

Issued March 13, 1912.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE UNIVERSITY OF MISSOURI AGRICULTURAL
EXPERIMENT STATION, F. B. MUMFORD, DIRECTOR; CURTIS F.
MARBUT, IN CHARGE SOIL SURVEY.

SOIL SURVEY OF PEMISCOT COUNTY,
MISSOURI.

By A. T. SWEET, C. J. MANN, AND H. KRUSEKOPF, OF THE
U. S. DEPARTMENT OF AGRICULTURE, AND E. S. VANATTA
AND H. G. LEWIS, OF THE UNIVERSITY OF MISSOURI.

HUGH H. BENNETT, INSPECTOR IN CHARGE.

[Advance Sheets—Field Operations of the Bureau of Soils, 1910.]



WASHINGTON:
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1912.

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LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., August 9, 1911.

SIR: During the field season of 1910 the survey of Pemiscot County begun in 1909 was completed. The selection of this area was made after a conference with the State authorities, with whom the Bureau of Soils is cooperating. Pemiscot County is located in the lowland section of southeast Missouri, much of which formerly was in a poorly drained condition and uncultivable. Many of the soils are very productive, and since the installation of drainage systems, the extension of which continues, great progress has been made in agriculture. The differentiation of the soils by the bureau should lead to greater diversification of crops and the adjustment of soil types to crops grown. Cotton, corn, and alfalfa are the principal crops raised at present.

I have the honor to recommend that the accompanying manuscript report and map be published as advance sheets of Field Operations of the Bureau of Soils for 1910, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

HON. JAMES WILSON,
Secretary of Agriculture.

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MAP.

Soil map, Pemiscot County sheet, Missouri.

SOIL SURVEY OF PEMISCOT COUNTY, MISSOURI.

By A. T. SWEET, C. J. MANN, and H. KRUSEKOPF, of the United States Department of Agriculture, and E. S. VANATTA and H. G. LEWIS, of the University of Missouri.

DESCRIPTION OF THE AREA.

Pemiscot is the southeast corner county of Missouri, being a portion of that part of the State which extends south of the thirty-sixth parallel. This southern projection of the State extends from the thirty-fifth parallel on the south to the thirty-sixth parallel on the north and from the St. Francis River on the west to the Mississippi River on the east. Of this area, Pemiscot County occupies approxi-

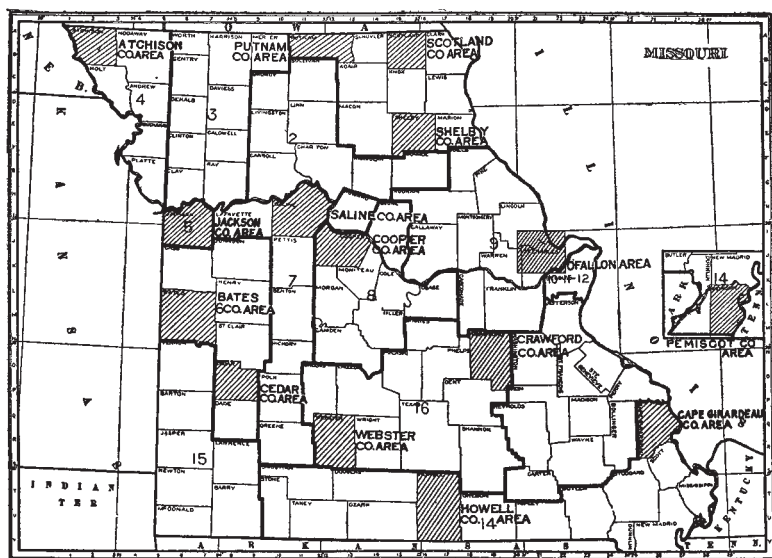


FIG. 1.—Sketch map showing location of the Pemiscot County area, Missouri.

mately the eastern half and is bounded on the east by the Mississippi River, on the south by Arkansas, and on the west and north by Dunklin and New Madrid Counties of Missouri. It has an area of 488 square miles, or 312,320 acres.

Pemiscot County and this southern extension of the State as a whole belongs to that lowland or river bottom region which, beginning immediately below Cape Girardeau, covers the southeast portion of Missouri and extends into Arkansas and Louisiana. On the

eastern side of the Mississippi River the same stretch of lowland extends across the southern part of Illinois and the western part of Kentucky, Tennessee, and Mississippi. In this report only the portion west of the Mississippi and north of the southern boundary of Missouri will be considered. This region is commonly referred to as the "Lowlands" of southeast Missouri. (See fig. 2.)

For a clear understanding of any portion of this lowland region a comprehensive idea of its topography and drainage as a whole is necessary.

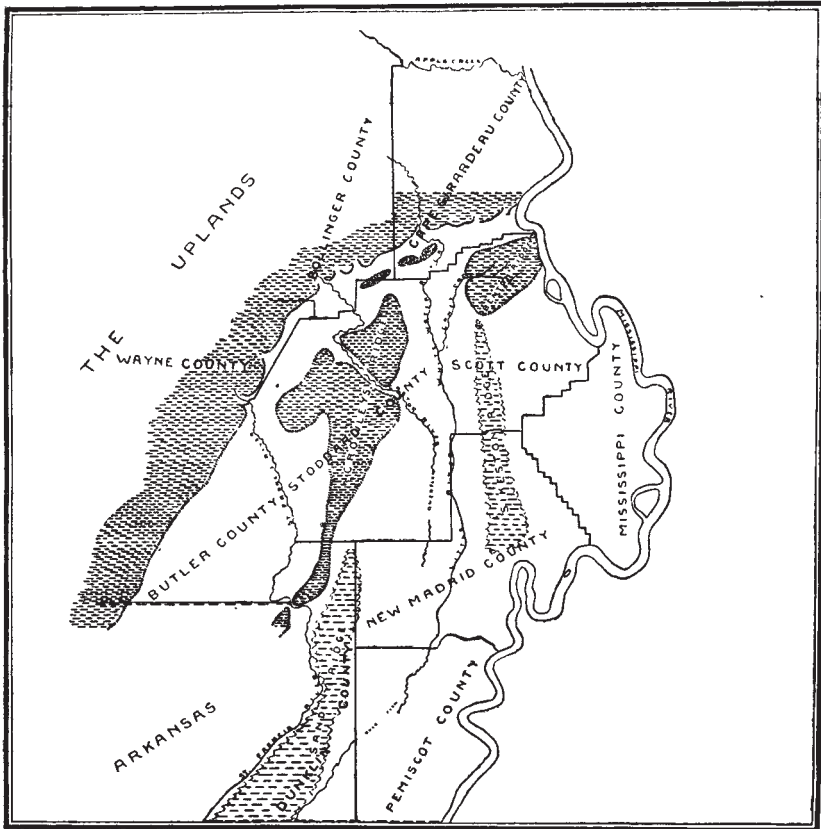


FIG. 2.—Showing lowlands of southeast Missouri.

From St. Louis to Cape Girardeau the flood plain of the Mississippi River varies in width from less than a mile to a maximum of about 6 miles. The average width is between 4 and 5 miles. In places there is no bottom land on the Missouri side, rocky bluffs coming to the river's edge. A short distance below Cape Girardeau this flood plain widens rapidly or else joins a wide lowland which appears to be an extension of the Mississippi flood plain. At a distance of 10 miles south of Cape Girardeau an east-and-west line reaching from

the present channel of the Mississippi to the western edge of the lowlands would extend over 30 miles, while a similar line 35 miles south of Cape Girardeau, in the latitude of Poplar Bluff, would be nearly 70 miles long, a part of the widening in this case being due to an eastward swing of the Mississippi River.

On the thirty-sixth parallel, the southern boundary of the larger part of Missouri, the lowlands have a width of about 53 miles, gradually widening as the western portion extends into Arkansas. The western and northern boundary of the lowlands, as shown on the accompanying sketch map (fig. 1), is sharp and well defined, and in many places consists of a steep, rocky bluff varying in height from 50 to almost 100 feet.

