SOIL SURVEY OF UNION COUNTY, KENTUCKY.

By HERBERT W. MAREAN.

LOCATION AND BOUNDARIES OF THE AREA.

Union County embraces an area of about 361 square miles, lying near the western end of Kentucky, about midway between the Green and Cumberland rivers. Along its northern and western borders, for a distance of about 36 miles, flows the Ohio River. To the southwest lies Crittenden County, from which it is separated by the Tradewater River. Webster County borders it on the southeast and Henderson on the northeast. Morganfield, the county seat, has a population of about 2,000, while Sturgis and Uniontown stand next in size and importance. (See fig. 11.)

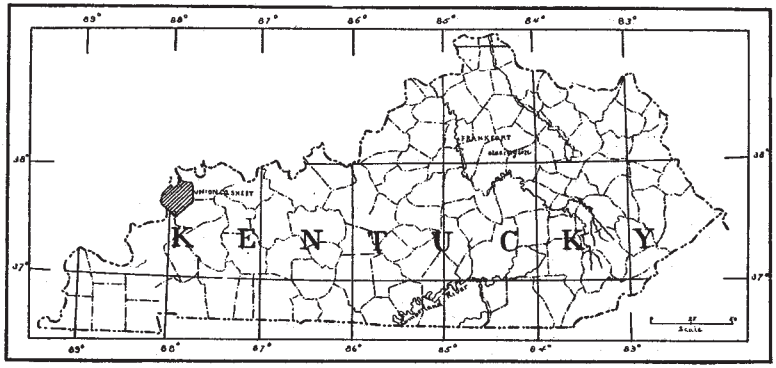

FIG. 11.—Sketch map showing area surveyed in Kentucky.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

Union County was laid off from Henderson County in the year 1811. The first permanent settlement in the region was made about the year 1805. Previously to this the territory had been visited by immigrants who did not remain long, but pushed on farther west or returned to their homes in the East. The earliest settlers were from Virginia and North Carolina. They were of two classes. The first class took up lands under army grants made by the Government in recompense for services rendered during the Revolutionary war. Large tracts were laid out by this "military survey" comprising claims of from 1,000 to 1,200 acres each. The other class was composed of those who settled under

the so-called "head-rights" law, by virtue of which a squatter might claim title to a certain portion of land, provided that he could prove that he had actually settled on it and made certain improvements. This law, because of its breadth and liberality, was the cause of great injustice. Many succeeded in gaining possession of large tracts of land by doing little more than piling up heaps of brush and burning them.

The life of the early settler was the life of the frontiersman of that day. Dense forests covered the land, inhabited by an abundance of wild game which was depended on in part for the food supply. The first lands to be settled were the uplands and ridges. The lowlands and stream bottoms were covered by swamps and bogs, and the early farmers sought the higher and drier localities. As fast as the land could be cleared of its growth of timber agricultural pursuits were begun. Slave labor was employed from the first and the crops grown were corn and tobacco, with some oats. Corn furnished food for man and beast, and tobacco was the money crop with which other necessities could be bought.

The fertility of the soil attracted more immigration and the country was quite rapidly developed. Stock raising was an important industry then, as it is now. Hogs were chiefly raised, although the grazing of cattle and sheep was also followed. It was not until about the middle of the nineteenth century that wheat growing became an important industry, but since then this and the raising of beef cattle have steadily increased in importance.

The rapid settlement of the more desirable portion of the uplands naturally led to the development of the lowlands and bottoms, and through ditching and drainage this very fertile part of the country has been opened up. At the present time a large proportion of all the bottom lands has been reclaimed. These are generally considered the most desirable lands for general farm purposes.

CLIMATE.

There being no Weather Bureau station in Union County, Ky., the table given below, showing normal temperature and precipitation, presents the figures for Weather Bureau stations at Fords Ferry, situated in Crittenden County, just south of Union County, and Henderson, lying north of the area, in Henderson County. It is believed these readings, differing so slightly as they do, may be safely applied to the intervening territory.

Normal monthly and annual temperature and precipitation.

