that 1909 was the driest year ever recorded in this section. Many farmers probably did not report acreages of these crops where they were too poor to be harvested

In 1880 there were 526 farms in the county, constituting 64 per cent of the total area of the county, about half of the farm land being improved. By this time the crops were more varied than during the earlier period. Corn occupied the greatest acreage, followed by cotton, wheat, oats, and hay. Sorgo was grown for forage and for making sirup. Some fruit was grown, the total value being about $900. The value of forest products was estimated at $4,655. At this time much attention was given to improving the quality of the livestock. Better cattle and hogs were being brought in and used in grading up the native stock. The tax rolls of the county in 1882 showed the total number of cattle as 5,399, horses and mules 2,211, sheep 308, and hogs 1,796. The total assessed value of livestock that year was approximately $150,000, an increase over the previous year of about $26,000.[5]

With the coming of the railroad to Rockwall in 1886 an impetus was given to settlement. By 1890 the population had increased to 5,972 and the number of farms had increased to 861, with a total acreage of 76,629, which constituted 80.5 per cent of the total area of the county. The average size of farms had decreased from 116 acres to 89 acres, but the proportion of improved land in farms had increased to approximately 84 per cent. Cotton had sprung into great prominence, with an acreage more than three times that of 1880, and corn, which was now in second place, had nearly doubled its acreage.

In 1920, 89.6 per cent of the land in the county was in farms, the total number being 1,075. The average size of farms was about 80 acres, and nearly 90 per cent of the land in farms was improved.

At the present time cotton is by far the most important crop grown. More land is devoted to it than to all the other crops combined. The total production in 1909 was 13,260 bales from 41,950 acres, and in 1919 it was 9,788 bales from 42,024 acres. The greatest production of cotton in this county in one year was about 18,000 bales, but the average crop is around 12,000 or 13,000 bales. Cotton in 1919 occupied about 44 per cent of the total area of the county and about 55 per cent of all the improved land. It is the cash crop of the county; all other crops are grown principally for home use, although corn, oats, and hay are sold occasionally.

The principal variety of cotton grown is the Mebane. This seems to be better adapted to the soils and conditions of Rockwall County than any other variety. Rowden and Kasch are grown to a large extent, and a number of other varieties are represented by considerable acreages. A little long-staple cotton is grown, but has not yielded enough to make it popular. Cotton is grown on all the soils of the county. The best yields are produced on the bottom soil, Trinity clay, and on the black uplands, Houston black clay, and Bell clay.

The yield of cotton depends chiefly on the fertility of the soil, the amount and distribution of rainfall, and the abundance of insect pests. The boll weevil is by far the most destructive pest. Early planting is general when weather conditions permit, as this gives the crop the benefit of the early rains and enables it to get a good

[5] From report of Commissioner of Insurance, Statistics, and History, 1882.

start and to set many bolls before the weevil becomes very destructive. Several types of machines are used in the effort to combat this pest. These aim to collect the weevils from the plants and mechanically destroy them. While these devices undoubtedly do some good they fall far short of absolute control. The use of poison by dusting the plants with calcium arsenate, at frequent intervals, beginning at the time when the adult weevils first make their appearance, seems to be the most practical and efficient method of checking the weevil. In some parts of the county good results are obtained by picking and destroying the first bolls that form on the plants, thus destroying what would be the first generation of the weevils to hatch out and giving them a very material setback for the season, and then following immediately with applications of poison. In some seasons the leaf worm does serious damage, and whole fields may be ruined in a very short time. The worm may be controlled by poison sprays or dusts, which should be applied as soon as the first worms make their appearance.

Corn ranks next to cotton in acreage. It occupied a smaller acreage but produced a larger yield in 1919 than in 1909. The season of 1909, however, was the driest ever recorded, having only 17.98 inches of rainfall. Corn is grown by most farmers and on all kinds of soil. The crop is usually not sufficient to supply local demands.

Oats are an important crop. Much of this crop is used for feeding farm stock, and when there is any surplus it is shipped to outside markets. The principal variety is the Texas Rust Proof. Most of the farmers seed oats in the fall, though there is considerable spring seeding, usually early in February. Fall-sown oats are sometimes damaged slightly by winter frosts, but they usually give a better yield than spring oats, as the latter are likely to be materially injured by early summer droughts. Oats are grown on all the upland soils of the county. While the best yields ordinarily are obtained on the dark-colored soils, very good yields have been produced on the lighter colored soils in the eastern part of the county and on the eroded hillsides of the central part in seasons of plentiful rainfall. Practically no oats are grown on the bottom lands.

Wheat ranks fourth in acreage. Fair yields are obtained in good seasons, but ordinarily wheat is not considered a paying crop. It is grown on most of the upland soils, but is not grown on the bottom lands, especially because of its susceptibility to rust and the danger of lodging on the low-lying soils. It also is often severely damaged by rust on the upland soils. Wheat is usually seeded in the fall, and it then gets the benefit of the early spring rains and is more likely to mature before the period of summer drought.

Hay is an important crop, and some kind of hay or forage crop is grown on most farms, though the production is often insufficient for home and local needs. Some farmers grow sorgo for hay. Johnson grass hay is grown for the market on a few farms. There is considerable Bermuda grass in the county and this is sometimes cut for hay. Much of the hay produced in the county, however, is obtained from the patches of native grasses, which occupy a part of the land on many farms in the county. These grasses consist

principally of big bluestem, golden bluestem, white beard grass, long-leaved dropseed grass, tall grama (side oat grama) and some buffalo grass (locally called mesquite), and rescue grass. In places Bermuda grass and Johnson grass have obtained a foothold in these fields. A good deal of the grass land is along creeks and draws where it can not be readily cultivated, and much of it is pastured the year round. Usually the fields cut for hay are pastured part of the year.

Most of the hay of the county is grown on areas of Houston clay, the eroded phase of the Houston clay, and on the Wilson clay and clay loam. It is usually considered that the Houston black clay is too rich a soil to devote to hay, as it is so well adapted to cotton and corn. However, very good returns are often obtained from a crop of hay at a small cost of production, and it is probable that as great a net profit could often be obtained from an acre of hay as from an acre of cotton or any other crop.

"A very small area of the once solid prairie remains unbroken in pastures or meadows; but from that remnant some idea may be obtained as to the nature of the original prairie vegetation.[4] The grazing of the pastures and the mowing of the meadows have certainly tended to reduce the number of species of grasses, especially the annual forms. This is most evident in the pastures on the black waxy land [Houston soils], where the buffalo grass (*Bulbilis dactyloides*), locally called mesquite grass, has practically survived and replaced all other native grasses. In a pasture on that kind of soil, north of the town of Rockwall, where sheep, horses, and cattle were kept, no other native perennial grass was discovered, when inspected on the third of October, 1923. * * * When unobstructed by taller plants it spreads rapidly, both from seed and by runners. These can, however, only live on the surface and are readily killed when covered by plowing. The buffalo grass is for this reason no menace to cultivation. It holds its ground against the Bermuda with ease, * * * is more drought resistant than the Bermuda, can stand as much tramping and any amount of cold. * * *

"Buffalo grass does not spread easily in meadows of mixed grasses, as observed in Mr. Wallace's meadows, 4 miles south of Rockwall, even if such meadows be regularly mowed. Other grasses, especially tall perennials, hinder it from spreading by preventing its runners from forming roots, and obscure its presence by overtopping and covering it from view. This meadow, located on a gentle slope, has never been broken or pastured, but has been mown for hay for over 30 years. The most conspicuous and apparently most abundant grasses found on the 3d of October, then in the flowering stage after the last mowing of the summer, were: Big bluestem (*Andropogon furcatus*), golden bluestem (*Sorghastrum nutans*), white beard grass (*Andropogon saccharoides*), long-leaved dropseed grass (*Sporobolus longifolius*), and tall grama (*Bouteloua curtipendula*). Of these, the first two were most abundant and are the most valuable for hay. Underneath these tall grasses, the buffalo grass was found in more or less scattered patches.

[4] These quoted paragraphs are taken from "A Short Survey of the Vegetation of Rockwall County," by H. Ness, botanist, Texas Agricultural Experiment Station, 1923. Other information from the same source has been incorporated in this soil-survey report.

"On passing from the black land [Houston soils] to the rawhide land [Wilson soils] the change in the soil is great, but less quickly noticed than the change in the vegetation. The number of species of grasses becomes greater, while gradually several of the more typical black-land forms vanish. Hurrah grass (*Panicum fuscum*), which is the pest in the cultivated field of the black land, becomes replaced by the crab grass.

"There are certain plants which go with certain soils and are therefore indicators of those soils. Such a plant is *Croton capitatus*, or woolly headed croton. * * * On the entire trip over the black land [Houston soils] * * * not a single specimen of this weed was observed, but 1½ miles to the south of Royse City, on the rawhide land [Wilson clay], it was met with as the first notification of change in the soil from black land to rawhide."