In the northern part of the lowlands are a number of ridges trending generally northeast to southwest or north and south. The most northern of these ridges extends from Grays Point and Commerce to the east to Oran on the south and west and is called the Commerce Hills or Benton Ridge. About 10 miles south of Benton Ridge another elevation known as Crowley Ridge begins, extending south and west into Arkansas for a distance of 40 miles. Of the same general contour Benton and Crowley ridges appear to form part of the system which formerly extended from Commerce to the Arkansas line.

North of the lowland now separating Benton Ridge from Crowley Ridge another long ridge extends southwest from Delta for a distance of 13 miles. The eastern part of this elevation is known as Hickory Ridge, while the lower and narrower part to the west is called Goose Pond Hills. In the lowland a short distance east of the northern point of Crowley Ridge are a few small isolated hills. Outcrops of limestone beds similar to those found along the bluff line of the uplands to the north and west are found on these hills and ridges. The east and south sides of Crowley Ridge and Benton Ridge are sharp and well defined and have the same general trend.

Within the lowlands in Missouri there are other ridges, but they are low, rising but a few feet above the level of the surrounding country and entirely lacking the rock structure found in the higher elevations. These low ridges have a general north and south trend and are separated by wide strips of lower area. Sikeston and Sand Ridges are the most extensive of these.

Sikeston Ridge begins near Morley, continuing almost due south to New Madrid, a distance of 30 miles. It varies in width from less than a mile at the north to more than 6 miles at the south. Southwest of New Madrid are numerous smaller ridges having a general northeast to southwest trend, which may be considered as fragments of an extension of Sikeston Ridge.

Sand Ridge leaves Crowley Ridge near Dexter and runs due south to a point about 6 miles from Kennett, where it swings slightly to the west, continuing in that direction until it passes beyond the State boundary line. The lower portion of it is cut by low-lying areas into several smaller ridges.

Extending from Crowley Ridge and Sand Ridge on the west to Sikeston Ridge and the higher land along the Mississippi River on the east is a broad belt of lowland within which are numerous smaller ridges having the same general north and south or north-east-southwest trend of the larger ridges. These are often but 3 or 4 feet higher than the adjacent lowlands, and vary in size from those which are only a few yards wide and a few hundred yards long to those which are a quarter of a mile in width and a mile or more in length.

The Mississippi River, which extends along the east side of this lowland, is the only large stream flowing through the region. Higher lands near the river prevent other direct drainage. The Whitewater enters the lowlands at Allenville, 12 miles west of Cape Girardeau, flows through the broad gap between Crowley Ridge and Benton Ridge, and unites with Castor River near the center of the lowlands forming Little River. Castor River enters the lowlands at Zalma, about 25 miles southwest of Cape Girardeau, crosses the lowland between Crowley Ridge and the upland, crosses Crowley Ridge through a deep gap, and unites with Whitewater. Little River is formed by the confluence of Whitewater and Castor, and flows due south until it reaches a point west of New Madrid, where it swings slightly west. At the northern boundary of Pemiscot County it unites with Open Bay, an old overflow channel of the Mississippi, and continues in a southwesterly direction until it passes out of the State. Little River has a fairly well defined channel until it reaches a point west of Pascola, where it broadens out into a swamp known as Little River Overflow. West of the main channel of Little River are several overflow channels, the largest being New River and Lost River. They are really broad stretches of lowland with a more or less clearly defined channel which meanders through them and is marked by sedge grass growing in the open water.

The St. Francis River enters the lowland at Wappapello, about 15 miles north of Poplar Bluff, and after flowing to the south between Crowley Ridge and the upland for 25 miles cuts through this ridge, continuing to the south on its eastern side, forming the western boundary of the southern portion of Missouri.

The origin of this lowland region has given rise to much speculation ever since it was first visited by white men. The fact that the lowlands are not occupied by any stream of sufficient size to have formed them and that the small streams of the region, Whitewater,

Castor, and the St. Francis, cross rather than follow these belts, makes the problem a most puzzling one. The broad, flat area which follows the narrower valley of the Mississippi north of Cape Girardeau and bordered by the same line of sharp bluffs has, however, been the cause of associating the Mississippi River in some way with its origin.¹

According to the explanation advanced by Prof. Marbut, the Mississippi River originally occupied the lowlands between Benton and Crowley Ridge on one side and the upland on the other. While the Mississippi occupied this lowland and was making the sharp, steep bluff with the regular curve which extends from west of Neelyville through Poplar Bluff, Wappapello, Zalma, Whitewater, and Cape Girardeau, the Ohio River swung far west of its present course, forming the steep bluff and regular curve found on the east and south side of Crowley Ridge and the Commerce Hills. At this time these two ridges were continuous, but at the place where the wide gap now occurs a small tributary of the Ohio eroding soft rock worked back until it tapped a small tributary of the Mississippi, the lower course of which was working in hard rock. By this means the Mississippi was diverted from the lowland between Crowley Ridge and the upland on the west and joined the Ohio west of the present site of Morley. It then gradually widened the gap between Crowley Ridge and Benton Ridge. Later, through the same process of small stream erosion and capture, the Mississippi again changed its course and cut through the Commerce Hills, thus reaching the Ohio by a still shorter route.

Pemiscot County is not reached by any of the higher ridges of the southeast Missouri lowlands, and with the exception of a strip of slightly higher land which extends along the Mississippi River, other narrower strips which border Open Bay and Pemiscot Bayou, and a few minor ridges the surface is uniformly low, sloping gradually to the south and west. The county has a river front of about 35 miles, but the Mississippi receives no direct drainage. Little River and Little River Overflow spread over the northwest part of the county, covering approximately one-fifth of its area.

Starting a short distance south of Hayti is a stream known as Pemiscot Bayou, which on account of its numerous wide curves has a length in this county of over 35 miles. It passes out of the county to the south about 16 miles from its starting point. Another bayou,

¹ Several theories in explanation of its origin have been advanced, but none free from serious criticism have been found until Prof. C. F. Marbut, of this department, in 1902 published a monograph (Vol. I, No. 3, The University of Missouri Studies. The Evolution of the Northern Part of the Lowlands of Southeast Missouri), based on a series of careful researches covering a period of several years, in which he seems to have given the true explanation of their origin, or at least one which is less open to criticism than any other heretofore advanced.

known as Elk Chute, starts northeast of Pascola and flows to the south and west until it passes out of the county. Pemiscot Bayou, Elk Chute, Open Bay, and numerous smaller bayous are distributaries, or streams flowing from the Mississippi River, formed by overflow from that stream before the lowlands were protected by a levee. At present they carry off much of the normal rainfall, and in many cases have been deepened by dredging and used as parts of the artificial drainage systems.

The narrow strips of higher ground bordering these bayous are usually found only on one side, but in some places occur on both sides. These ridges are usually higher on the bayou side and occur on the outside of the wide curves or meanders. In some places small bayous have built up natural levees of this kind several feet above the surrounding soil and have then abandoned them, leaving a V-shaped trench on the top of a ridge.

Formerly there were numerous lakes in Pemiscot County, but with the exception of Little River Overflow and a few lakes on the river side of the levee all of these have been partly or entirely drained.

In 1870 Pemiscot County had a population of 2,059. In 1890 the population was 5,975. In 1900 it had increased to 12,115, and the census of 1910 showed a further increase to 19,559, an increase of over 61 per cent in the last 10 years and of over 225 per cent in the last 20 years. This indicates rapid development, especially for a county having no large towns or cities and in a State where the rural population as a whole during the last 10 years has fallen off.

There is now approximately one person for every 16 acres of land in the county, but since much less than one-half the county is cleared and under cultivation it will be seen that the population of the cultivated portion is quite dense. After making allowance for those living in the towns and for those who work in the timber the population for the cultivated areas will probably average 40 or 50 persons to the square mile.

Agriculture was the principal occupation of the early settlers and in 1880 about 2,500 acres were planted to cotton, 5,000 acres to corn, with a small acreage devoted to wheat, oats, and garden truck.¹ The splendid forest resources, however, soon led to the establishment of numerous saw and planing mills and stave factories. Lumbering for several years has been the principal industry of a large part of the county. As the forests were cut off the agricultural development of the county followed, being stimulated by heavy immigration, which still continues.