Month.	Temperature.		Precipitation.	
	Fords Ferry.	Henderson.	Fords Ferry.	Henderson.
	° *F.*	° *F.*	*Inches.*	*Inches.*
January	36.3	36.6	3.85	3.86
February	34.3	34.9	2.61	2.64
March	47.6	47.8	5.09	5.58
April	57.6	58.7	4.05	3.41
May	67.3	68.1	4.25	3.99
June	76.6	77.1	3.52	4.46
July	78.5	78.1	4.04	4.10
August	78.6	79.1	1.71	2.28
September	72.6	72.7	2.56	2.42
October	59.1	60.3	2.55	3.19
November	46.9	47.2	3.74	3.74
December	37.5	37.9	3.06	3.65
Year	57.7	58.2	41.03	43.32

The average length of the growing season as deduced from records of the same stations is about one hundred and eighty days. At Fords Ferry the average date of last killing frost in spring is April 13, and of the first in fall October 8. In the case of Henderson the figures are April 6 and October 25, respectively.

PHYSIOGRAPHY AND GEOLOGY.

The rocks underlying all the soils of Union County are sandstones and sandy shales belonging to the Carboniferous group of sedimentary rocks, or Coal Measures. The county lies within the district known as the western coal region of Kentucky, and is plentifully supplied with an excellent grade of bituminous coal. Many mines are in active operation and furnish the best of fuel at a reasonable price, compensating for the lack of firewood, which is becoming scarce in this section of the country.

Along the Ohio River bottoms are found deposits belonging to more recent geological groups. These are in the form of river sediments and give rise to the sandy and clayey soils of that district. The geological relations of the soils of the upland part of the county are somewhat obscure. Although the underlying rocks are of a distinctly sandy nature, the soil contains practically no sand whatever, but is made up almost entirely of silt. Again, while the outcrops of bed rock in different sections of the area show considerable variation in character, the texture and agricultural value of the soil overlying these rocks show remarkable uniformity. Therefore it is necessary to conclude that the soils of Union County are not residual in the sense of being derived by disintegration from the underlying rocks, but that they are derived from a loesslike covering or mantle.

The term "loess" is used by the geologist in this country to designate a mantle of unconsolidated material covering large areas along the Mississippi Valley from the Great Lakes to the Gulf of Mexico and extending for many miles to the east and west along the larger tributaries of the Mississippi River. It is supposed to have been derived from glacial débris, transported by the ice sheet when the glacier invaded the northern part of the continent in the Quaternary period. It is thought to have been laid down partly by water deposition and partly by æolian agencies, but authorities are not agreed upon this point. But that the upland soils of this region are of loess origin is proven by many facts, as the uniformity of texture extending over large areas, the predominance of silt and the absence of coarse sand and gravel in the composition of all the soils, and the nonconformity between soil and underlying rock. Furthermore, in several deep cuts along the bluff that separates the upland from the river bottom the exposed subsoil shows the typical loess texture and is distinctly stratified. From these several facts we are forced to conclude that the upland soils of Union County are not the product of rock disintegration, but are derived primarily or secondarily from the loess.

The county may be divided into two main physiographic divisions—the upland, embracing the larger area, and the Ohio River bottom. The river bottom stretches in a belt varying in width from one-fourth of a mile to 3 or 4 miles along the northwest, west, and southwest border of the county. It lies in a nearly level plain about 20 feet above the normal water level of the river, but is subject to inundations at times of high water. Running longitudinally along the bottoms are depressions or sloughs from 200 to 300 yards wide that are always wet and boggy. Near the banks of the river are quite pronounced ridges, forming in some instances natural levees, while the land slopes gradually inland, as is usually the case where a stream is subjected to periodic overflow. In several instances there are distinct terraces rising above the general level of the valley, forming the so-called "second bottom."