In a pasture about 4½ miles south of Royse City the following species, which are typical for the Wilson series of soils, were found to be the predominant grasses: Texas grama (*Bouteloua texana*), windmill grass (*Chloris verticillata*), lace grass (*Eragrostis capillaris*), slender paspalum (*Paspalum setaceum*), *Panicum hallii*, and *Tridens congestus*.

There are some rather large areas of Johnson grass and Bermuda grass on the bottoms along the East Fork of the Trinity River, and these produce heavy yields of hay which is of a good quality if cut at the proper stage of development. Johnson grass should be cut at the time of flowering, or just before the head emerges from the boot, and the sod should be plowed, thoroughly smoothed and rolled every three or four years, as it does not thrive continuously on an unbroken sod. Most of these fields were at one time cultivated, but the grasses took possession and cropping was discontinued. Some farmers have been able to exterminate these grasses in areas desired for other crops by early plowing in the fall, followed by numerous harrowings and cultivations and a second or third plowing if necessary during the winter. A cultivated crop is then planted, and by thorough cultivation and hoeing the grass is kept from getting a start. Pasturing for a few years before plowing is also helpful in eradicating Johnson grass. Too often the land is farmed by tenants working under short-term leases, who do not make the effort necessary to eradicate these pests.

Alfalfa has been grown in various parts of the county with fair success. It has usually done best on the Houston black clay, but good results have been obtained on the Houston clay. Very little alfalfa has been grown on the bottom lands of this county, but it seems likely that this soil, Trinity clay, is well adapted to alfalfa, as in other counties under very similar conditions excellent crops of alfalfa are being produced on this type of soil. The greatest setback to this crop comes from the droughty periods of the summer months, when the ground becomes dry, and cracks form which are often several inches wide and extend to several feet in depth. Root rot often does considerable damage in spots which usually become larger each year, until the stand, owing to this disease and the damage done by the dry weather, is no longer profitable and is plowed under. However, results seem to indicate that if a grain crop has been grown on the land the previous year, which usually retards the action of the

root rot, and if the land is then thoroughly prepared, alfalfa will give good results for two to five years. Some stands have been maintained successfully for much longer periods.

It seems evident that the growing and occasional plowing under of a leguminous crop, such as alfalfa, sweet clover, or cowpeas, would be highly beneficial to practically all the soils of the county, and especially where the richer, darker-colored surface soil has been washed away. This practice would not only build up the soil, enriching it in plant food, but would give it a greater water-holding capacity and would help to prevent cracking in dry weather and erosion in periods of excessive rainfall. Any vegetable matter plowed under tends to loosen the soil, thus increasing the air space, which will greatly aid in making plant food available to the growing crop. Cowpeas have been grown with good success by a few farmers in this county. This crop will very likely be more commonly grown in the future, as it excels as a soil builder and gives valuable forage. It is successfully grown in other counties on practically all of the soil types found in Rockwall County. Sweet clover is also a good soil-improving crop, which does well on heavy soils and is also adapted to lighter soils. Practically none is grown in this county at the present time, but its use is strongly recommended.

Barley is grown in small quantities, and its production seems to be on the increase. It yields considerably better than wheat and ranks high as a feed for farm animals, especially hogs. It is probable that it will supplant wheat, at least to a large degree, in this county. There has been some objection to it on account of the beards, which make it disagreeable to handle while harvesting, but several beardless varieties are now being grown, and thus the principal objection is overcome. Rye and broomcorn are grown to a very small extent. They appear to do well on the upland soils.

Small quantities of the grain sorghums, principally feterita, are grown by some farmers for feeding farm stock. This crop is especially good for dry seasons, as it does not require as long a growing season as corn and will sometimes make a good crop when the season is too dry for corn to be a success. Some sorgo (sweet sorghum) is cut for hay and a little is cut for silage, although at the present time there are only one or two silos in the county. Considerable sirup is produced, most of which is for home and local use. The sorgo is usually planted about corn-planting time, and two cuttings are obtained, one in July and one in September, and sometimes a third cutting late in October or early in November. Sweet potatoes and white potatoes are grown quite generally to supply home needs.

Vegetables, berries, and some other fruits are grown on nearly every farm for home use. Blackberries and dewberries do well. Grapes do well on all the soils of the county. Many farms have a few vines, and on some they are grown for local sale. A large number of varieties are grown, the Munson being one of the most important. In some places vineyards are planted on slopes where the black land has been partly or entirely washed away. If the rows are run across the slope, conforming to the contour of the land, they will form slight terraces which prevent to a large degree any further erosion.

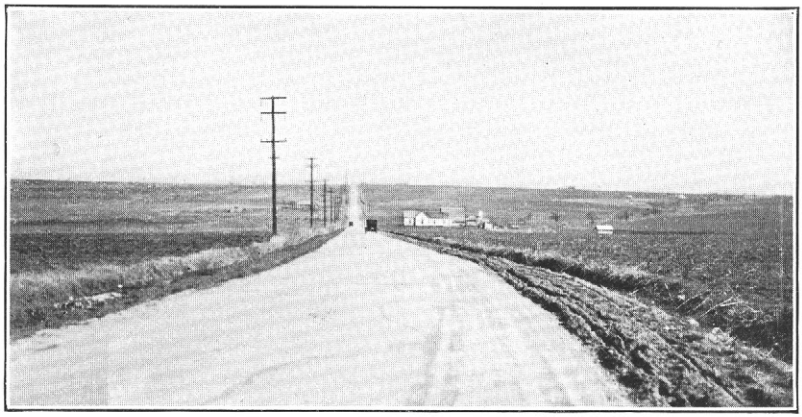


FIG. 1.—CONCRETE ROAD CROSSING ROCKWALL COUNTY

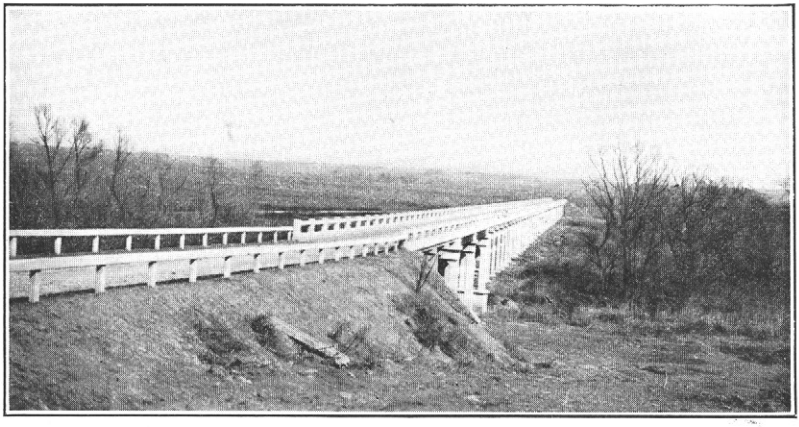


FIG. 2.—CONCRETE VIADUCT ACROSS THE EAST FORK OF THE TRINITY RIVER

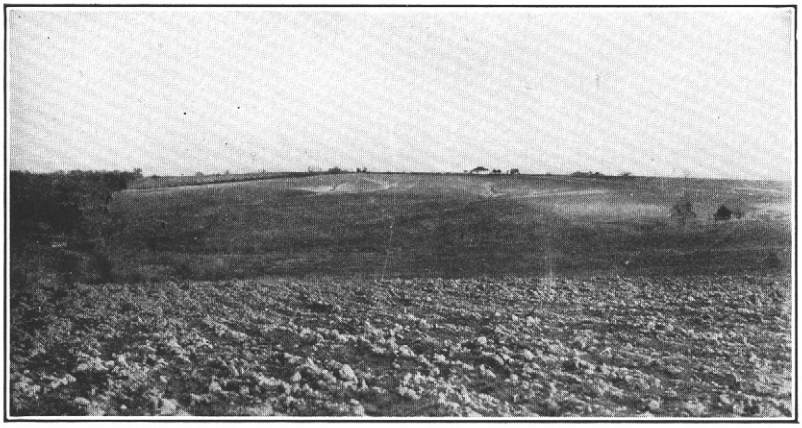


FIG. 1.—EFFECTS OF EROSION ON THE HOUSTON CLAY, ERODED PHASE

The light-colored subsoil is exposed by the washing away of the surface soil. Bad gullies are forming on the steeper slopes and cultivation of such places is practically impossible. This could have been prevented by proper terracing

FIG. 2.—A PROPERLY CONSTRUCTED TERRACE

Crops are planted over these terraces, so that there is no lost area

Peaches are popular in the farm orchard lot, and nearly every farm has from 10 to 50 trees. They are grown commercially on only a few farms, but give good results. Peaches seem to do fairly well on nearly all the upland types of soil in the county, but are most successful on the Houston black clay and the other soils having a gently undulating, well-drained surface. Some orchards growing on rather steep slopes of Houston clay, eroded phase, are doing well, but on the more nearly level areas the trees are larger and apparently more thrifty. As with grapes, if the rows are run in such a manner that proper cultivation will form slight terraces on the slopes, erosion will be checked. The Elberta is the principal variety, but many other varieties are grown with success.