The greater number of the older settlers came from Kentucky and Tennessee and many still come from those States and from Arkan-

¹ Missouri Agricultural Report, 1880-81, p. 215.

sas. At present a large percentage come from farther north in Missouri and from Illinois, Indiana, and other northern and eastern States.

A few of the plantations in the vicinity of Caruthersville are farmed by negro tenants, but the negro population of the county as a whole is small, representing only about 6 per cent of the total number of inhabitants.

Pemiscot County is well supplied with railroads, the main line of the St. Louis & San Francisco from St. Louis to Memphis crossing it from north to south, while another line of the same road crosses it near the center from east to west. This road also has a line extending from Deering through Pascola to Wardell. The Mississippi Valley Railroad extends from Tyler through Steele and beyond the county line to the west. A branch of this road leaves the main line near Cooter and extends into Arkansas to the south. The St. Louis & Deering Southwestern is at present under construction from Caruthersville to Deering, from which point it extends to the southwest into Arkansas. Many of these lines were built primarily for the lumbering business, but as this industry has decreased through the cutting off of the timber, other industries have been developed, so that few, if any, of these lines will suffer from lack of business when the timber resources are exhausted. Although the facilities offered by many of these lines are poor, they serve as a means of getting supplies into and products out of the country. The Lee Line and other steamboats also offer cheap river transportation.

St. Louis and Memphis are the principal market points of the county, St. Louis being approximately 200 miles from the northern boundary and Memphis 80 miles from its southern boundary. Freight rates to either point, even on perishable products, are not high.

The principal towns of the area are Caruthersville, Hayti, Steele, Holland, Tyler, and Cooter. All of these have two or more cotton gins, and there are several other gins in the county. Caruthersville also has a cottonseed-oil mill of large capacity, stave factories, and other industries. Deering is the center of a large lumber industry. Pascola has a large stave mill, and almost every town in the county is the shipping point for one or more large sawmills.

CLIMATE.

The climate of Pemiscot County and of the southeast Missouri lowlands as a whole is somewhat different from that of central and northern Missouri, being slightly warmer both in summer and winter. It has slightly heavier precipitation, with greater humidity and a longer growing season.

The mean temperature at Caruthersville as given by the United States Weather Bureau for 13 years is 38.1° for the winter months, 59.5° for the spring months, 78.3° for the summer months, and 59.7° for the fall months. February has the lowest mean temperature, 36.2°, and July the highest, 79.3°. The highest temperature recorded at Caruthersville in 9 years was 107° and the lowest 22° F. Extremely low temperatures are very uncommon. The average date of the last killing frost in spring for a period of 13 years is April 5; of the first killing frost in autumn for the same period, October 21. The number of days with no frost is estimated for the entire section at 201,¹ thus giving a growing season sufficiently long for maturing cotton, for obtaining four or five cuttings of alfalfa, and for raising two or more crops of garden truck.

The average precipitation at Caruthersville for a period of 30 years is 45.32 inches, distributed rather uniformly throughout the greater part of the year, the mean average for March being the highest and for October the lowest.

Health conditions in the southeast Missouri lowlands have not been very good, due in part to the large amount of land lacking natural drainage, and to the unsanitary conditions under which many of the people live. Drainage conditions are being rapidly improved, and the person who will take every precaution to make his home surroundings sanitary and will eat food suited to the climate need have little to fear from malaria or other ills of the country.

AGRICULTURE.

Practically all of Pemiscot County was heavily timbered at one time. This growth consisted of white, red, black, willow, and other varieties of oak, sweet and tupelo gum, hickory and pecan, black walnut, sycamore, cottonwood, soft maple, ash of several varieties, willow, sassafras, hackberry, box elder, elm, ironwood, pawpaw, locust, persimmon, and cypress.

The transition to agriculture has necessarily been somewhat slow, but has been much more rapid than was often the case in clearing the forested areas of the Eastern States, for here a farm is often cleared and practically all the stumps removed in from five to seven years. This difference in the time required for clearing is due to several causes. In the lowlands of this region, owing to rapid growth, the wood is soft and decays more rapidly than where it has grown under more rigorous conditions. The humid atmosphere favors rapid decay. Owing to a high water table the trees do not root deeply; hence the roots soon decay and the stumps can be removed. Then, too, much of the land has been cut over by large lumber companies,

¹ Report of the U. S. Weather Bureau.

which have removed the salable timber from large areas in a single season.

After all the timber has been removed, there still remain many standing trees, the tops of those which have been cut, logs which have been on the ground for years, and often considerable growths of small trees, underbrush, and briars. The cost of clearing varies greatly, depending upon the character and amount of the timber, the amount of underbrush, the number of large logs on the ground, and the size of the trees left standing, but the average cost at the present price of labor is probably between \$10 and \$15 an acre.

It was formerly the practice to deaden all timber on land which was to be cleared and leave it from two to five years before making any further attempt at clearing. By this time much of the timber would be entirely decayed and the remainder so light and dry that it could easily be disposed of. This method, owing to the increasing demands for cleared land, is giving way to speedier methods. After land has been cleared, it is usually put into corn for one or two years, after which it may be planted to cotton.

No data are available showing the amount of cleared and un-cleared land in the county at the present time, but a conservative estimate would place the cleared area at considerably less than one-half; it is probably not much over two-fifths. This area, however, is being rapidly extended and small clearings and deadenings are to be found scattered throughout the better drained portions of the timbered areas.

The first year after Little Prairie was settled, we are told, 14,040 bushels of corn was raised,¹ and corn has continued to be one of the staple crops of the county ever since. The estimated yield of corn for the year 1909² was 567,791 bushels, an average yield of 31 bushels per acre. This is a remarkable showing when the conditions under which much of this corn was grown are considered. Many fields planted to corn are thickly scattered with large dead or dying trees. The seed bed is not usually well prepared. Much corn is cultivated only twice, some only once, and little attention is given to the selection of seed corn. Even under these conditions yields of from 60 to 75 bushels per acre are not uncommon.

The corn production of Pemiscot County can be very greatly increased. To do this, on lands which have been farmed for a few years, corn should take a regular place in a rotation, following a leguminous crop. Better preparation of the seed bed and more thorough cultivation are necessary. The proper selection and care of seed corn will also materially increase the yield.³

¹ Houck's History of Missouri, Vol. III, p. 238.

² Missouri Bureau of Labor Statistics, 1909-10, pp. 152-153.

³ Corn Growing in Missouri. Bulletin State Board of Agriculture and Bulletin No. 88, Co-operative Variety Tests of Corn, College of Agriculture, both offer helpful suggestions on this subject.

Cotton has also been raised in Pemiscot County for several years and is at the present time the principal money crop of the area, the yield for 1909 being as follows:¹

Cotton, baled.....	pounds..	4, 998, 500
Cottonseed hulls.....	do.....	4, 534, 000
Cottonseed linter.....	do.....	134, 000
Cottonseed meal.....	do.....	5, 014, 000
Cottonseed oil.....	gallons..	253,919
Cottonseed grabots.....	pounds..	21, 900

A fair crop of cotton averages from 700 to 1,200 pounds of cotton in the seed per acre and yields considerably higher than this last amount are not uncommon, the average yield for the county being estimated at between 800 and 1,000 pounds per acre.

Owing to the amount of handwork used in hoeing and chopping, the labor necessary to grow a crop of cotton, aside from the picking, is somewhat greater than that required to produce a crop of corn, but under the same conditions is less than twice as much. The price for picking during the last year was from 75 cents to \$1 per hundred, and a good hand can pick from 200 to 350 pounds per day. One man and team, under average conditions, with a small amount of help at chopping time and help in picking, can grow about 20 acres of cotton. The last year the price of seed cotton at the gins in Pemiscot County ranged from 4½ to a little over 5 cents a pound, the average price being about 4¾ cents for the season. Under average conditions and ruling prices cotton offers a very attractive money crop, with fairly large profits. In fact, the cotton industry in Pemiscot County has become so profitable that it has prevented to a considerable extent the introduction of other crops.