Dividing the river lowlands from the upland portion of the county is a bluff varying from 50 to 100 feet in height. In the southern part of the county this is a precipitous sandstone cliff, standing up boldly to a height of from 75 to 100 feet above the river; in the northern section the ascent to the upland is less abrupt, and deep cuts show the material to be of typical loess structure. The upland portion of the county varies from a gently undulating plain to a roughly rolling or hilly country. Lying in a belt 5 or 6 miles broad, and stretching from a point about 4 miles west of Morganfield, across the middle of the county to Highland Creek, on the eastern boundary of the county, is a region of gently rolling upland, with broad stream valleys and low, rolling hills. Again, in the southern section, around the

town of Sturgis and eastward through the Pond Fork district, there is a region of level land. Separating these two areas is a range of hills running in an east and west direction and acting as a minor drainage divide. Following the general course of the Ohio River is a range of hills—the river hills—where the land is more rough and broken. There are differences of elevation of from 100 to 150 feet in the more rugged parts of this area, although the slopes are not steep enough to make cultivation unprofitable. Here the stream bottoms are narrower, but usually there is a belt 200 or 300 yards wide bordering the stream courses. On the whole the topography of the upland is that generally designated as an undulating plain, and is very favorable to agricultural pursuits.

SOILS.

Seven distinct types of soil occur in the Union County area, all of which, with the exception of the Sturgis fine sandy loam, have been correlated with soil types recognized in other surveys.

The following table gives the name and area of each soil and the proportion which each is of the whole area:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Miami silt loam	154,176	66.7	Sharkey clay	4,032	1.7
Waverly silt loam	25,216	10.9	Miami fine sandy loam	3,072	1.3
Yazoo clay	24,448	10.6	Sturgis fine sandy loam	2,176	.9
Memphis silt loam	17,984	7.8	Total	231,104	

MIAMI SILT LOAM.

The Miami silt loam, the most extensive and important soil in the area, is the one locally spoken of as "the upland." It is a yellowish or gray silt loam of varying depth, ranging from 6 to 12 inches. It is mellow and open, never bakes into hard clods, and is almost as easy to plow as a sandy loam. The subsoil, however, which is met at a depth of about 10 inches, is more claylike in its properties. Exposures in road cuts show a rather stiff and tenacious red-brown loam made up largely of silt particles. Under this, at a depth of 6 to 10 feet, the soil becomes similar in texture to the surface foot, i. e., incoherent and silty and of a yellowish color. The soil is found throughout the entire upland portion of the county, where it occupies all the features of topography, varying from almost level to the most rolling and hilly areas in the district. It is a well-drained soil and at the same time possesses good water-holding properties. The surface soil is of such character as to allow rain water to enter easily, and this is stored

up in the more compact subsoil within easy reach of the roots of growing plants. On some of the steeper slopes, however, and where improper methods of cultivation have been practiced, the soil suffers considerably from washing. With care this can be prevented, and even where washing has commenced, if taken in time it can be considerably checked by filling the gullies with straw or by plowing under sufficient quantities of organic matter. If more humus was incorporated annually with the soil, in the form of barnyard manure or decayed wheat straw, of which there is an abundant supply, the tilth of the soil would be so improved as to prevent this washing in a large measure. It is believed that some of the more hilly portions might be profitably made into permanent pastures by sowing to blue grass. Blue grass has been tried with good success in a number of cases.

The whole area of this soil, which is of loess origin, rests unconformably on the underlying sandstone or sandy shale, or upon the residual product of their disintegration. The average thickness of this covering of loess is about 20 feet, though where it has been subjected to more active erosion it is sometimes no more than 2 or 3 feet thick. There are comparatively few rock outcrops and seldom is a stone fragment seen on the surface. A few exceptions to this rule occur in the southern portion of the country, where narrow strips, too small to be indicated on the soil map, are characterized by the presence of considerable quantities of shale, which has worked up from the immediately underlying rock.

The crops at present grown on the Miami silt loam are wheat, corn, grass, and tobacco. The yield of all these crops is good, maintaining an even average through the various seasons. Corn will produce from year to year about 35 bushels per acre, and in good seasons as high as 50 bushels per acre. The quality of the wheat on the upland is superior to that grown on any other soil, though the average yield of 18 to 20 bushels per acre is exceeded by some of the bottom lands. An excellent quality of tobacco of the heavy export type is grown, the product being from 1,000 to 1,500 pounds per acre, with an average yield of 1,100 or 1,200 pounds per acre. Clover has been the great hay crop of this country, but of late the farmers have had difficulty in obtaining a good stand. It is probably an instance of the soil becoming "clover sick," a condition of not uncommon occurrence, and remedied, so far as we now know, only by substituting some other crop for a number of years. Stock peas are being sown quite extensively and are meeting with increasing favor as a forage crop. It is believed that alfalfa might profitably be added to the grass crops raised on this soil, and it is hoped that careful and thorough experiments with this may be made.