Apples are grown to a small extent, but not with very good success. Plums and pears do fairly well, but not as well as peaches, and are not as commonly grown.

The 1920 census reported 1,204 pecan trees, with a production of 30,811 pounds of nuts. These are mostly native trees, but the nuts are of good quality. A few pecan groves have been set out and are doing well. The pecan tree is a native along the watercourses of the black lands, and if given reasonable care will do equally well on the prairie land.

There are only a few small dairies in Rockwall County. The local demand for butter is supplied largely by farmers who keep a few cows and have a small surplus. In view of the close proximity of Dallas it would seem that a further development of the dairy industry might prove profitable in those parts of the county near shipping points.

A few hogs are raised on nearly every farm. Many farmers do not keep a brood sow, but buy the pigs at weaning time and raise and fatten them for home consumption or for sale. On several farms hog raising is done on a large scale, and some high-class pedigreed stock is being produced.

Poultry is raised on practically all farms. A few modern poultry houses have been built, and some fancy stock is produced. Much interest is manifest in poultry and the industry is growing rapidly.

Many farmers keep a few colonies of bees. An excellent quality of honey is produced, which is largely used in the home.

No definite system of crop rotation is practiced in this county. Cotton is the main cash crop, and other crops are grown principally for home use. As long as the price of cotton remains near the present level (22 to 30 cents) this condition will no doubt obtain. However, should the price decline to pre-war levels it is likely that other crops would be grown to a much greater extent. With Dallas and other good markets close at hand, and with a well-built highway connecting this county with Dallas, it seems that an excellent opportunity is presented for intensive agriculture in this region. The rich soils of the extensive bottoms, which are rapidly being protected from overflow by the building of levees, offer almost an ideal location for the production of truck crops. The upland soils are well adapted to dairying, poultry raising, and general farming, provided they are handled in the proper manner.

Plowing in preparation for spring crops begins early in the fall and continues through the winter when the weather will permit.

Winter oats are usually sown from December 1 to January 15 and harvested the latter part of May, while spring oats are sown February 15 to March 19 and harvested late in May or early in June. Wheat is usually sown in October and harvested from the first to the middle of June. These grains are sometimes sown broadcast and sometimes with a drill. When they follow cotton they are often harrowed or drilled in without plowing the land. This seems to be a good practice for fall-sown grains, provided the field is free of weeds, but where grain is sown in the spring the land usually is plowed.

Corn is planted from the first to the middle of March and is harvested in September. The land usually is plowed in the fall. If cotton or corn was on the land the preceding year, the land is simply bedded up, but if a grain crop occupied the land, the field is plowed and then bedded. Corn usually is planted in the water furrow, and later the land is leveled by cultivation. It is said that this gives the roots good depth and makes the plant better able to withstand dry weather. The crop is cultivated from three to five times, and may be hoed once or twice if very foul with grass and weeds.

Land for cotton is prepared very much the same as for corn. The seed usually is planted on a ridge. One-third to one-half bushel of seed is sown per acre, and later the crop is thinned to the proper stand. Planting is done from April 1 to April 15, and picking begins about August 1 to 15 and continues into November. The crop usually is cultivated from two to six times and hoed from one to three times. It is the prevailing practice, when preparing land for a crop, to rake into bunches and burn the cotton stalks or cornstalks and other trash that may be on the land at the time of plowing. Some farmers cut the stalks and plow them under in the fall. This is done more often where the stalk growth is not heavy. It seems the best practice to turn the stalks and other trash under whenever possible, as this adds to the amount of organic matter in the soil. This will improve the physical condition, increase its water-holding capacity and aid in preventing washing of the soil; and by loosening the soil it will let in air more easily, which will assist in making the plant-food material available.

A great deal of damage has been done to the soils of this county by erosion of the slopes in times of heavy rainfall. Although the parent or soil-forming material underlying most of the county weathers rapidly, forming a rich, black soil, in many places erosion is so active that the surface soil is washed away more rapidly than it can form. This leaves the underlying yellowish-brown, highly calcareous clay exposed, as is shown in Plate 2, Figure 1, and often deep gullies and ravines are cut on the steeper slopes. Practically no place in the county is entirely free from the detrimental effects of erosion, and some nearly flat areas lying at the foot of slopes are gullied considerably in places. The deeper black lands of the center of the county have a more gentle topography than the rest of the county, and therefore have suffered less from erosion. In places, however, these lands are gullying badly, and the farmers in those sections realize the need of some means of preventing the carrying away of their richest soil, and the gullying of their fields.

Terracing seems to be the only practical solution of the erosion problem. In the southeastern part of the United States, and in some parts of Texas, terracing has long been practiced with great benefit. Prior to 1922 very little if any terracing had been done in Rockwall County. At this time, however, a county agricultural agent is devoting much time and energy to this important phase of soil protection and soil building, and more farmers are adopting the practice. These terraces, when properly constructed, run across the slope of the hill and have a fall of about 4 or 5 inches to 100 feet, so that the water will flow at such a slow rate that no erosion will result. (Pl. 2, fig. 2.) The terraces are usually built with road-grading machinery. The height of the ridges should be from 12 to 15 inches in order to get the best results. Where terracing has not been done, washing of the land may be stopped to some extent by running the rows of corn or cotton across the slope to conform to the contour of the land. With bedding and cultivation running in this direction, there would be less tendency for water to flow down the slopes, the run-off would be considerably slower, and very little washing would result.

There is considerable land in the county along small streams and draws that is now practically useless because of occasional overflows. Much of this land might be reclaimed by deepening and straightening the courses of these streams, as they are so crooked and shallow and often so badly obstructed with brush and vegetation that the flood waters subside slowly. In some cases these may be put into good condition with a team and road grader or ordinary dump scraper. The soil along these streams is usually very productive, having been washed down from the surface of the surrounding uplands.

Up to the present time practically no commercial fertilizer has been used in this county. In other counties fertilizers have been used on the same types of soil with good results. It is probable that 100 pounds of cottonseed meal mixed with 100 pounds of 18 per cent acid phosphate would be a good combination to apply, especially for corn, cotton, and wheat. It is doubtful if the application of lime would be of any great benefit, as the soils of the county are for the most part calcareous. The soils in the extreme eastern part of the county, locally known as "rawhide" land, are noncalcareous and might be benefited by the application of lime. If lime is used it is essential that a rotation of crops which includes a legume be practiced, so that the supply of nitrogen may not become exhausted. Cotton and corn are seldom benefited directly on this soil by lime additions. Owing to the fact that very little experimental work has been done with fertilizers on the types of soil found in this county, it would seem best for farmers to use commercial fertilizers on small fields in a more or less experimental way, until more definite information about their use becomes available.

The Texas root rot is a disease which is causing considerable loss to crops throughout the county, but seems to be worse on the black lands. The affected spots, commonly known as "alkali" spots, become noticeable during July, usually being worse if the early part of July is wet. The plants on these spots wilt and die, and the root

appears to be rotted away. The disease principally affects cotton and leguminous plants such as alfalfa and cowpeas, although blackberries, apples, pears, and apparently nearly all plants having a taproot are subject to the disease. Dr. J. J. Taubenhaus, of the Texas Agricultural Experiment Station, states that beyond any doubt the disease is the Texas root rot and that it is not caused by the presence of alkali. In a letter to the author of this report, Doctor Taubenhaus[5] states that this disease is not caused by alkali, but by a definite parasitic fungus, known as *Phymatotrichum omnivorum*. This organism lives through the winter on a living root. Such roots are actually being furnished by the cotton itself and by various weeds. Some of the principal weeds found in the cotton fields of this county which are carriers of root rot are the wild morning-glory, cocklebur, and the ragweed. The disease does not live on corn, sorghum, wheat, oats, or grasses; these should be used in the rotations as a means of control and absolutely clean cultivation should be practiced.

In the early history of the county most of the farms were operated by the owners themselves. Gradually, however, the number of tenant farmers has increased. The census reports show that 48.5 per cent of the farms were operated by tenants in 1880, 60.5 per cent in 1890, 65 per cent in 1900, and about 71.7 per cent in 1920, leaving only 28.1 per cent operated by owners and about 0.2 per cent by managers. Many of the owners live outside the county. Some of them own large tracts of land, which are usually divided into tenant farms of 40 to 150 acres or more.