In the growing of cotton there is much ground for improvement. Little attention is given to the selection of seed, the common practice being to buy mixed seed at the gins. This mixed seed consists of seed from several plantations and of several different varieties. Much might be done to improve both the yield and the quality of fiber through careful selection and breeding. An authority on cotton growing² says:

The day when any cotton planter can afford to plant just any variety of any sort of seed has truly passed.

Another cause of indifference as to the quality of cotton produced is the custom in this section of selling all cotton in the seed, by which the grower of good staple receives only a slightly higher price than does the man who grows a poorer grade.

¹ Annual Rept. Mo. Bureau of Labor, 1910, pp. 152-153.

² Cotton, by C. W. Burkett, p. 94.

Many fields in the older settled portion of this county have been in cotton almost continuously for 30 or 40 years, and although fair results are still obtained, this can not continue unless some system of crop rotation which will maintain or increase the productiveness of the soil is adopted. The following rotation would be found well suited to many portions of the area: First year, oats or wheat. This should be harvested, the land well disked, and put at once into cowpeas, which should be cut for hay, and the land plowed. The second year cotton is planted, and the third year corn with cowpeas between rows, the land plowed and put into wheat in fall or oats in spring.

The methods of fencing and renting cotton lands discourages the growing of other crops or crop rotation. Much land used for cotton is held in large tracts, the improvements consisting of a fence around the entire plantation and several tenement houses scattered over it. Fields are divided by roads and little or no provision made for pasture or for keeping any live stock except teams used in farming the place. Feed for these is often bought. Leases are often made for but one year at a time, so that the tenant does not know whether he will be allowed to stay another year or will be compelled to move on and give place to some one who will pay higher rent, for there are more farmers than farms.

The ordinary terms of crop rent in Pemiscot County are one-third of the corn and one-fourth of the cotton. When the owner of the land furnishes the team, seed, and farming implements he receives half the crop, but pays for picking half the cotton. The customary cash rent for good cotton land has been \$5 an acre, but within the last two years the scarcity of land has resulted in rentals of \$6 and even \$7 an acre being paid in some sections.

The farm unit for rented lands in this section is 40 acres, the larger holdings usually being divided into farms of this size with a set of buildings on each. The farms which are cultivated by the owners are of the same size or larger.

Next to cotton and corn, alfalfa¹ is the most important crop of the county, and the area devoted to it is being gradually extended. Four or five cuttings a season are obtained, the yield per acre averaging about a ton to each cutting. Some trouble is occasionally experienced in curing the first cuttings, but on account of the demand for hay in this section and the high prices paid the crop is a very profitable one. Where the soil is sufficiently drained clover does well. Little attention appears to have been given to timothy. On the heavier soils it should yield good crops. Bluegrass is almost unknown in

¹ See Circular 40, The Seeding of Alfalfa, and Bulletin No. 72, Alfalfa Growing in Missouri, Missouri Experiment Station.

the county, yet in a few places small areas of fine bluegrass were seen. White clover is found along the roads and railroads wherever there has been a chance for it to get a foothold. Bermuda grass makes a dense and luxuriant growth.

Cowpeas¹ are planted extensively in Pemiscot County, and grow luxuriously wherever planted. The common practice is to plant them in rows with the corn or between the rows after the corn has been laid by. They are used as pasturage for hogs with the corn, or after the corn has been gathered. This crop² should be sown more extensively for hay, and on the sandier soils should be plowed under green, to add humus and to improve the soil texture. Soy beans³ are another valuable legume crop suited to this section. Rape⁴ also is a good forage crop for hogs, especially when used in combination with grain.

As a result of these observations it appears that the scarcity of pasturage and of hay crops is due entirely to lack of effort to raise such crops and not to unfavorable conditions of either soil or climate.

Trucking as yet has received little attention. On the well-drained fine sandy and silty soils, and especially where soils of this kind have been recently cleared, ideal conditions exist for this form of agriculture. Watermelons⁵ are grown extensively in other counties of the lowlands and may be grown here with equal success. The sandy ridges offer ideal conditions for growing sweet potatoes⁶ and peanuts⁷ on a commercial scale. Tomatoes, sweet corn, cucumbers, peppers, asparagus, pumpkins, and other canning products could undoubtedly be raised here with profit. Bramble berries and strawberries⁸ are also attractive crops. They would provide opportunity for utilizing idle labor, which is now used mainly during cotton chopping and picking seasons.

Little attention has been given to orchard crops, and results obtained so far have not been very encouraging, yet if proper care were employed in cultivating, pruning, and spraying it seems quite probable that on the higher sandy, well-drained soils, peaches might be grown profitably on a commercial scale, and fruits of all kinds suited to this latitude could undoubtedly be grown for family use.

¹ Growing Cowpeas in Missouri, issued by the Missouri State Board of Agriculture, gives valuable suggestions on this crop.

² Farmers' Bulletin 278, United States Department of Agriculture, Legume Crops for Green Manure.

³ Farmers' Bulletin No. 372, United States Department of Agriculture, Soy Beans.

⁴ Farmers' Bulletin No. 164, United States Department of Agriculture, Rape as a Forage Crop.

⁵ See Farmers' Bulletin 193, United States Department of Agriculture, Watermelon Culture in Georgia.

⁶ See Farmers' Bulletin 324, United States Department of Agriculture, Sweet Potatoes.

⁷ See Farmers' Bulletin 356, United States Department of Agriculture, Peanuts.

⁸ See Farmers' Bulletin No. 198, United States Department of Agriculture, Strawberries.

Summer apples are now grown for home use on a good many farms. Some good peaches and plums were seen on the sandy soils.

Pecan growing in some parts of the South has become a profitable industry. In the higher parts of Pemiscot County, along the Mississippi River and Pemiscot Bayou, native pecan trees make a vigorous growth and produce large crops of nuts of good quality, and it is believed that cultivated pecans of the hardier varieties could also be grown here with profit.

Land values have advanced sharply here as in other parts of the country in the last few years. Cleared and improved land in the best agricultural sections of the county is worth from \$75 to over \$100 an acre. Where the land is uncleared or only partly cleared the price ranges from \$35 to \$50 an acre, while in the lower portions of the county, where drainage ditches have not yet been dug, land can be bought for \$10 to \$25 an acre.

The greatest need of Pemiscot County at the present time is the adoption of a rational system of general farming. In such a system cotton raising might still occupy first place, but it should be accompanied by crops of corn, small grains, and hay. More land should be devoted to pasture and general farming should be combined with stock raising. Dairying should be a profitable industry, as green feeds would be available for a large part of the year and alfalfa and clover hay, with corn for ensilage, could be produced at small cost.

Hog raising has always received much attention. It can be made much more profitable by substituting for the present methods of letting the hogs range at will, the more modern methods of raising them on clover, alfalfa, and rape, supplemented with corn.¹

SOILS.

The soils of Pemiscot County are alluvial in origin, having been deposited by the Mississippi River during periods of high water. In the northwestern part of the county Little River has added to the Mississippi River deposits material brought from the lowlands farther north and, to a small extent, from the uplands.

As a whole the soils are characterized by their high percentage of fine sand, silt, and clay; by the frequent occurrence even in the heavier and more uniform types of small mounds of clean, medium to coarse sand called "sand blows"; by the occurrence of the soil areas in elongated areas—slight ridges or mounds with a general northeast-southwest trend; and by a gradation from fine sandy or silty soils with lighter textured subsoils in the eastern and southeastern parts of the county to a heavy clayey soil with mottled, plastic heavy clay or silty clay subsoil in the northwestern part.

¹ Farmers' Bulletin 411, United States Department of Agriculture, gives many helpful suggestions on hog raising applicable to this country.

Annual flooding of the surrounding lowlands by the Mississippi antedates the coming of the first settlers to the region. During years of extremely high water the entire bottoms would be flooded, but during other years only the lower lying portions would be submerged. So year by year the Mississippi added to this region its contribution of soil.

All this deposited soil, however, is not of the texture easily cultivated, and some is not very productive. Where deposited by swift currents it is often too sandy for corn and cotton, and where deposited by still water in basins or by water from which the sand had already settled it was often heavy, wet, and difficult to handle.