All the common fruits do well, though none are grown for the outside market. Peaches would do well on the shaly slopes in the southern portion of the area, and if entered upon on a sufficiently large

scale to render marketing economical the industry might be introduced with profit.

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

Mechanical analyses of Miami silt loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
6869	1 mile E. of Morganfield.	Silt, 0 to 9 inches...	1.18	0.18	0.42	0.28	0.66	7.62	82.86	7.42
6529	½ mile E. of Morganfield.	Silt, 0 to 11 inches..	1.39	.00	.12	.23	.59	9.70	81.30	8.00
6871	1 mile E. of Uniontown.	Silty loam, 0 to 10 inches.	1.09	Tr.	.30	.24	.52	6.08	81.38	11.16
6530	Subsoil of 6529.....	Silt, 11 to 36 inches.	.39	.00	.23	.31	.62	5.77	76.90	16.60
6872	Subsoil of 6871.....	Silty clay, 10 to 36 inches.	.42	Tr.	.14	.46	.38	4.68	72.88	20.68
6870	Subsoil of 6869.....	Silty loam, 9 to 36 inches.	.42	.06	.40	.30	.64	6.98	67.52	23.70

WAVERLY SILT LOAM.

The Waverly silt loam, which is designated by the farmers as "black bottom," is found in all parts of the upland division of Union County. The principal areas are found on the southeastern border of the area, occupying the level country lying southward from the Pond Fork, and in the eastern section along the broad, level bottoms of Highland and Caseys creeks. In texture the soil is eminently adapted to agriculture. It is a dark, almost black, silt loam, plastic like a clay loam when wet, but mellow and loamy when dry. The soil, which varies little to a depth of 12 to 15 inches, is underlain by a plastic black or drab clay loam. A profile generally shows, at from 3 to 5 feet below the surface, a yellowish silt loam which closely resembles in character the subsoil of Miami silt loam and is probably of the same material.

The physiography and physical character of the soil suggest its origin to be a combination of shallow-water deposition and marsh accumulation. It is said that much of this land, now well drained and free from overflow, was once covered with shallow, nearly stagnant water for a greater part of the year. It was thickly forested, however, and falling leaves and decaying vegetable matter were mixed with the sediments brought down by the rain waters. It is probable that this soil originally occupied all the stream bottoms, for it is usual to find it underlying other bottom soils, as though these had been recently washed on.

This soil is liable to be wet unless underdrainage is practiced. Much of it is underdrained, though where the bottom is narrow it is often sufficient simply to deepen and straighten the stream course. A good quality of tile, manufactured within the county, is easily available, and land can be tile-drained at a net cost of 55 to 80 cents per rod, the price varying according to size of tile used.

Practically all the crops grown within the area do well on this type of soil. Corn averages nearly 60 bushels per acre and occasionally produces as high as 75 or 80 bushels. It is also eminently adapted to grass; both clover and timothy give good yields. Wheat in favorable seasons will make 25 to 30 bushels per acre, with an average yield of 20 bushels, but the quality of the wheat is not so good, as a rule, as that raised on the Miami silt loam. The straw is very heavy and liable to lodge. Tobacco yields are heavy, 1,300 pounds per acre being a fair estimate of the average; but this, too, is not always of the best quality, and the larger yield is counterbalanced by the lower price which it brings in the market. On the whole, the soil is best adapted to the raising of corn and grass.

