

Issued May 12, 1914.

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.

---

SOIL SURVEY OF BARTON COUNTY,  
MISSOURI.

BY

H. H. KRUSEKOPF, OF THE UNIVERSITY OF MISSOURI,  
AND FLOYD S. BUCHER, OF THE U. S.  
DEPARTMENT OF AGRICULTURE.

---

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

---

[Advance Sheets—Field Operations of the Bureau of Soils, 1912.]



WASHINGTON:  
GOVERNMENT PRINTING OFFICE,  
1914.

**BUREAU OF SOILS.**

MILTON WHITNEY, *Chief of Bureau.*

ALBERT G. RICE, *Chief Clerk.*

SOIL SURVEY.

CURTIS F. MARBUT, *In Charge.*

G. W. BAUMANN, *Executive Assistant.*

**COMMITTEE ON THE CORRELATION AND CLASSIFICATION OF SOILS.**

CURTIS F. MARBUT, *Chairman.*

HUGH H. BENNETT, Inspector, Southern Division.

J. E. LAPHAM, Inspector, Northern Division.

MACY H. LAPHAM, Inspector, Western Division.

J. W. MCKERICHER, *Secretary.*

Issued May 12, 1914.

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.

---

SOIL SURVEY OF BARTON COUNTY,  
MISSOURI.

BY

H. H. KRUSEKOPF, OF THE UNIVERSITY OF MISSOURI,  
AND FLOYD S. BUCHER, OF THE U. S.  
DEPARTMENT OF AGRICULTURE.

---

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

---

[Advance Sheets—Field Operations of the Bureau of Soils, 1912.]



WASHINGTON:  
GOVERNMENT PRINTING OFFICE,  
1914.

## LETTER OF TRANSMITTAL.

---

UNITED STATES DEPARTMENT OF AGRICULTURE,  
BUREAU OF SOILS,  
*Washington, D. C., November 11, 1913.*

SIR: The accompanying report and soil map cover the survey of Barton County, Missouri, one of the projects undertaken by the bureau during the field season of 1912. This work was done in cooperation with the Missouri Agricultural Experiment Station, F. B. Mumford, director, and the selection of the area was made after conference with State officials.

I have the honor to transmit herewith the manuscript report and map covering this area and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1912, as provided by law.

Respectfully,

MILTON WHITNEY,  
*Chief of Bureau.*

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

## CONTENTS.

---

	<b>Page.</b>
SOIL SURVEY OF BARTON COUNTY, MISSOURI. By H. H. KRUSEKOFF, OF THE UNIVERSITY OF MISSOURI, and FLOYD S. BUCHER, OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.....	5
Description of the area.....	5
Climate.....	7
Agriculture.....	8
Soils.....	14
Bates fine sandy loam.....	15
Bates very fine sandy loam.....	16
Bates loam.....	17
Bates stony loam.....	18
Bates silt loam.....	18
Summit stony loam.....	19
Summit silt loam.....	20
Summit silty clay loam.....	20
Clarksville gravelly loam.....	21
Clarksville silt loam.....	21
Cherokee silt loam.....	22
Gerald silt loam.....	23
Neosho silt loam.....	25
Osage fine sandy loam.....	25
Osage loam.....	26
Osage silt loam.....	26
Summary.....	27

---

## ILLUSTRATIONS.

---

FIGURE.	<b>Page.</b>
FIG. 1. Sketch map showing areas surveyed in Missouri.....	5

MAP.

Soil map, Barton County sheet, Missouri.





of the county. The area drained by Dry Wood Creek in the northwestern part of the county has a rolling surface, with long, low ridges and rounded hillocks, the slopes of which are sufficiently smooth for easy cultivation. The roughest land is found in the northeastern corner of the county, along Horse Creek, but only a few of the hills along the water courses are precipitous. The southeastern section of the county is marked by occasional mounds which rise above the generally smooth country.

The general slope of the county is from southeast to northwest. It has an average altitude of 900 to 1,000 feet above sea level, but the total variation does not exceed 150 feet. These slight variations indicate the absence of broken areas. There are few counties in the State that possess a smaller percentage of nonagricultural land.

The topographic features of the region are indicative of the geological structure and relative resistance of the rocks, which lie in nearly horizontal beds with a gentle northwestward dip. The higher or younger rocks outcrop in succession in the direction of the bedding slope. The lowest rocks are exposed in the southeastern and the highest in the northwestern corner of the county. The strike of the strata is about due northeast and southwest.

The surface features of the county are the direct result of erosion. This has acted in proportion to the resistance of the interbedded shales, sandstones, and limestones composing the region. The extensive shale beds give rise to soils characterized by level or undulating topography and this gives way to more rolling relief where the underlying sandstone has been exposed. Only along the streams in the sandstone region is the land broken and rough. The flood plain of the Muddy Fork of Spring River is comparatively narrow, and is rarely more than 20 to 30 feet below the adjoining upland, the change in altitude being almost imperceptible in many places.