The soils changed from time to time by deposition of material varying in coarseness, with changes in the velocity of currents, so that it is a common thing to find alternating layers of different soils. As the streams built up natural levees along the river banks, the flood waters as they poured over these deposited first the coarse sand particles, carrying the finer silt and clay particles farther out into the lowlands. Gradually overflow channels were developed. These bayous followed the general slope of the land, but where they carried excessive amounts of sandy material which could not be carried by a sluggish stream they soon deposited portions of it, and in doing so formed meanders like those formed by any other heavily laden stream flowing at low grade. Thus we find the sandier soils along the Mississippi and along Pemiscot Bayou and Open Bay. The broadened sandy area from Gayoso to the southwest is probably due to the overflow of the river, where it makes the wide curve to the west between that point and Caruthersville, and is not a continuation of Sikeston Ridge, as has been supposed.

Even after depositing near the river and bayous much of the sand which they carried, the flood waters still held considerable amounts of sand, which was deposited in long, narrow, slight ridges varying in height from a few inches to 2 or 3 feet, usually with rather abrupt sides and elongated sharp points. In other places, where there were stretches of quiet water, silty and silty clay ridges having the same general trend were formed. Between these sandy and silty ridges are broad, almost perfectly level, stretches. In general the ridges are sandy and the level areas between them heavy, but the reverse is sometimes the case.

In 1850 Congress passed an act authorizing the sale of public lands, and the use of money so obtained in reclaiming swamp lands. Soon afterwards, under the provisions of this act, a levee was built along the Mississippi entirely across Pemiscot County, but it was too near the river and has been entirely cut away by the stream. About 12 years ago a high levee well back from the river was built by the National Government at a cost of \$14,000 per mile, the cost of build-

ing being charged against the lands abutting. Since then, with the exception of one period when the levee broke, no soils have been deposited by the Mississippi. Rather heavy rainfall, and the natural flow of Little River, augmented by considerable drainage water from the systems which have been installed in New Madrid and Stoddard Counties, cause the inundation of a great portion of the western and northwestern part of the county during a large part of the year. In this part deposition of heavy silt and clay soils is still slowly going on.

Scattered throughout the county, except on the higher areas adjacent to the river and bayous, and forming a belt, the center of which is approximately followed by the main line of the Frisco Railroad from Portageville to the State line, are small mounds of sand called "sand blows." These, where they have been undisturbed by cultivation, range in diameter from 8 or 10 feet to 50 feet or more and in height from only a few inches to 15 inches or more above the general level. The material of these mounds is composed largely of quartz sand, ranging in texture from medium to coarse. Near the edge of the sand blows heavier material can usually be reached at a depth of 30 inches or less, but near the center the sand is usually 3 feet or more in depth. The sand blows differ from the small sand ridges in texture of the sand, that of the blows being coarser and sharper, and also in having much less silt and fine sand.

The most plausible explanation of the existence of the sand blows is that during some previous stage of the Mississippi it carried a larger volume of water than at present, had a swifter current, and carried much coarse sand. During some flood stage it deposited a layer of this sand over the entire area where the sand blows now occur. It is known that under certain conditions a swift inundation of a sandy flood plain will sometimes cut it into innumerable small, round or nearly round mounds. An excellent example of this is to be seen in parts of the Gila Valley, Ariz., which was flooded in 1896. After the Mississippi had deposited this layer of sand a heavier flood may have left the surface covered with mounds of sand or may have in places cut away all of the sandy layer except the mounds. Subsequent inundation and deposition of heavier material may have covered these, except a small portion at the top, leaving the sand blows as we now find them.

Whatever their origin, the sand blows present one of the difficult problems for the farmers of this section. The sand itself is of low agricultural value, and the small amount of humus which has accumulated under forest conditions is soon depleted under cultivation. In fields which have been farmed for a few years the sand blows can readily be detected by the smaller growth of corn and cotton on them. Any attempt to mix the soil of the sand blows with the heavier soils around them by moving the soil out over the surrounding

heavier soil may improve the heavier soil, but will leave a spot in the center of the sand blow of less fertility. Besides being too sandy for crops, the areas in which the sand blows are most numerous usually have a pitted surface, which interferes seriously with the surface drainage.

There are many sandy ridges in Pemiscot County that do produce excellent yields of cotton, corn, and other crops. These are the slight ridges of sand, or decidedly sandy soil, that are underlain within the 3-foot section by heavier material, usually a silty loam or silty clay.

While it is true that a large part of the soil of this region is very fertile and, under a thorough system of drainage, highly productive, the soil types are not uniformly so, nor are all soils suited to all crops of the region. On this account the prospective buyer should carefully investigate the land before purchasing.¹

The soils of Pemiscot County may be divided into two broad classes:

(1) The Sarpy soils. The fine sandy loam, silty clay loam, and clay types, occurring near the Mississippi, Pemiscot Bayou, and Portage Bay, are fairly uniform in color, grading from a light buff or grayish brown to light brown, with little change of color between soil and subsoil and with the latter lighter in texture than the soil. The sand and sandy loam members of the series are mixed soils, i. e., include areas of silt loam, silty clay loam, and clay. These usually lie farther from present stream courses than the other soils of the Sarpy series and are much more variable in color and texture. The sand is usually of a light color.

(2) The Sharkey soils. Mottled, heavy, plastic clay, and silty clay loam, occupying the main portion of the western part of the county. These heavy soils lie mainly at a somewhat lower level than the Sarpy soils and are usually poorly drained.

The following table gives the names of the different types, together with their actual and relative extent:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Sharkey clay.....	150,400	48.2	Sarpy fine sandy loam.....	20,288	6.5
Sarpy silty clay loam.....	41,344	16.5	Sarpy sand (with included areas of Sharkey clay).....	16,384	5.3
Coarse subsoil phase.....	6,208		Sharkey silty clay loam.....	7,168	2.3
Depression phase.....	4,096				
Sarpy loam (with included areas of Sharkey clay).....	38,464	12.3	Total.....	312,320	
Sarpy clay.....	15,680	8.9			
Heavy phase.....	12,288				

¹ For examination of soil and subsoil a common 1½-inch auger with a 3 or 4 foot handle can be profitably used. By boring into the soil a few inches at a time and withdrawing the auger the soil material can be examined from the surface downward.

SARPY FINE SANDY LOAM.

The Sarpy fine sandy loam ranges in color from grayish brown to light brown or brown. In texture it runs from a light fine sandy loam through fine loam to a light silt loam, the surface soil usually being rather light, but becoming heavier at a lower depth. At about 10 to 16 inches from the surface the soil is usually underlain by a light, very fine sandy loam or very fine sand, the color ranging generally from yellowish brown to brownish yellow, faintly mottled with shades of yellow or brown. The line between the soil and subsoil is usually very sharp. Near the river in the eastern part of Organ Township, and in a few other places, areas of fine sand too small to be mapped have been included with the fine sandy loam.

At other points the texture in small areas ranges from loamy sand to sand, usually underlain within the 3-foot section by silty clay loam, but continuing a brownish-yellow color to a depth of 3 feet in spots. The area in the southern part of sec. 18, T. 18 N., R. 12 E., is largely made up of soil of this character.

The line of separation between the fine sandy loam and the lighter phase of the silty clay loam is often very indefinite, one soil grading into the other almost imperceptibly. Near Hayti and south of Portageville on the south side of Open Bay certain areas of rather dark-brown fine sandy loam, with a layer of dark-brown, almost black loam in the subsoil, have been included with this type. This soil is typically developed near the Mississippi and along the bayous. The highest elevations are attained nearest the river or the bayous, where the areas form natural levees. It is also lightest in texture near the water front. Gradually, as the surface slopes downward and away from the streams, the soil becomes heavier in texture.

The largest bodies of this soil occur in the vicinity of Caruthersville and Game, a large body of it stretching from the latter point toward the south. Other bodies occur along the line of the levee north of Big Lake, along the east side of Black Island south of Portageville, in places along Pemiscot Bayou, and in small bodies elsewhere in the area.