Mechanical analyses of the soil and subsoil of this type are given in the following table:

Mechanical analyses of Waverly silt loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
6531	1 mile N. of Seven Guns.	Silty loam, 0 to 14 inches.	1.28	0.00	0.25	0.14	1.21	9.37	85.50	3.48
6879	4 miles NE. of Morganfield.	Loam, 0 to 10 inches.	2.93	.32	.16	.18	.60	2.10	92.54	3.58
6877	3 miles NE. of Waverly.	Silty loam, 0 to 12 inches.	2.57	.36	.46	.30	.50	6.00	80.48	11.50
6532	Subsoil of 6531.....	Silty loam, 14 to 36 inches.	.94	.27	.31	.41	1.68	5.53	84.75	7.05
6878	Subsoil of 6877.....	Silty loam, 12 to 36 inches.	1.22	.36	.70	.32	.36	5.90	84.52	7.42
6880	Subsoil of 6879.....	Clay loam, 10 to 36 inches.	1.20	.56	.70	.26	.40	1.66	87.56	8.44

SHARKEY CLAY.

Sharkey clay is a soil of comparatively limited extent. The principal areas of it lie in the southeast, in what is known as the Pond Fork district along the North Fork of the Tradewater River. Other small areas are found in the southwest, near Henshaw, and there are a few narrow strips of it occurring in the Ohio River bottoms.

This soil, sometimes called "gumbo land," is a heavy drab or dark-

brown clay, impervious and very difficult to work. It bakes hard in the sun and when plowed up wet forms compact clods which crumble and fall to pieces like quicklime when the rain falls on them. The coarse, granular structure produced by this "slaking" gives rise to the term "buckshot land," which is often used to designate this condition of the soil. The soil is about 6 inches deep and is underlain by a stiff, waxy clay subsoil, usually of a dark bluish-gray color or mottled.

The principal areas of Sharkey clay are found along the level bottoms of the stream courses. Little of it is under cultivation. It is generally wet and in need of drainage, being subject to overflow. Most of the areas of Sharkey clay are covered by a dense growth of timber, but some portions of newly cleared land were met with where corn was being grown, and good yields of this crop are reported. At first it is very difficult to turn this soil, even with a steel plow drawn by 3 or 4 horses, but after a few years of cultivation, especially when the land has been drained by ditching and tiling, the soil becomes quite mellow and loamy, very closely resembling, if not identical with, the Waverly silt loam. Indeed, much of the soil mapped as Waverly silt loam was originally in the condition of the Sharkey clay, but has been so changed in character through a long period of cultivation and drainage that it is now recognized as a distinct type with widely differing properties. Thus the expenditure of labor and money in the improvement of these lands will bring a sure return in a soil of lasting fertility.

It is probable that this soil was accumulated as a sediment deposited in shallow water when the low-lying portions of the country were covered with boggy lakes. That it has been subjected to swamp conditions is evidenced by its dark color and the comparatively large percentage of organic matter which it contains.

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

Mechanical analyses of Sharkey clay.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
6623	3 miles E. of Sturgis.	Clay loam, 0 to 6 inches.	5.77	0.34	0.70	0.54	2.20	4.60	55.64	35.64
6624	Subsoil of 6623.....	Waxy clay, 6 to 36 inches.	1.35	.10	.50	.38	1.74	5.00	60.00	32.18

STURGIS FINE SANDY LOAM.

The only sandy soil in the upland section of the area is the Sturgis fine sandy loam. The soil to a depth of 12 inches is a fine sandy loam, brown or reddish in color, and composed of a mixture of fine sand and silt. In a few limited areas this varies to a medium sandy loam composed almost entirely of sand. The subsoil is a sticky, yellowish, fine sandy loam grading into a heavy, tenacious silt very similar to the subsoil of the Miami silt loam. This silt subsoil is met at a depth varying from 2 to 4 feet and appears to be the original surface soil upon which a layer of sandy sediment has been deposited. This type of soil is found only in comparatively limited areas. It occurs in a belt a mile or two wide along Cypress Creek in the southern portion of the county. The surface is level or gently undulating.

As stated before, this soil stands alone of all the upland soils in being of a distinctly sandy nature, so the question of its origin is not quite clear. The process of its formation was probably one of deposition by flowing waters. At an earlier stage in its development Cypress Creek probably overflowed its banks at times of heavy floods and spread out over the level valley through which it flows. The water, carrying with it particles of sand and silt in suspension, deposited these when the widened course of the stream allowed the water to flow more slowly, and the coarser particles were laid down first near the banks. The grading from coarser to finer material in the soil from the present bank of the stream outward supports this view.