Farms usually are leased on shares, the usual rent being one-fourth of the cotton and one-third of the grain, where the tenant furnishes his own equipment. Where the owner furnishes the teams and tools the usual rent is one-half of all crops. In a few cases cash rent is paid, especially for pasture or grain land.

Of the total population of Rockwall County, which in 1920 was 8,591, about 5,000 live on farms. About 20 per cent of the inhabitants are colored; most of these live on farms and are tenants or day laborers, while a few of them own small farms.

On a few of the farms, especially those operated by the owners, the houses are large and have all the modern conveniences. The average country home is comfortable and adequate. (Pl. 3, figs. 1 and 2.) Nearly every farm has a small barn for housing farm animals in bad weather and storing feed. There are very few sheds for storing farm machinery, however, and practically all farm tools are exposed to the weather the year round.

Land prices vary in Rockwall County according to location, topographic conditions, distance from good roads and towns, farm improvements, and the nature of the soils. The prices range from $50 to $150 an acre or more. Just after the World War land prices were greatly inflated and land sold for twice or even three times its present value. Along the East Fork of the Trinity River considerable bottom land sells for $75 to $150 an acre. Some of the bottom land is still covered with forest, about 50 per cent being under cultivation. More land is being cleared each year, as these bottoms

[5] Bul. 307, Texas Agr. Expt. Sta., Texas root rot of cotton and methods of its control.

furnish a large part of the county with wood, and it is likely that in a few years practically all the land available for agriculture will be utilized.

SOILS

Rockwall County lies in the northeastern part of the Black Waxy Belt of the Coastal Plains province. This belt is a strip of flat, undulating, and gently rolling prairie country extending from the vicinity of the Red River, southwesterly to the vicinity of San Antonio.

The soils of the county are derived principally from the underlying highly calcareous beds of unconsolidated, or only very weakly consolidated clays. To the eye these marly clays are generally lacking in siliceous material, although its presence may be detected by chemical analysis.

The calcareous clay beds weather rapidly into a stiff, waxy clay soil, black at the surface, with a whitish-yellow or brownish-yellow subsoil. The parent soft rock is light bluish in color immediately beneath the yellowish clay, and is locally called soapstone or joint clay, owing to its jointed and laminated structure. Some of the more extensive and poorly drained divides are characterized by small depressions known as "hog wallows," which are produced by the unequal drying and shrinkage of the clays in such places.

These black soils are represented in Rockwall County mainly by the Houston series. The black color of the surface soil is generally supposed to be due to the accumulation of organic matter. The soils are typically calcareous. The carbonates are being slowly leached away by rain water, but the highly calcareous parent material weathers into soil so rapidly that lime carbonate is abundant in most places, being most concentrated where the newly formed subsoil material or first product of weathering lies near the surface. In small spots the soil does not carry enough carbonate of lime to effervesce with hydrochloric acid, but in most places it does, and at depths of 15 to 24 inches the material is almost everywhere highly calcareous.

In the eastern part of the county much of the dry surface soil has more of a dark-grayish or dark-ashy cast at the surface than the Houston black clay, and it does not effervesce with hydrochloric acid above depths ranging from about 2 to 4 or 5 feet. This soil, locally called "rawhide land," is possibly derived from less calcareous parent material. These soils are represented in this county by the Wilson series.

The soil of the narrow strip of country that occupies the terrace in the extreme western part of the county consists chiefly of a black waxy clay, similar to that of the rolling prairie division, but derived from alluvial material laid down by streams at a time when they had not cut their beds to the present low level. This part of the county is underlain, at least in places, by beds of irregularly stratified, rounded, waterworn gravel. Wells of good drinking water are common on this terrace material, the water usually being found in the gravel strata. One of these gravel beds, which lies near the surface just north of Cottonwood Creek, near the edge of the East Fork valley, has been uncovered and some of the gravel used for road

building and other purposes. This terrace is occupied by soils of the Bell and Lewisville series.

The recent alluvial soils are composed of material washed from the soils occupying the drainage basins of the streams. They are very young and are added to by surface deposits at every overflow. They are mainly highly calcareous, and largely belong to the Trinity series. In a few places there are brown first-bottom soils, which do not effervesce with acid. These resemble the soils of the Ochlockonee series, common to the stream bottoms of east Texas, but the areas of their occurrence are so small that they have been included with the Trinity soils.

There is very little nonagricultural land in Rockwall County, probably less than 5 per cent. This is mainly land along streams or draws that is too badly eroded to be cultivated, or is first-bottom land, subject to occasional overflow and therefore of low agricultural value. Some of the bottom land has been protected by levees, and other levees are proposed, so that it is probable that most of the overflow land will in time be reclaimed. Practically all the black prairie land is in cultivation, with the exception of small areas occupied by permanent pastures and very narrow strips along some drainage ways.

The soils of the county are grouped into series on the basis of differences in origin, color, topography, structure, and lime content. The series are divided into soil types on the basis of differences in texture of the surface layer.

The soils of Rockwall County that are derived entirely or largely from unconsolidated calcareous strata are correlated in the Houston and Wilson series. The alluvial soils along the streams are grouped in the Trinity series, and the older alluvial or terrace soils lying above present overflow are placed in the Bell and Lewisville series.

The types of the Houston series have black to brown surface soils, The subsoil is yellowish-brown to whitish-yellow calcareous clay, having a substratum of calcareous, marly clay. The series is represented by the Houston black clay and the Houston clay, the latter having an eroded phase and a colluvial phase.

The types of the Wilson series have surface soils ranging in color from black or dark brown to brown or grayish brown. The subsoil is a dark bluish gray, stiff, plastic, noneffervescing clay, which is underlain at depths of 3 to 6 feet by a substratum of yellowish calcareous clay. Three types were mapped in Rockwall County, the Wilson clay, clay loam, and fine sandy loam.

The types of the Trinity series are derived from alluvial material and have surface soils of dark ashy gray to black or dark-brown color, overlying a subsoil of black or nearly black to dark ashy gray, heavy plastic clay. These soils are calcareous. One type is mapped in the present survey, the Trinity clay.

The Bell soils are found on high terraces and represent old alluvial material deposited before the present first-bottom soils were formed. The soils are black or very dark bluish gray, and the subsoil is dark bluish gray to very dark brown. Both soil and subsoil are calcareous, and are underlain at a depth of 3 to 6 or more feet by a substratum of yellowish, calcareous clay. The Bell clay is the only type of this series mapped in this county.

The types of the Lewisville series have brown to yellowish-brown surface soils with a pale yellowish brown highly calcareous subsoil. These are terrace soils, but the original terrace topography has been changed, the surface now being hilly or sloping. One type, the Lewisville clay, is mapped in this county.

In the following pages of this report the soils of Rockwall County are described in detail, and their relation to the agriculture of the county is discussed. The accompanying map shows their location and distribution throughout the county. The following table gives the actual and relative extent of each soil type mapped:

Areas of different soils

Soil	Acres	Per cent	Soil	Acres	Per cent
Houston clay	21,888	38.1	Wilson clay	5,568	5.8
Eroded phase	12,992		Bell clay	960	1.0
Colluvial phase	1,408		Lewisville clay	768	.8
Houston black clay	26,816	28.1	Wilson fine sandy loam	256	.3
Trinity clay	17,216	18.0			
Wilson clay loam	7,488	7.9	Total	95,360	

HOUSTON BLACK CLAY

The Houston black clay is a very dark brown to black calcareous clay, underlain at 6 to 10 inches by very dark brown or dark bluish gray to black calcareous clay. At a depth of 15 to 20 inches, the subsoil material commonly becomes a little lighter in color, owing to the presence of whitish marly material, and at depths varying from about 5 to 10 feet it passes into the parent clay beds, consisting of whitish, yellowish, or light cream colored to brownish-yellow highly calcareous clay or marly clay.

In spots here and there the subsoil is exposed at the surface, so that the soil has a lighter or brownish color and is more calcareous than the typical surface soil. There are also spots in which the surface soil does not effervesce with hydrochloric acid, but in such places the subsoil is prevailingly calcareous. Locally on slopes much of the surface soil has been washed away and the subsoil lies so near the surface that a brownish or ashy color appears in the plowed fields. These areas when large enough, were separated as Houston clay.

The surface soil of the Houston black clay when wet is very sticky, and locally the type is called "black waxy land." When dry, however, it crumbles into a fine condition, and proper cultivation gives a good soil mulch of very fine soil fragments. This soil is noted for its good tilth and will of itself crumble and loosen to depths of 4 or 5 inches in fields that have been cultivated. In periods of drought this soil contracts to an excessive degree, and large cracks form which often are several inches wide and several feet deep. So badly does this clay material crack that roads built over it must have good foundations or they will be of short life.