The sandier portion of this type, especially those areas in which a sand subsoil slightly coarser than typical comes within 10 to 15 inches of the surface, usually does not give profitable yields. Small areas of this phase occur on the Mississippi River front, especially on the east side of Black Island north of Gayoso. These areas can be improved by plowing under green crops of clover or cowpeas or by applying barnyard or stable manure. They are well suited to the production of melons, sweet potatoes, and a number of vegetables, in garden peas, onions, beans, and Irish potatoes. The heavier phases are suitable for cotton, corn, wheat, and alfalfa—in short, for

practically all crops grown in the area. Portions of these soils in the vicinity of Caruthersville are already used successfully for onions, potatoes, and other vegetables. Plums, summer apples, and peaches are successfully grown for home use by a number of farmers.

The average yield of corn is between 25 and 35 bushels and of seed cotton from 800 to 1,000 pounds per acre. Wheat yields in the neighborhood of 12 to 20 bushels per acre. Oats are seldom grown. On the whole the Sarpy fine sandy loam is highly prized for agricultural purposes. It is the easiest type in the area to handle, especially as regards cultivation.

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

Mechanical analyses of Sarpy fine sandy loam.

Number.	Description.	Fine. gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
25403, 25405.....	Soil.....	0.1	2.2	3.9	17.4	26.5	36.0	14.2
25404, 25406.....	Subsoil.....	.1	.2	.5	9.9	29.7	47.1	12.5

SARPY SILTY CLAY LOAM.

The soil of the Sarpy silty clay loam is a light-brown to dark-brown silty clay loam, usually a lighter shade of brown below the surface 2 or 3 inches and faintly mottled with rusty brown or shades of brown, particularly in the poorer drained situations. The subsoil, which is encountered at depths ranging from 8 to 24 inches, is a yellowish-brown, friable light silt loam, very fine sandy loam, or very fine sand, more or less mottled with rusty brown, or in the poorer drained areas with drab. Occasionally the subsoil is underlain within the 3-foot section by silty clay loam or silty clay of a rather plastic structure and generally mottled bluish and brownish colors. In places sandy mounds are encountered, but the type is mainly free from patches or sand blows.

The Sarpy silty clay loam is developed typically along the Mississippi River, though often separated from the latter by strips of Sarpy fine sandy loam. It also occurs along Pemiscot Bayou and Open Bay, grading from a light phase near the streams to a heavy phase on the side away from them. Where typically developed away from the streams this soil often occurs in long, narrow ridges. Such areas can frequently be detected by their heavier growths of corn and cotton.

The greater part of the type is well drained, and on account of its light subsoil drainage is only a matter of proper ditches.

As a whole, the Sarpy silty clay loam is the most productive soil of the area. Before being cleared it supported a growth of walnut, hickory, oak, sycamore, elm, hackberry, ash, soft maple, box elder, ironwood, sweet gum, cottonwood, and occasionally poison ivy and grape vines.

It now produces large crops of corn, cotton, alfalfa, clover, and a number of vegetables. Corn yields from 40 to 75 bushels, cotton 1,200 to 1,600 pounds in the seed, and alfalfa 5 or 6 tons to the acre. Some fair crops of oats were seen.

Two phases, differing in some respects from the typical soil, have been mapped, the Coarse subsoil phase and the Depression phase.

Coarse subsoil phase.—This phase of the Sarpy silty clay loam greatly resembles the typical soil in color and texture to a depth of from 8 to 12 inches, but the subsoil consists of a medium, fairly sharp yellowish-brown to grayish-brown sand which may extend to a depth of 3 feet or more, being in turn underlain by very fine sandy loam or fine sand of the typical profile. In places a silty clay loam or silty clay of plastic character and mottled drab or brown in color underlies the coarser sandy strata. The principal areas of this phase occur south of Hayti. In point of agricultural value it is practically on a par with the typical soil. It is slightly less retentive of moisture.

Depression phase.—The Depression phase of the Sarpy silty clay loam occurs northeast of Cooter in a basin formerly occupied by Pemiscot or Big Lake, but now drained. The surface soil is very loose and friable, in places containing considerable amounts of medium sand and much organic matter. The subsoil differs but little from the typical subsoil. In agricultural value the phase and typical soil rate about the same.

The following table gives the average results of mechanical analyses of samples of the typical soil and subsoil of the Sarpy silty clay loam:

Mechanical analyses of Sarpy silty clay loam.

Number.	Description.	Fine. gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
25407, 25409.....	Soil.....	0.1	0.8	1.2	5.9	16.0	52.9	21.1
25408, 25410.....	Subsoil.....	.0	.1	.1	22.5	49.7	30.1	7.3

SARPY CLAY.

The soil of the Sarpy clay consists typically of a yellowish-brown to grayish-brown silty clay, compact and fairly uniform in color and texture to a depth of 15 to 24 inches, where it is underlain by light silt loam or fine sandy loam. Mottlings of rusty brown and drab are common from the surface downward.

The principal areas of the Sarpy clay occur in the old lake basins and poorly drained areas near the Mississippi, the largest one of the kind being outside the levee, north of Gayoso, and on the east side of the basin formerly occupied by Pemiscot Lake.

Some of the Sarpy clay is used for corn, yields of from 50 to 75 bushels being obtained. But little of it has been used for other crops. When thoroughly drained it should prove a productive soil, well suited to grass, wheat, and probably cotton.

The lower lying portions of this soil were originally covered with heavy growths of cypress around the margin of the lakes. Portions are now heavily timbered.

Heavy phase.—In the lower sections near the lakes a heavy phase of the Sarpy clay is frequently encountered, in which the lighter subsoil material is usually not found above 30 inches. The color of the soil varies from grayish brown to nearly black, while the subsoil is mottled with brownish and drab. This phase is also found in places where narrow ridges of heavy black soil separate low areas of lighter soil, a good example being between the long, narrow lakes southeast of Canady. This phase is more deficient in drainage than the typical soil.

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

Mechanical analyses of Sarpy clay.

Number.	Description.	Fine. gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
25401.....	Soil.....	0.0	0.5	0.6	4.1	2.2	57.0	35.4
25402.....	Subsoil.....	.1	3.8	6.7	47.5	19.5	17.3	4.8

The following sample contained more than one-half of 1 per cent calcium carbonate (CaCO_3): No. 25401, 0.68 per cent.

SARPY SAND (WITH INCLUDED AREAS OF SHARKEY CLAY).

The Sarpy sand (with included areas of Sharkey clay) comprises intricately associated areas of sandy soils of the Sarpy series, of Sharkey clay, and of the heavier members of Sarpy soils. In places the sandy soil predominates, while elsewhere there seems to be an equal distribution of the sandy mounds and heavy depressions. It was not possible to map separately the different soils included in these areas, owing to the small size of the individual areas and the rather broad range of texture. Locally this soil is known as "mixed land."

The hummocks range from about 8 to 15 inches in height and are irregular in shape. The material of the sandy patches varies from brownish-yellow to yellowish-brown light sandy loam to rather loose sand, underlain at about 4 to 8 inches by sand faintly mottled grayish

and yellowish brown or rusty brown. This material may continue to a depth of 3 feet or more or it may pass into a mottled bluish-drab and rusty-brown plastic silty clay or silty clay loam at some point within the 3-foot section. The sand is generally deeper near the center of the mounds.

Probably the greater proportion of the soil in the depressions is true Sharkey clay, consisting in the surface inch or two of a dark-brown to nearly black silty clay loam to silty clay and below this of a tough, plastic silty clay of mottled colors—drab or bluish drab and rusty brown. Not infrequently sandy material is encountered in the subsoil of the depressions at varying depths within the 3-foot section. In some places Sarpy silty clay loam is encountered in the depressions. Other classes of soil also are found, but these represent in the main gradations between the prevailing light sandy soil of the mounds and the heavy silty clay of the depressions. The essential characteristic of the soil mapped under this type is the rapid change from light sandy material to heavy clayey material within small areas.

No large bodies of this soil occur in the area, the largest being in the vicinity of Steele and Cooter, but other bodies occur near Hayti, south of Portageville, and in many other places in the belt of sandy soils followed by the Frisco Railroad. Many areas too small to be mapped have been included with the Sarpy loam.