The Sturgis fine sandy loam is a well-drained soil, but because of its more open texture it is more likely to suffer from drought than the other upland soils. This is especially true on the ridges, where the soil contains a smaller admixture of silt.

The crops at present grown are those general throughout the area—corn, wheat, and grass. Corn produces from 25 to 35 bushels and wheat an average of 15 bushels per acre. It is not as good land for grass as the heavier bottom lands, but it is thought that alfalfa might be more successfully grown than either clover or timothy, while the more sandy ridges are perhaps better adapted to the production of watermelons than to the crops at present cultivated. However, the total area occupied by this type is not large enough to make it of much importance.

The table on the next page shows the texture of the soil and subsoil of this type.

Mechanical analyses of Sturgis fine sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
6625	1 mile S. of Sturgis.	Fine sandy loam, 0 to 12 inches.	0.64	0.00	0.10	0.20	39.34	27.50	24.96	7.40
6626	Subsoil of 6625.....	Silt and sand, 12 to 36 inches.	.21	.00	.14	.20	30.42	27.82	24.28	16.96

YAZOO CLAY.

The Yazoo clay is the principal river bottom soil. It covers an area of about 38 square miles, stretching in an unbroken belt along the Ohio River from the northernmost extremity of the county to the Tradewater River, which forms its southern boundary. About half the area of this soil is at present under cultivation, the remainder being for the most part heavily timbered. It is separated from the upland by the "bluff" or "river hills," while a narrow strip of Miami fine sandy loam is usually found between it and the river banks.

Its color is of a dark-brown or tan-bark shade. There is little apparent difference between soil and subsoil, except where cultivation has influenced the physical character of the surface. It varies considerably in condition and somewhat in texture in different parts of the area. Near the bluff, where it is usually covered with timber, it is more apt to be wet and marshy. This gives it the appearance of being very heavy and tough, but under cultivation it becomes more friable, though somewhat hard to work and liable to clod and bake. Toward the river it often becomes considerably lighter through an admixture of sand. This phase, which is a stage in the gradation from the clay to the sandy loam, is considered very desirable, as it is more easily cultivated.

This soil is an alluvial deposit belonging to a recent geological period. In fact, inasmuch of the area is subject to occasional overflows that add their part to the thickness of the alluvium, it may be considered as still in process of formation. It is a strong, fertile soil capable of producing good yields of various crops. On account of the danger from overflow, however, it is planted almost exclusively to corn. For the most part the land is owned or rented by farmers having farms in the upland district, who remain on the bottoms only long enough to cultivate and harvest this crop. In places quite extensive areas of Yazoo clay occupy a higher terrace or "second bottom," where crops are practically safe from damage by high water in the spring. On such

areas wheat and other crops are planted and do remarkably well. Oats, hay, and tobacco are among those reported to yield high averages on this soil. The average yield for corn is 45 bushels per acre, with occasionally a crop of 60 to 75 bushels in favorable seasons.

The mechanical analyses of typical samples of the Yazoo clay are shown in the following table:

Mechanical analyses of Yazoo clay.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
6883	5 miles W. of Uniontown.	Clay loam, 0 to 10 inches.	2.65	0.10	0.12	0.28	0.76	1.64	66.60	29.32
6881	Near Raleigh	do	3.18	.16	.28	.30	1.24	6.58	59.94	31.50
6884	Subsoil of 6883	Clay loam, 10 to 36 inches.	1.62	Tr.	.04	.02	.46	18.52	59.74	21.68
6882	Subsoil of 6881	do	1.48	Tr.	.28	.28	2.28	11.06	49.62	36.00

MEMPHIS SILT LOAM.

The Memphis silt loam is a stream-bottom type, locally known as the "gray bottom" or "made land." The soil is a brown or yellowish-gray silt loam 12 inches or more in depth, underlain by an incoherent silt of a mealy texture. It differs in texture from the other silt soils of the area in being in no degree plastic or tenacious, but rather of the character of a very fine sand. As a rule it varies but little in texture to a depth of 3 or 4 feet, although the upper foot is usually of a more loamy nature, due to the effects of cultivation.