The Houston black clay is the most extensive and most important soil type in the county. It occurs chiefly in a belt averaging about 4 miles in width, running north and south across the east-central part of the county, and including the towns of Fate, Blackland,

McLendons, Chisholm, and part of Royse City. Other smaller areas are mapped in different parts of the county.

The surface of the Houston black clay is undulating to very gently rolling. The main body of the type occupies a high divide, whose average elevation is greater than that of any other part of the county. The drainage is good on most of the type. The streams have not cut their valleys as deep as they have in the soils farther west. Erosion is going on, however, and unless terracing or some other method is employed to prevent it, the surface will gradually become rough and broken, and much of the valuable surface soil will be washed away.

This type is, in the main, a treeless prairie. There are, however, a few scattered cedar and bois d'arc trees, and along some of the streams oak, elm, ash, hackberry, and some pecan trees are found.

Practically all the Houston black clay is in cultivation. There are a few small areas of virgin pasture land, but practically all this could be cultivated. These areas usually support a good growth of native grasses which include buffalo grass (locally called mesquite grass), big bluestem, white beard grass, tall grama, golden bluestem, and in some places Bermuda and Johnson grasses.

The Houston black clay is the most productive upland soil in the county. The principal crops grown are cotton, corn, oats, wheat, and sorghum. The acreage of cotton is greater than that of all the other crops combined. Owing to periods of drought in the early summer, the corn crop sometimes fails, but with good seasonal conditions corn yields from 30 to 50 bushels per acre. Oats yield, in good years, from 30 to 75 bushels. Wheat, which is not grown as much as formerly, yields from 10 to 20 bushels per acre. Barley yields from 15 to 35 bushels per acre and apparently is becoming a more popular crop, as it yields better than wheat and is a very good feed, especially for hogs. Cotton yields from one-fourth to 1 bale per acre, depending on the rainfall and the amount of damage by insect pests. The average production ordinarily lies between one-third and one-half bale per acre.

Sorgo (sweet sorghum) gives heavy yields of forage and may be cut twice, or in long seasons three times. A little is used for silage. Considerable sirup is made for home use. Milo and feterita are grown in small quantities. They mature in a comparatively short time and do not require as much rainfall as other grain crops. Occasionally, however, the grain sorghums are heavily damaged by the midge, so that the formation of seed is prevented. A very little Sudan grass is grown and gives good yields. The principal hay crop, however, comes from the native grasses and small areas of Johnson and Bermuda grasses. Two or three tons or more per acre are often obtained in a season. If the hay is cut early, before it becomes woody, it is of fairly good quality. Alfalfa and cowpeas are grown very little, but do well on this type of soil. These crops, as well as cotton, are damaged considerably by the root rot, but this disease can be controlled by crop rotation and clean culture.

Up to the present time systematic crop rotation has not gained a footing in the agricultural practice of this county. Although crops are frequently changed, cotton is the main crop and occupies the land the greater part of the time. Practically no commercial fertilizer

is used and no special methods are employed to maintain soil fertility. Some land was being terraced the year of the survey (1923). This must be considered an important step in the maintenance of the productiveness of this type of soil.

The farms on the Houston black clay are usually well kept. The buildings and improvements are perhaps somewhat above the average of the county, especially where the farms are operated by the owners. Such farms bring prices around $100 an acre, and near the larger towns and in the better locations $125 to $150 or more.

For the improvement of this soil, organic matter should be plowed under, and terraces constructed to prevent washing. Legumes, such as alfalfa, sweet clover, or cowpeas, should be grown to keep up the supply of nitrogen in the soil. An adequate store of organic matter in the soil also tends to lessen the effects of prolonged droughts. Feed crops, such as barley, feterita, and Sudan grass, could be grown more extensively and probably with a greater certainty of success than corn.

HOUSTON CLAY

The Houston clay is an ashy-brown or dark ashy brown to dark ashy gray, calcareous clay, underlain at about 4 to 6 inches by yellowish-brown calcareous clay which extends to 7 or 8 inches. Below this is a light yellowish brown to pale brownish yellow or cream-colored, highly calcareous clay, which grades beneath into the parent material, a whitish to pale bluish gray marly clay, usually at depths ranging from 4 to 8 or 10 feet. The entire soil section is strongly calcareous. Lime particles and concretions are numerous below 12 or 15 inches and are often found nearer the surface.

In places this type appears very much like the Houston black clay, having a surface layer almost as dark in color, but this layer is thin, in most cases not over 2 to 4 inches deep, so that when the land is plowed it has a decidedly brownish or ashy-gray appearance. Spots are included in which the dark soil is somewhat deeper, but these areas are too small and scattering to be mapped separately. Where they are most numerous they give the field a spotted appearance. In Denton County a similar condition prevailed over rather large areas, and these were mapped as a spotted phase of the Houston clay. In Rockwall County these areas were not considered large enough or of sufficient importance to be separated, as their agricultural value is practically the same as of the typical Houston clay.

While this soil is a heavy clay and is very plastic when wet, it, like the Houston black clay, crumbles to a desirable tilth on drying. If left in a cloddy condition by plowing, the clods break down rapidly into a fine crumbly mass when exposed to the weather for a short time. If cultivated when dry it forms an excellent tilth. This seems to be particularly a characteristic of the Houston series, but is more or less present in all the soils of the county.

The Houston clay ranks next in importance to the Houston black clay. It occurs on slopes along streams and drainage ways and on narrow divides where the surface layer of black soil has been thinned by erosion. Its main area of occurrence is between the belt of the Houston black clay and the valley of the East Fork. The surface is gently rolling to hilly and the drainage is thorough.

Most of the type is under cultivation, with the exception of small areas devoted to pasture and hay. Probably not over 2 per cent is unfit for cultivation, and this is generally utilized for pasture. (Pl. 4, fig. 1.)

About the same crops are grown on this type as on the Houston black clay. The more important are cotton, corn, oats, wheat, and sorgo. In wet years they yield nearly as well as on the Houston black clay, but in dry years they do not thrive as well as on the deeper black soil. The surface, on drying, does not crumble as deep as that of the Houston black clay and it does not hold moisture quite as well. It cracks badly, though not quite as much as the black clay; this feature often causes considerable damage to crops such as alfalfa. Root rot does considerable damage, but less than on the Houston black clay. It can be controlled to a great extent by a rotation of crops and by destroying or turning under all roots that may serve as a winter harbor for the spores.

Cotton, in average years, yields from one-fourth to two-thirds bale, corn 30 to 35 bushels, oats 25 to 60 bushels, and wheat 10 to 18 bushels per acre.

Farm practices are practically the same as on the Houston black clay. The greatest need of the soil is protection against erosion; this may be obtained by terracing. Weeds, crop residues, and green manure crops should be plowed under to increase the content of organic matter in the soil. This not only increases the supply of nitrogen in the soil, but increases its power to hold water and therefore to resist drought. It is probable that a light application of commercial fertilizer would be beneficial. A mixture of equal parts of acid phosphate and cottonseed meal has shown results on this type of land in other counties, but cottonseed meal is ordinarily too high priced for use as fertilizer. Barnyard manure and acid phosphate is an excellent combination, but on account of the feeding of Johnson grass hay to stock, many farmers do not like to apply the manure to the land for fear of trouble from the grass. Alfalfa, sweet clover, and cowpeas do fairly well on this type of soil and should be grown when possible, as they assist greatly in building up the land.

Farms on this type sell for $75 to $125 or more an acre, depending on improvements and distances from towns and good roads.

Houston clay, eroded phase.—The Houston clay, eroded phase, is a light ashy brown to grayish-brown clay, underlain about 7 inches by a yellowish-brown to brownish-yellow more or less marly clay. Both surface soil and subsoil are highly calcareous, and lime particles and concretions are found throughout the soil section. The substratum of marly clay is encountered at depths of 3 to 8 feet. In many places, where erosion has been most rapid, the soil consists of pale-yellow or cream-colored, highly calcareous clay, representing exposed parent material.

This phase occurs principally on steep slopes and narrow divides where erosion has been severe. It is of considerable extent, especially on the hills along the east side of the valley of the East Fork. The topography is rolling to hilly and the drainage is good to excessive. On account of the badly eroded condition of much of it, cultivation is in places difficult, and considerable areas are so badly eroded that they are practically bare of vegetation.

Probably about 65 per cent of this phase is under cultivation. The crops grown are the same as on the typical Houston clay, but the yields are not so good. Crops produce best in seasons of plentiful rainfall, sometimes yielding about as well as on the typical soil. In droughty seasons, however, yields are very light. Heavy rains just after planting sometimes wash much of the seed out of the ground and make replanting necessary. Cotton ordinarily yields from one-sixth to one-third bale, corn 10 to 20 bushels, oats 20 to 50 bushels, and wheat 10 to 18 bushels per acre. Root rot is present on this phase, especially after a wet spring season, but is not as bad as on the typical Houston clay.