On account of the uneven surface, plowing is somewhat difficult. A considerable proportion of the type is utilized for cotton and corn. On those mounds where the sand is deepest crops often suffer from lack of moisture. Very good yields are secured from the heavier soils of the depressions under normal seasonal conditions. Fields of this grade of land when under crops sometimes have a peculiarly spotted appearance, owing to the good condition of the plants on the heavier depressions and the reverse condition on the light mounds. Crops do well on those sandy mounds having a heavy subsoil. The deeper sandy areas could be improved by plowing under cowpeas or other vegetable matter, such as barnyard manure.

This soil is by no means considered undesirable for agricultural purposes; in fact, it is appreciated to such an extent that a large proportion has been cleared and put under cultivation. It will probably give average yields of corn between 25 and 35 bushels and 600 to 900 pounds of seed cotton to the acre. Portions of it should produce good crops of clover, cowpeas, and early garden vegetables. The timber growth of forested areas comprises mainly sycamore, elm, hackberry, cottonwood, hickory, oak, sweet gum, ash, box elder, soft maple, pecan, walnut, honey locust, hawthorn, and pawpaw. Cane, poison ivy, grapevines, and iron weed are also conspicuous plants.

Below are given the mechanical analyses of samples of the soil, subsoil, and lower subsoil of this type:

Mechanical analyses of Sarpy sand (with included areas of Sharkey clay.)

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
25392, 25394.....	Soil.....	1.1	10.9	16.8	40.5	10.0	12.5	7.7
25393, 25395.....	Subsoil.....	1.0	9.0	14.6	25.3	10.3	30.8	8.8
25396.....	Lower sub-soil.....	.1	1.4	1.5	2.9	14.0	60.4	19.5

SARPY LOAM (WITH INCLUDED AREAS OF SHARKEY CLAY).

The Sarpy loam (with included areas of Sharkey clay) is another mixed type of soil including depressions of heavy material and mounds of lighter soil occurring in such intricate arrangement with respect to each other as to preclude any satisfactory separation. The type averages heavier and is less hummocky than the Sarpy sand, and in the main it is better suited to agriculture. This soil is locally styled "mixed land" or "black loam." Usually the heavier soil of the depressions consists of black silty clay in the surface inch or two and plastic clay below, mottled drab or bluish drab and rusty brown in color. The higher lying patches often consist of silty clay loam to silty clay of a dark-brown to nearly black color in the surface inch and mottled bluish drab and rusty brown below. At about 3 to 5 inches sand to very fine sandy loam of a mottled yellowish-brown and grayish color is encountered. In other places the surface soil of the hummocks is sandy as well as the subsoil. Light-textured material is occasionally found in the subsoil of the heavy types of the depressions on the one hand and heavy material in the subsoil of lighter hummock soil on the other.

In sections 21, 28, 33, 34, and 35 southwest of Braggadocio a phase of loam occurs in which the surface 6 to 10 inches is a brown loam overlying very heavy, sticky, tenacious brownish mottled clay. This clay contains a considerable amount of medium to coarse sharp sand and numerous small, smooth, white concretions, apparently of lime. The deeper subsoil becomes lighter in color and texture to the depth of 3 feet, but persists as sandy clay. It is quite productive.

In sections 14, 15, 22, and 23, northwest of Gayoso, a small body of loam is underlain at a depth of 10 or 12 inches by a heavy and in places dark-colored silty clay.

Southwest of Game a strip has been included with this soil which consists of about 6 inches of dark-brown rather silty loam, which grades into a fine sandy loam, underlain in turn by medium sandy loam and then by silty clay.

Yields on this soil vary considerably. Cotton and corn are the most important crops. In some sections the type is considered very valuable for farming. Cotton matures earlier on the sandier portion of the type, which is a feature of considerable importance in those years when planting is late on account of unfavorable seasonal conditions. Cotton on some of the heavier soils of the county is damaged to some extent by fall frosts. The timber growth is the same as on the Sarpy sand.

SHARKEY SILTY CLAY LOAM.

The soil of the Sharkey silty clay loam ranges from a dark-drab to light-brown silty clay loam, faintly mottled with rusty brown, and 6 to 10 inches deep. The subsoil is a rather plastic silty clay mottled gray, bluish drab, and rusty brown in color. In places there is comparatively little change in texture or color from the surface downward. A portion of the type is underlain by a grayish-brown very fine sandy loam to silt loam. This lighter subsoil phase really represents an approach to the Sarpy silty clay loam.

Clods are frequently formed in plowing, but usually crumble during rains. The clay subsoil has a granular structure where exposed on ditch banks. Sandy mounds occur in places, but they are more scattered than on the "mixed-land" areas.

Only small areas have as yet been put under cultivation, and indifferent crops produced. This is probably due to deficient drainage. With thorough drainage and careful preparation of the seed bed it is believed that corn and small grains can be produced. There is no doubt as to the inherent fertility of the soil; its productiveness will depend upon its proper handling. After the establishment of good drainage the structure of the soil can be improved by cultivation and plowing under cowpeas or some other form of vegetable matter. Applications of lime should help materially in securing a more friable, crumbly structure—the proper condition of tilth for favorable plant development.

The largest areas of this soil lie in the northern part of the county to the south of Open Bay, to the southwest of Hayti, and to the west of Pascola. In several places land quite similar to this type was included with the Sharkey clay, owing to the impracticability of making a separation under the existing conditions of poor drainage.

SHARKEY CLAY.

In extent the Sharkey clay is the most important soil type of the area, covering approximately one-half of the entire county. In present agricultural value it is of but little importance, because only very small portions have as yet been drained and cultivated. Upon the possibility of developing it by proper drainage depends much of the future agricultural possibilities of the county.

The type consists of a grayish or dark-drab silty clay, often with a small amount of sand in the surface 2 or 3 inches. The surface soil also contains a rather large amount of organic matter, and in places is fairly friable—sufficiently so to insure comparatively easy cultivation under conditions of good drainage. The surface inch or two is often of a dark-brown color, while the subsurface is generally more or less mottled with rusty brown. At a depth of from 8 to 15 inches this darker colored soil grades into a mottled gray and yellowish-brown or rusty-brown plastic silty clay of uniform texture to the depth of 3 feet or more. The subsoil is quite uniform over a considerable proportion of the area, although in some places sand, sandy silt, or sandy clay is encountered. Such areas represent an approach to the Sarpy soils.

Although the Sharkey clay as a whole is fairly uniform, there are exceptions which should be noted. In many places there are slight ridges which are well timbered with hickory and known locally as "hickory ridges." The soil of these elevations is very dark brown to nearly black, while the subsoil is a heavy silty clay or clay less mottled than that of the typical soil. It contains in many places numerous small, black iron concretions. In other places a black silty clay occurs in depressions representing sluggish drainage courses. These are often referred to as "black land" and in many places are heavily timbered with tupelo gum. In the eastern part of the county many small areas of Sharkey clay in color and texture closely resemble the Sarpy clay.

Northeast of Terry ridges lighter in color than the hickory ridges have been included with this type. These approach somewhat the Sarpy silty clay loam in appearance of surface soil and in crop value, but have a heavier and more mottled subsoil. "Sand blows" are less common on this type than on the soils of the Sarpy series, but are found in places. Sandy loam and loam ridges too small to be shown on the soil map also occur.

In the vicinity of Samford limited areas of the black ridge phase of this type are cultivated, and northeast of Terry some of the lighter colored ridges are used. Fairly good results are obtained; but the typical clay has been used to so slight an extent that but little is known in this immediate section of its crop adaptation or its agricultural value. The same soil is profitably used for cotton and corn in the Mississippi bottoms farther south.

When thoroughly drained there seems to be no reason why this soil should not be found well adapted to corn, the small grains, timothy, and possibly clover. Cotton, particularly those varieties bred upon similar alluvial land, would likely do well on this soil, especially after it has been used for a few years for other crops.