This soil is found throughout the whole upland portion of the area, where it lies in narrow strips along the edges of the streams. It is colluvial in origin, formed by the deposition of soil washed from the surface of the Miami silt loam. It is probable that a good deal of this type is of recent formation, having been formed since the land was settled, and it may owe its origin largely to the hand of man. It is generally underlain at a depth of from 2 to 4 feet by the heavy black soil of the Waverly silt loam, upon which it has been deposited. This heavy loam originally covered most of the upland valleys, but when the country was cleared of its protection of timber and put under the plow the rain waters drained off more rapidly, flooding the narrower stream bottoms and carrying along a large amount of the surface soil from the upland to be deposited in these bottoms. In those broader bottoms where the Waverly silt loam is the predominating type—as, for instance, in the Highland Creek bottom, on the eastern border of the

county—there is usually found a belt of the Memphis silt loam on each side of the stream, where repeated overflows have left a covering of this deposit over the original black soil.

The soil is apt to be wet and "crawfishy" unless it is underdrained. It is not a difficult soil to drain. Most of that under cultivation is tiled, the tile lines being led into the main stream, which is usually deepened and straightened. This not only provides an outlet for the tile lines, but also enables the stream the better to carry off the water at times of heavy rainfall, and so prevents overflow.

The crops chiefly grown are corn, wheat, and hay. The type is best adapted to corn, yielding an average of 40 bushels per acre, while yields of 50 or 60 bushels are often produced. Grass also does very well, but the soil is not as well adapted to the production of wheat. Some tobacco is grown, but it is liable to suffer from "frenching," and the soil is not thought to be as favorable for this crop as the upland types.

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

Mechanical analyses of Memphis silt loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
6873	Near Morganfield ..	Silt, 0 to 12 inches ..	1.06	Tr.	0.34	0.14	0.98	8.74	82.78	6.04
6875	2 miles S. of Morganfield.	.....do.....	1.09	.40	.44	.28	.80	3.40	83.06	11.52
6874	Subsoil of 6873.....	Silt, 12 to 36 inches .	.46	Tr.	.06	.16	2.04	11.08	78.14	7.76
6876	Subsoil of 6875.....	.....do.....	1.84	.20	.56	.78	6.04	9.20	75.02	7.88

MIAMI FINE SANDY LOAM.

Miami fine sandy loam is the name given to the least important of the river-bottom soils. It is a red-brown or yellowish sandy loam of medium texture, but varies considerably in the percentage of clay it contains. A typical profile shows the mellow sandy loam 10 inches in depth overlying red sand. Sometimes clay loam is met at a depth varying from 1 to 4 feet. Often the soil is a loose, incoherent sand, resembling beach sand, and this phase is sometimes devoid of vegetation. The soil occurs in low ridges, usually very narrow, immediately bordering upon the Ohio River. The areas of this type are, as a rule, higher than the Yazoo clay which lies adjacent to them. These sands are the product of alluvial deposits laid down during the inundations which frequently occur. As long as the swollen stream is con-

fined within its narrow channel the flow is so swift that the coarse particles are held in suspension, but as soon as the overflow takes place and the water, spreading out over the broad, level bottoms, is retarded in its rate of flow, the sediment is dropped, the sand being the first to be laid down. Farther from the banks, where the flow is still more sluggish, silt and clay particles are deposited, forming the clay loam soils.

Nearly all of this soil is under cultivation, though there are some local areas of nearly pure sand upon which no crops are grown. Corn is the principal crop, and where there is a considerable proportion of clay in the soil an average yield of 40 to 45 bushels per acre is secured. Watermelons are also grown, and many small patches too sandy for other crops produce excellent melons. The soil is eminently adapted to the growing of garden vegetables and has the added advantage of being located close to the river, affording easy transportation facilities. It would seem that a trucking interest might profitably be started here.

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

Mechanical analyses of Miami fine sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
6885	6 miles NE. of Uniontown.	Fine sandy loam, 0 to 10 inches.	1.25	Tr.	0.30	0.12	14.88	47.38	22.58	14.02
6886	Subsoil of 6885.....	Medium sand, 10 to 36 inches.	.89	Tr.	.14	.16	46.24	41.50	6.26	5.02

AGRICULTURAL CONDITIONS.