The greatest need of the eroded phase is terracing to prevent further erosion and the plowing under of organic matter, especially green manures. It will be almost impossible to build up this land without first protecting it with terraces.

Land values at present range from about $45 to $75 an acre, or slightly more in especially desirable locations.

Houston clay, colluvial phase.—The Houston clay, colluvial phase, is a brown calcareous clay, which in places is uniform to depths of over 3 feet, but which commonly is darker brown below depths of about 8 inches. Yellowish-brown marly clay appears at depths ranging from about 4 to 8 feet or more.

This phase has been formed in part by the weathering of the parent material underlying it and in part by the soil washed down from the adjoining hillsides. It occurs as a narrow, irregular strip of land at the foot of the hills on the east side of the East Fork valley, and lies just above the first-bottom soils. It occupies a position similar to that of a terrace. This phase is of small extent. The surface is gently sloping to gently undulating. The drainage is fairly good.

The same crops are grown as on the typical Houston clay, and practically the same yields are obtained. The land values are also about the same.

WILSON FINE SANDY LOAM

The Wilson fine sandy loam to a depth of 4 to 8 inches is a brown, mellow, friable, noncalcareous fine sandy loam. The subsurface layer is a bluish-gray, stiff, plastic, noncalcareous clay, which in places is mottled with brown and here and there faintly with reddish brown. Below 18 inches the subsoil normally is a bluish-gray, stiff, plastic, noncalcareous clay, without mottling. Locally the surface soil is almost black, and somewhat heavier, in places consisting of clay loam or even clay, but these spots are so small that they could not be shown satisfactorily on a map of the scale used in this survey. In some places the subsoil is brownish in color and is not as heavy as the typical subsoil of the Wilson series.

The Wilson fine sandy loam is of minor importance, occurring only in two small areas in the southeastern part of the county. The surface is undulating to rolling, and the drainage is good.

The crops common to other parts of the county are grown on this land, but the yields are somewhat lighter than on the Wilson clay loam. Cotton ordinarily yields from one-sixth to one-third bale, corn 10 to 25 bushels, oats 20 to 45 bushels, and wheat from 8 to 15 bushels per acre. Sweet potatoes, potatoes and garden vegetables

do fairly well, and small fruits and berries are grown to some extent with fair success. This land at this time (1923) has a value of about $50 to $75 an acre.

The greatest need of the soil is the addition of organic matter in the form of barnyard manure, green-manure crops, or other vegetable matter. Commercial fertilizers, while not in use at the present time, should give good results on this type of soil.

WILSON CLAY LOAM

The Wilson clay loam is an ashy-brown to dark ashy brown clay loam, underlain at about 6 to 8 inches by dark bluish gray, stiff, noncalcareous clay. Yellowish-brown or cream-colored calcareous clay is encountered at depths ranging from 3 to 8 feet. This soil, as mapped, includes spots of Wilson clay and spots where the surface soil is slightly calcareous, which are too small to be shown on the map. There are also small areas in which the surface soil has a grayish-brown color and contains considerable fine sand, and, in places, considerable very fine sand. In a few small areas the surface layer of 2 or 3 inches is a brown fine sandy loam, underlain abruptly by a heavy clay loam or clay. In places in the vicinity of Munson the subsoil has about the same color as the surface soil, and the clay loam extends to about 15 inches before grading into brownish clay; in these places the dark bluish gray subsoil is usually encountered at a depth of 2 to 3 feet.

On some of the slopes, especially bordering High Point Creek, the subsoil in places is slightly mottled with brown or reddish brown, and the soil appears very much like Crockett clay loam, but the areas are too small and of too little importance to be mapped as a separate type.

Although the soil of the Wilson clay loam is very sticky when wet, it works up into an excellent tilth if cultivated at the proper time. It frequently hardens and does not crumble as deeply as the Houston soils. This type is locally called "rawhide land." It occurs in a belt, with an average width of about 1 mile, extending across the county north and south, along the eastern county line.

The surface is gently undulating to undulating. In the vicinity of Munson it is almost flat. The drainage is good over most of the area, but slightly deficient on the more level parts.

Cotton is the principal crop grown on this soil. Corn, wheat, oats, and other crops are grown chiefly for home and local use and their acreage is small. Cotton yields about one-fourth to one-third bale per acre, corn 18 to 40 bushels, oats 30 to 60 bushels, and wheat 8 to 12 or 15 bushels. Some of the farmers state that in a wet year they can produce as good yields on this land as on the Houston black clay. It is not, however, naturally as productive a soil, and in dry seasons crop yields are low. Fruit and vegetables are raised in small quantities. Potatoes are grown for home use and do well on the well-drained locations.

Farm practices are about the same as in other parts of the county. The soil is plowed very shallow, from 2 to 4 inches, usually not more than 3 inches deep. Cotton is planted on beds, although, following a grain crop or when the land is very foul with Johnson grass or other weeds, the field may be plowed and then bedded. Bermuda

grass is an important pasture grass and is occasionally cut for hay. In places it has become a pest. Numerous small pastures on this type support a mixture of Johnson grass, Bermuda grass, and the native grasses.

The present selling price of land of this type ranges from $60 to $100 an acre.

The Wilson clay loam could undoubtedly be greatly improved by plowing under vegetable matter, especially green-manure crops. Commercial fertilizer is not used, but it would no doubt increase yields. Very little barnyard manure is applied, except to the gardens; the quantity available is very small. Where it has been used it has given excellent results. An application of about 2,000 pounds of ground limestone per acre, or its equivalent in caustic or hydrated lime, would probably be beneficial to this soil, especially if alfalfa or clover is to be grown. Cowpeas and alfalfa, where it is possible to grow them, would benefit the soil. Sweet clover plowed under has given excellent results on this type of soil in other counties.

WILSON CLAY

The Wilson clay consists of about 7 inches of dark ashy brown to nearly black, stiff, heavy clay, underlain by dark bluish gray to almost black very stiff clay, which grades downward into lighter-colored clay, and passes at a depth of 3 to 6 or 8 feet into brownish-yellow highly calcareous clay, similar to the parent material underlying the Houston soils. Neither the soil nor subsoil effervesces with hydrochloric acid. In places the lime-bearing substratum comes close to the surface, giving the soil over small areas a more brownish color. In such areas the soil may effervesce with hydrochloric acid. There are some small included spots of clay loam, which are brown or dark brown in color but do not show the presence of lime carbonate.

The Wilson clay occurs in the eastern part of the county in a narrow belt running north and south and bordering the eastern margin of the Houston black clay. Where the two types merge it is difficult to draw the line of separation. The distinction here is made on the basis of the lime content, the soil showing no reaction with hydrochloric acid being classed with the Wilson series.

About 2½ miles south of Munson, near the county line, and bordering a small drainage way, is a small area that has the general appearance of a terrace. It is a dark-brown to nearly black clay with a bluish-gray subsoil. It is therefore similar to the Wilson clay, except in position. In other counties similar areas have been mapped as Irving clay, but as this area is of such small extent and is the only one in Rockwall County, it was included with the Wilson clay.

The Wilson clay has many of the characteristics common to the Houston black clay. The surface soil, however, seems to be slightly more compact, does not crumble and crack to such an extent as the Houston soils, and is more difficult to plow, especially if plowed deep. It has less power to hold water and is not as able to resist drought as the Houston soils. However, it assumes an excellent tilth when properly handled. The surface is undulating to gently rolling. The drainage is usually good.

Practically all the Wilson clay is in cultivation, with the exception of small areas along streams and a few small pasture lots. Cotton, corn, wheat, oats, and sorgo are the principal crops grown. The farm practices and methods are about the same as on the Houston black clay. The crop yields in good seasons are nearly equal to those of the Houston black clay, but in dry years the Wilson clay is slightly more droughty. In average seasons cotton yields from one-fourth to two-thirds bale per acre, corn 20 to 40 bushels, oats 35 to 75 bushels, and wheat 12 to 25 bushels.

The land sells at the present time for about $75 to $125 or more an acre.

The greatest need of this type is organic matter. This may be supplied by plowing under green-manure crops. Not only will this add nitrogen to the soil, but it will have a marked effect on its texture, making the surface soil looser and adding to its water-holding capacity. Very little is being done at the present time to build up this land, or even to maintain its productiveness. Cotton and other crops, especially wheat, are said not to yield as well as they did a number of years ago. On the more rolling areas terracing should be employed to prevent further erosion of the surface and the washing away of valuable soil. The application of lime might be beneficial, especially in the growing of certain leguminous crops. Manure would undoubtedly give good results, and acid phosphate or a mixture of acid phosphate and nitrogen, say a 10–2–0 mixture, would likely give increased yields of cotton, corn, and wheat.