Some difficulty would naturally be expected in preparing the seed bed on so heavy a soil. Clods will be formed where the land has not the proper content of moisture. Such clods should break down more readily than in the case of clay soils containing less silt, but it is well to avoid their formation as far as possible. Farmers should therefore study the effect of plowing under varying moisture conditions in order to determine which is most favorable.

It is interesting to note that in some portions of the Mississippi bottoms practically the same type of soil is allowed to dry out thoroughly before plowing is commenced, for the reason that on drying the soil cracks in such a way as to effect a more or less granular structure. Again, the land is sometimes plowed when very wet, and subsequent rains are depended upon to prevent baking. Such methods are pursued by those who claim that when the soil is moderately moist intractable clods are quickly formed unless rain follows almost immediately. These methods are not considered advisable for Pemiscot County, and are mentioned simply to indicate the importance of looking carefully into the working properties of this soil, which in this section has largely existed under such poor drainage conditions as to preclude agricultural operations. Lime would markedly improve the structure of this clay land, as would also the addition of vegetable matter.

The first steps toward the utilization of the Sharkey clay for agriculture is the establishment of drainage; the next most necessary step is the establishment of a good soil structure—the opening up of the dense soil so as to permit proper circulation of air and moisture. Oak, hickory, hackberry, ash, soft maple, locust, gum, iron wood, box elder, and sycamore are common trees on the type.

DRAINAGE.

About 16 years ago the first dredge in southeast Missouri commenced operations. It dug a ditch in New Madrid County 29 miles long and 40 feet wide. About 9 years ago work was started simultaneously in several of the counties and since that time over 900 miles of drainage ditches have been constructed in 7 counties. These ditches are from 20 to 70 feet in width and from 6 to 12 feet deep. They drain a combined area of nearly 400,000 acres outside of the territory embraced in the Little River District. This work has been done by small county drainage districts at a cost of from \$3 to \$6 an acre of land reclaimed.

In 1907 the Little River drainage district was organized and surveys and plans made for the largest drainage project in the world outside of Holland. For a time legal complications delayed this work, but in November, 1910, the work of levying assessments against

the lands to be drained was completed. It is the purpose of the men in charge of this work to begin actual construction in the spring of 1911. This district alone will drain over 500,000 acres of land at an estimated cost of about \$6.50 an acre. Existing and proposed drainage systems are shown in figure 3.

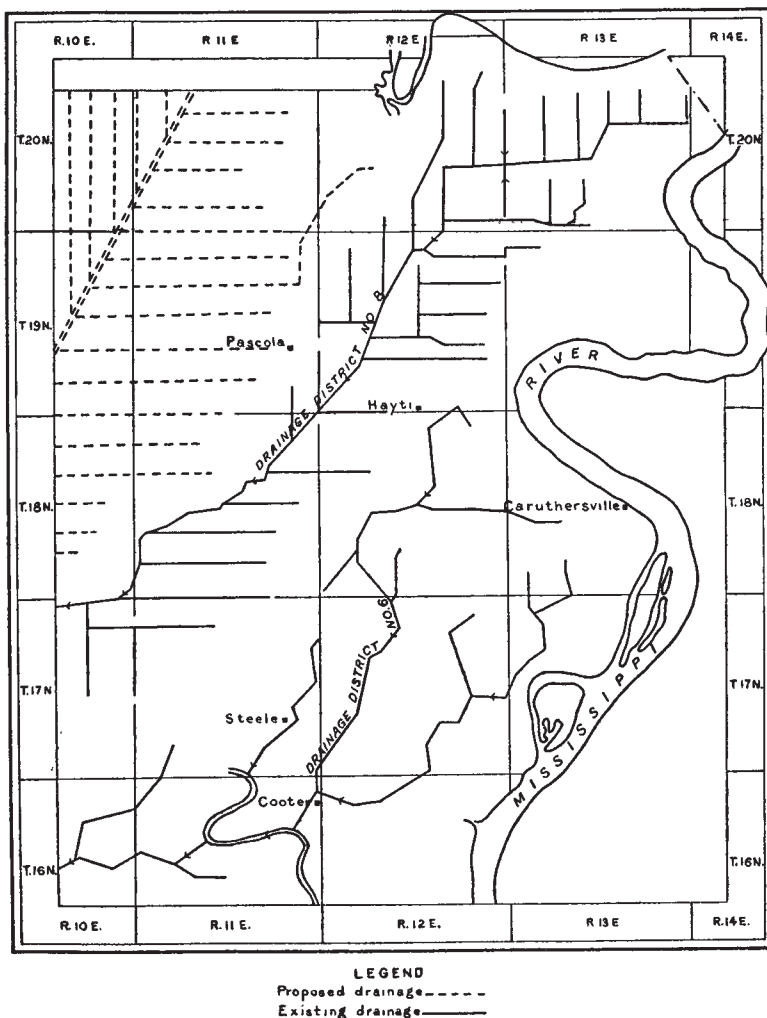


FIG. 3.—Existing and proposed drainage systems.

More than three-fourths of Pemiscot County has been organized into small drainage districts and the larger part of the main ditches are already dredged. The remaining ditches of these systems have been approved and are being constructed as rapidly as possible. On the accompanying drainage map they are indicated as existing drain-

age. The northwestern part of the county is embraced in the Little River drainage district and the ditch lines are indicated as proposed drainage.

In addition to the main ditches already dredged much needs to be done in the way of constructing laterals and small open ditches. Much work in leveling the surface will also be necessary before the best results are obtained. In the heavier soils of the area it is quite possible that a complete system of tile drains will be necessary in addition to open drains.

SUMMARY.

Pemiscot County is located in the lowlands of southeastern Missouri and is the corner county of the State.

This region as a whole, and especially the southern portion of it, differs from the remainder of the State in topography, in climate, in crop adaptations, and to a great extent in the character of the people and the methods of farming.

Almost the entire county was once heavily timbered, and at the present time less than one-half of it has been cleared and put under cultivation. The salable timber is being rapidly cut by lumber companies and the cut-over areas cleared for cultivation.

The cost of clearing ranges from \$10 to \$18 an acre, and fair crops of corn are raised in the clearings the first year. The trees are shallow rooted and few stumps remain long after the fields have been cultivated.

The Mississippi River formerly flooded large parts of the county during each period of high water, but a Government levee now affords ample protection.

Artificial drainage has been necessary. Drainage districts have been organized and many miles of dredged ditches constructed. At the present time more than three-fourths of the county has been provided with main ditches or others are now in process of construction. A large area in the northwest part of the county is included in the Little River drainage project, on which actual work has not yet begun.

Cotton, corn, and alfalfa are the principal crops raised at present. The yields are fair and good profits are made, but there is much room for improvement in selection of varieties and in cultivation and handling of crops.

Hay, grain, and pasture crops should receive more attention. Cowpeas are grown in the corn, but the acreage should be extended both for the production of hay and of seed.

Many parts of this county present ideal conditions for growing trucking crops and berries. Transportation facilities are good and markets close. Land values are low, but the prices are rapidly advancing.

The needs of the area are better methods of farming, the use of a wider range of crops, the combination of stock raising with other farming, and a general improvement in buildings.

The soils of Pemiscot County may be divided into two general groups:

(1) The Sarpy soils: The fine sandy loam, silty clay loam, and clay types occurring near the Mississippi, Pemiscot Bayou, and Portage Bay are fairly uniform in color, grading from a light buff or grayish brown to light brown, with little change of color between soil and subsoil and with the latter lighter in texture than the soil. The sand and loam members of the series are mixed soils, i. e., include areas of silt loam, silty clay loam, and clay. These usually lie farther from present stream courses than the other soils of the Sarpy series and are much more variable in color and texture. The sand is usually of a light color.

(2) The Sharkey soils: Mottled, heavy, plastic clay and silty clay loam, occupying the main portion of the western part of the county. These heavy soils lie mainly at a somewhat lower level than the Sarpy soils and are usually poorly drained.

The population of Pemiscot County is increasing rapidly. With its wide range of crops and the opportunities for intensive farming, its good transportation facilities, and its proximity to markets, the productive nature of much of its soil, and the present low price of land the county is destined to become one of the most densely populated and most productive sections of the State.

[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.]

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