Union County is distinctly an agricultural community. The degree of prosperity among the farming classes is above the average for the country at large. The fertility of the soils, together with the thrift of the owners, has made the farmer of this community a prosperous man and has brought within his reach the comforts and many of the luxuries of life.

As a rule the farms are worked by the owners, though renting on shares or for a stipulated money rental is not uncommon. The farms are generally small, ranging from 75 to 200 or 300 acres, with an average of about 100 acres.

The agricultural pursuits of the county are quite diversified, and no one product can be spoken of as the chief interest of the community.

Wheat, corn, tobacco, and hay are extensively grown, and all yield good returns. Although one farmer or one district may produce one of these practically to the exclusion of the others, still the rule is to vary the crops and practice a system of rotation. The most usual succession is wheat followed by clover, which, after being allowed to stand as pasture or meadow for two or three years, is followed by corn.

It is a country where anything like a total failure of crops is unheard of, even when there is a great shortage in other sections. The soil, which is naturally strong and fertile, is kept up by the growing of clover and other favorable crops and by the practice of proper cultural methods. Considerable stock is kept on all the farms. The production of large quantities of corn, wheat, and tobacco, which require horse cultivation, naturally leads to the keeping of a good many horses and mules. The raising of cattle and hogs is an industry of large and increasing importance. All these things have an important bearing on soil problems, for where stock is fed on the farm and the products of the soil are returned to it in a large measure as barnyard manure there is much less danger of exhausting the native fertility of the land.

In connection with the keeping of stock, some suggestions might be made as to possible improvements. In the first place, the barns and stables are, as a rule, poorly constructed, as is too often the case where the climate is mild. Where cattle must be housed through the winter these structures do not furnish adequate shelter during the few weeks of severe weather. The barns, which are without foundations, have no floors, and the stable manure is allowed to accumulate in the stalls for weeks and months at a time, instead of being thrown out into compost piles. Large stacks of wheat straw are annually burned in the field, merely to get rid of them. It would be well to utilize this large quantity of organic fertilizer; for though it may contain little real plant food, still if it were used for bedding stock and incorporated with the stable manure, or allowed to decay in piles and then applied to the land, it would be of great benefit in adding humus and improving the tilth of the soil. Such treatment is greatly needed by the soils in some of the hilly sections, where washing is liable to occur.

Permanent pastures are few, and it is thought that a change for the better might be made in this respect. The rule now is to pasture clover fields the second year, and sometimes the first year, while stock is often grazed on the young wheat in early spring. Blue grass does remarkably well, and in the few cases where permanent pastures have been sown to it they have given very satisfactory results. In those regions that now suffer serious erosion on account of the cultivation of grain and tobacco permanent pastures would be particularly serviceable in checking such deterioration of the land.

Fruit is found throughout the whole county, and many varieties do unusually well. Little or none is raised for the foreign market, but

each farm has a small orchard near the house which supplies the domestic need. Apples, peaches, and plums, with grapes and some small fruits, are the kinds chiefly grown. Conditions seem especially well adapted to apples, and in the eastern section near the Henderson County line there are several small, well-kept orchards that yield good returns. Several winter varieties are successfully grown and can be shipped with profit to outside markets.

Much of the bottom lands throughout the county, which were originally wet and unfit for crop production, have been reclaimed by thorough systems of drainage. There are large areas still remaining which when thus improved will develop into most productive farms. The usual method of drainage in the small stream bottoms is to deepen and straighten the stream bed to carry off the surplus water and prevent overflow at times of heavy rains. Where the bottom is narrow this may suffice, but generally lines of tile are laid laterally, leading into the central ditch. Through several of the broader bottoms an outlet ditch is constructed by the county. The community desiring an outlet drain petitions the county court; and if the petition is granted, the construction is carried on under the supervision of county officers, and a tax is levied upon the property benefited. Little or no drainage has been practiced on the Ohio River bottoms, but there is a good deal of marshy land there that might be rendered valuable by proper methods of drainage.

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