BELL CLAY

The surface soil of the Bell clay is a black, dark ashy brown, or dark ashy gray, calcareous clay, usually underlain at 8 or 10 inches by a dark bluish gray heavy, calcareous clay. As seen in road cuts a substratum consisting of yellowish-brown marly clay underlies this type at a depth of 4 to 10 feet. The subsoil passes gradually into this material.

The surface soil is very plastic and waxy when wet, but when dry it crumbles down to a fine fragmental condition, and under cultivation forms a fine mulch. In places the limy substratum material comes close to the surface, causing a lighter color. Such areas are small, however, and are not separated on the map. The Bell clay is very similar to the Houston black clay, and when these two soils occur in adjoining areas it is very difficult to draw the line between them.

The Bell clay occurs on a high terrace bordering the west county line. Its total extent is only 1½ square miles. It is derived from sediments laid down by the streams in times of overflow when these streams had not yet cut their channels to their present low levels. The surface is more nearly level than that of the Houston black clay, being usually gently undulating to undulating. Along streams and along the edge of the East Fork valley considerable erosion has taken place, but damage has not been as great as on the Houston soils. The drainage is usually fairly good.

The Bell clay is an important soil, although small in extent. Practically all of it is under cultivation. The crops grown are the same as on the Houston black clay, and the yields also are practically

the same. The agricultural practices and methods recommended for the improvement of the Houston black clay are also applicable to the Bell clay. While terracing is not so important on the Bell clay on account of the more level topography, it would in many instances be a good investment, as it would prevent further erosion and the formation of gullies and ravines.

Land values range from about $85 to $150 an acre.

LEWISVILLE CLAY

The Lewisville clay is a brown, highly calcareous clay, underlain at depths of 6 or 8 inches by a pale yellowish brown highly calcareous clay, which in turn grades into a substratum of pale-yellow marly clay, appearing ordinarily at depths ranging from 3 to 6 or 8 feet. The soil in places has a clay loam texture, and in spots the color is dark brown or nearly black, and in others yellowish brown. On the steeper slopes the soil is prevailingly of a more yellowish color than on the more nearly level areas. When wet the soil is very sticky, but when dry it crumbles down into a very fine condition and is fairly friable.

The type is underlain, at least in places, by more or less stratified rounded and waterworn gravel. These beds occur at depths of several feet to 50 feet or more.

This type is of small extent and of minor importance. It is a terrace soil and is associated with the Bell clay, being found chiefly on eroded slopes. Its principal development is in a narrow strip at the western edge of the East Fork valley. It bears the same relation to the Bell clay that the Houston clay, eroded phase, bears to the Houston black clay. The surface is sloping to steeply sloping, or rolling to hilly. In places bad gullies appear. Drainage is good to excessive.

About 75 per cent of this type is under cultivation. Most of the rest is utilized for pasture and hay, the main grasses being Johnson, Bermuda, buffalo (locally called mesquite), big bluestem, and white beard grass. The same crops are grown and similar yields obtained as on the Houston clay, eroded phase. Agricultural practices, methods of improvement, and land values are also the same.

TRINITY CLAY

The surface soil of the Trinity clay is a black or nearly black, calcareous clay. This in places extends to depths of 3 feet or more without change, but ordinarily at about 7 to 10 inches a dark-brown, highly calcareous clay is reached. Locally the subsoil shows some stratification, thin layers of brown or grayish-brown clay alternating with layers of the typical subsoil. This condition is most likely to occur near the edge of the uplands, where lighter-colored material has been washed down from the slopes. When wet the surface of the Trinity clay is very plastic and waxy, but it crumbles into a very fine mass when dry. When first plowed the soil of many areas has a brownish appearance, but on drying it becomes dark ashy brown or black.

In places the surface soil ranges toward brown or dark brown in color. Such areas, if of sufficient size, would have been mapped as

Catalpa clay, but in this county they are too small to be shown separately. There are also small areas in which the soil shows no reaction to the application of hydrochloric acid, as in places along Sabine Creek, High Point Creek, and other small waterways in the southeastern part of the county. Such soil, if of sufficient extent, would have been mapped as Johnston clay. Where the surface soil is brown and noncalcareous it is somewhat similar to the Ochlockonee clay. A few such spots occur along High Point Creek and other small drainage ways in that locality.

The Trinity clay is a first-bottom soil. The principal area, averaging about 2 miles in width, extends across the county in a north and south direction in the valley of the East Fork of the Trinity River. Areas of less importance are mapped in the valleys of most of the other streams, the more extensive lying along Sabine Creek in the northeastern part of the county. The surface of the type is flat and drainage is poor, except in close proximity to the stream bed.

This type is very productive and is an important soil in Rockwall County. Probably about 50 per cent of it is in cultivation, the rest being forested. Where the land is protected by levees it is being rapidly cleared and put into cultivation. (Pl. 4, fig. 2.) The principal forest growth consists of bois d'arc, elm, and oak; there are also considerable quantities of ash, pecan, hackberry, and black willow. The bois d'arc was formerly very abundant.

Cotton and corn are the principal crops on the Trinity clay. Cotton yields from one-third to 1 bale or more per acre, and corn from 40 to 100 bushels. Oats and wheat are not grown, as they are subject to rust and lodging on this bottom soil. Bermuda and Johnson grass do exceedingly well, and some rather large areas of these grasses are cut for hay each year. Vegetables do well on this soil, but scarcely any are grown. Alfalfa, where tried, has succeeded, and more of it should be grown, as there is usually a very good market for alfalfa hay. Giant Bermuda grass, lately introduced from South America, also should do very well on this type of land and should be valuable for pasture as well as for hay. This grass is quite similar to the common Bermuda grass, except that it grows much taller and is more erect, so that it is more easily cut for hay. While it is more hardy than ordinary Bermuda, it is also more easily exterminated by cultivation or shading.

Where this land is not protected by levees, overflows often do great damage to crops. This is especially true in the case of floods early in the season before the crops have become well established. Occasionally it is necessary to replant, which may make the crop so late that the yield will be far below normal.

The present value of this type of land ranges from about $50 to $150 an acre, depending on location and whether or not it is protected by levees.

This heavy soil can be improved by plowing under vegetable matter to loosen the surface soil and increase its water-holding capacity. Heretofore the fertility has been maintained and constantly added to by the rich deposits laid down by the streams at time of overflow, but with levee protection, which is necessary to insure regular crops, this source will be practically cut off, and the same practices as on the upland to keep up the productiveness

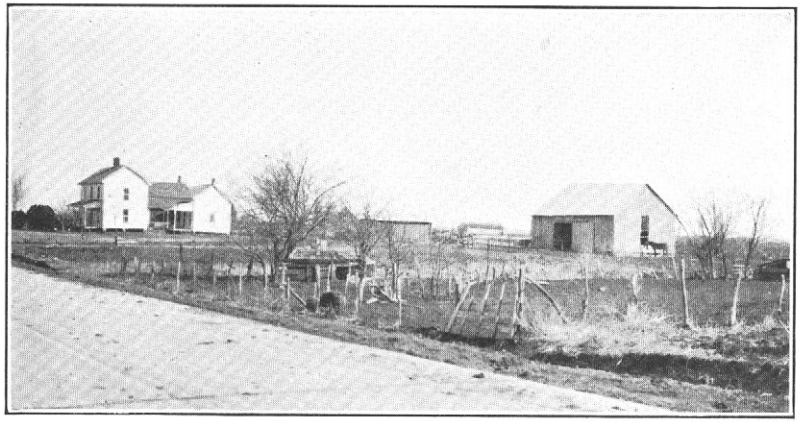


FIG. 1.—TYPICAL FARMSTEAD IN ROCKWALL COUNTY

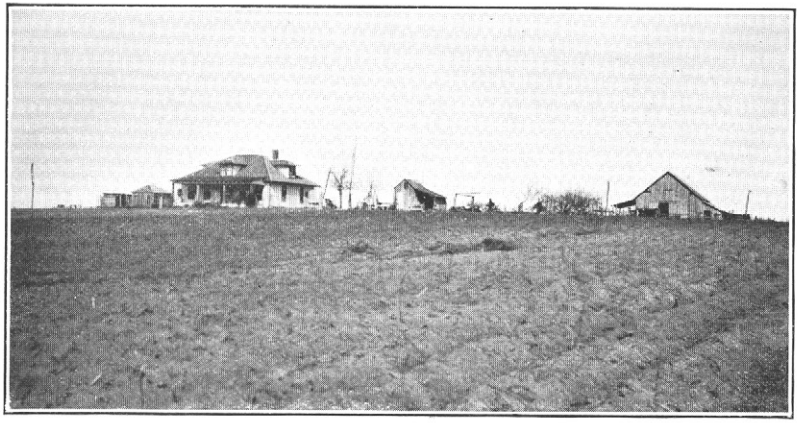


FIG. 2.—ANOTHER REPRESENTATIVE FARMSTEAD

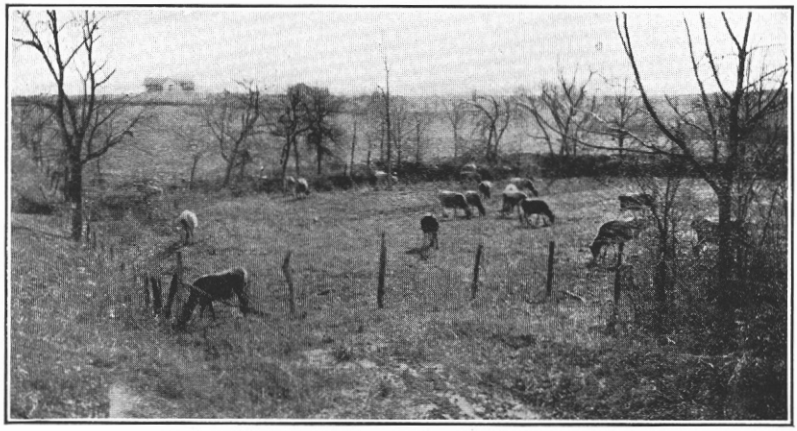


FIG. 1.—LAND ALONG A SMALL STREAM USED FOR PASTURE

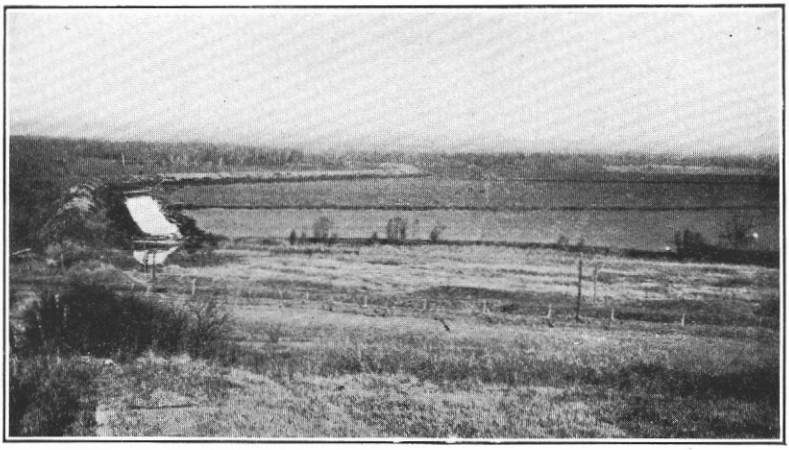


FIG. 2.—LEVEE AND RECLAIMED BOTTOM LAND ALONG THE EAST FORK OF THE TRINITY RIVER

should be employed. The growing of legumes and the turning under of a green-manuring crop from time to time will be found necessary if a decline in yields is to be prevented.

SUMMARY

Rockwall County is situated in northeast Texas. It has an area of 149 square miles. The county lies in the Black Waxy belt of the Black Prairie region. In the extreme western part there is a small area of terrace soils. Next to this is the valley of the East Fork of the Trinity River, which crosses the county from north to south and has an average width of about 2 miles. The soils of this valley are composed of alluvial material, laid down by streams at times of overflow. The rest of the county to the east is occupied by soils derived from the underlying beds of unconsolidated marly clays. The upland soils are included in the Houston and Wilson series, the recent-alluvial deposits give soils of the Trinity series, and the older stream deposits occupying terraces are classed with the Bell and Lewisville series.

The Houston black clay and the Houston clay are the most extensive and most important soils of the county. Practically all the soils produce good crops in seasons of favorable moisture conditions, but the darker colored soils are the most productive and give relatively better results than the other soils in dry years.

The topography of the county ranges from gently undulating to strongly rolling and hilly, the greater part being rolling. The general slope is toward the south and southeast,

The elevation of the county ranges from 390 feet above sea level at the lowest point in the valley of the East Fork to approximately 620 feet near the town of Fate.

In 1920 the population of the county was 8,591. Most of the inhabitants are engaged in agricultural pursuits. Rockwall, the county seat, Royse City, and Fate are railway towns on the Missouri, Kansas & Texas Railway, which runs from Dallas to Greenville and Denison. Heath, Chisholm, McLendons, Munson, and Blackland are smaller towns.

A concrete highway crosses the county through Rockwall, Fate, and Royse City, and connects with an excellent surfaced road to Dallas. Other concrete roads run from Rockwall to Chisholm and from Royse City to Chisholm. The remaining roads of the county are earth roads. The main ones are kept graded in a pretty fair condition. During long rainy periods the earth roads become almost impassable for any sort of vehicle, but they dry out rapidly and are seldom impassable for more than a few days at a time.

Practically all the county is reached by rural mail delivery routes. Telephones are in general use throughout the county, and good schools and churches are conveniently placed in the rural districts as well as in the towns.

The principal crop grown in the county is cotton. Other crops, such as oats, corn, wheat, and hay are grown, but principally for home and local use, very little being shipped out of the county. Some corn and oats are brought into the county for feed, especially in poor

crop years. Sorgo is grown on most farms for feed and for making sirup. One or two cows are kept on nearly every farm, and a few fair-sized dairies are in operation. On most farms pigs and chickens are raised. Systematic crop rotation is not practiced. Practically no commercial fertilizer is used at this time. Some terracing is being done, and this practice will doubtless become common as the benefits from it become apparent.

The census of 1920 reports 1,075 farms in the county, with an average size of about 79.5 acres. Tenants operate 71.7 per cent of the farms of the county. Farm land sells for $60 to $150 or $175 an acre.

Practically all the soils of the county can be improved by growing legumes, such as cowpeas, clover, and alfalfa, and by plowing under organic matter. Terracing should be practiced on all land that has sufficient slope to cause erosion in times of heavy rainfall. The valuable bottom-land soils can be improved by building dikes or levees to prevent overflow, where sufficiently large areas are available to warrant the expense of such construction.

○

[PUBLIC RESOLUTION—No. 9]

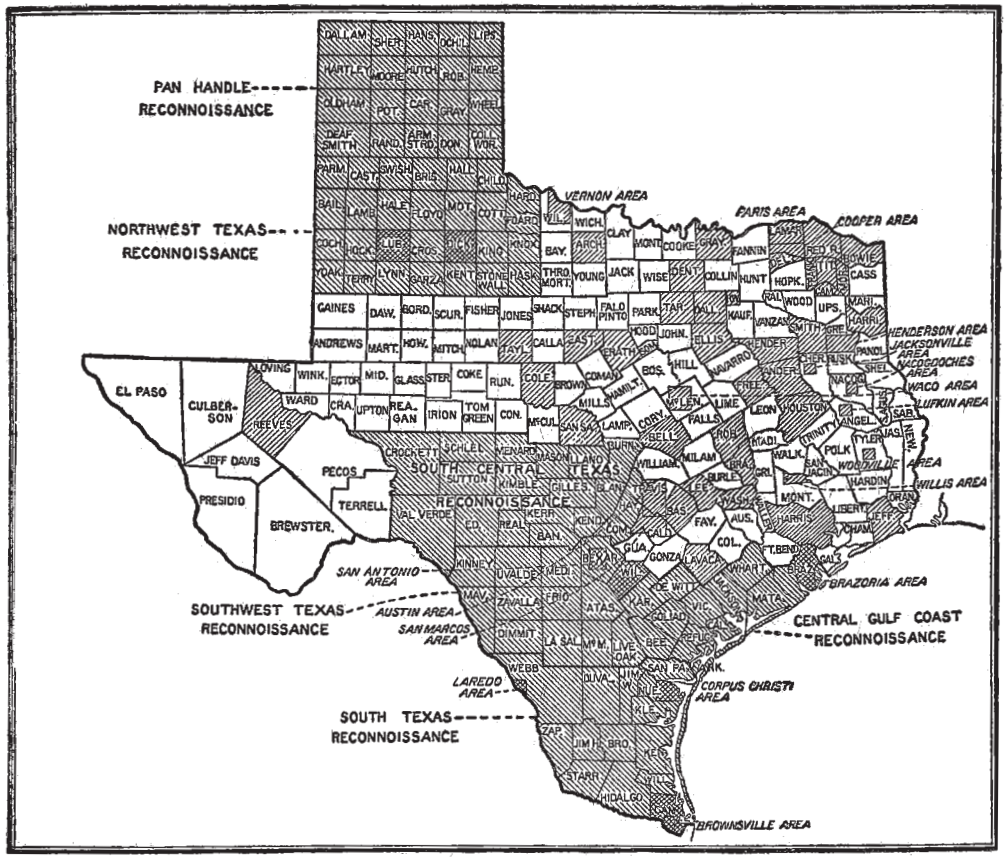
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

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

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

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]



Areas surveyed in Texas, shown by shading

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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.

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