Dry Wood Creek, with its two branches in the northwestern section, Little Dry Wood in the north-central part, and Horse Creek in the northeastern corner of the county, flow north into the Osage River, which empties into the Missouri. The drainage of the southwest corner of the county is southward through North Fork into Spring River. Muddy Fork of Spring River enters the county near Golden City, and follows a northwesterly course to the vicinity of Lamar, where it turns southward, leaving the county near Dublin.

Only a very small part of Barton County, principally that along Horse and Dry Wood Creeks, was originally forested, but much of this has been cleared, so that less than 20,000 acres of woodland remain, mainly in the northeastern corner of the county. The trees are principally white, black, blackjack, and willow oak, elm, hickory, cherry, and persimmon.

The first settlement in Barton County was made in 1838. The county was organized from the northern part of Jasper County in 1855. There were comparatively few settlers until after the Civil War, when immigration from Illinois, Indiana, and Ohio commenced. In 1880 the population was 10,330, and in the 1910 census a population of 16,747 was given.

Lamar, the county seat, is the largest town in the county. It has a population of 2,400 and is located at the junction of the St. Louis & San Francisco and Missouri Pacific Railroads. Liberal and Golden City are the two next most important towns. Minden and Burgess are important mining centers.

The transportation facilities are good. The St. Louis & San Francisco Railroad extends across the county from southeast to the northwest; the Missouri Pacific crosses the center in a north to south direction, while the Kansas City Southern, and branches of the Frisco and Missouri Pacific, traverse the western part of the county.

Wagon roads follow nearly every section line in the county. These could be greatly improved by a more extensive use of the road drag.

#### CLIMATE.

The climate of Barton County is practically the same as that of all southern Missouri. The mean annual temperature is about 56° F. The summer temperature frequently rises to 95° and occasionally exceeds 100°. As a rule the heat of the summer is tempered by southwest breezes. The falls are characterized by long periods of mild, pleasant weather. Zero weather does not occur every winter, and rarely occurs before January 1.

The mean annual precipitation is 41.24 inches. The rainfall is well distributed throughout the year. Droughts 4 to 6 weeks in duration are quite common during August and September, and these constitute the most unfavorable feature of the climate. The rainfall is ample, however, if proper means are employed to conserve the moisture, to produce good yields of all crops grown in the county.

The average date of the last killing frost in the spring is April 18, and of the first in the fall, October 17. The latest date of killing frost recorded in the spring during a period of 18 years is May 15, and the earliest date in the fall, September 15. Fruit is frequently injured by heavy frosts following periods of warm weather in late winter or early spring.

The following table, compiled from the records of the Weather Bureau Station at Lamar, gives the normal monthly, seasonal, and annual temperature and precipitation of Barton County:

*Normal monthly, seasonal, and annual temperature and precipitation at Lamar, Barton County, Mo.*

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December .....	35.6	72	- 9	2.01	2.02	1.71
January .....	32.2	75	-14	1.33	1.21	2.41
February .....	33.7	79	-23	2.40	0.70	1.65
Winter .....	33.8	.....	.....	5.74	3.93	5.77
March .....	45.8	93	1	2.98	4.90	4.45
April .....	57.0	91	22	4.11	1.95	1.82
May .....	65.9	93	29	5.55	2.38	8.70
Spring .....	56.2	.....	.....	12.64	9.23	14.97
June .....	74.0	102	41	4.96	0.97	2.39
July .....	78.0	108	53	4.45	1.95	14.29
August .....	77.0	104	47	4.10	3.50	4.06
Summer .....	76.3	.....	.....	13.51	6.42	20.74
September .....	70.1	104	33	4.17	4.90	7.60
October .....	58.6	96	25	3.11	1.87	7.17
November .....	45.9	80	10	2.07	1.65	0.79
Fall .....	58.2	.....	.....	9.35	8.42	15.56
Year .....	56.2	108	-23	41.24	28.00	57.04

AGRICULTURE.

The development of Barton County from its early settlement has followed practically the same lines that have characterized the agricultural progress of the west Missouri prairie region. In the beginning a patchy agriculture prevailed, based primarily on stock raising, the extensive prairies with a luxuriant growth of native grasses and the mild climate being well suited to this industry. The cultivation of the soil was begun in a limited way soon after the county was first settled. Small grain was grown principally for home consumption. The surplus cattle and grain were taken north to Osage and Missouri River points to be shipped to market. During the Civil War practically all of the permanent settlers left the county and its agricultural progress was temporarily checked.

In the early seventies there were less than 40,000 acres of improved farm land in the county. During the following two decades the county progressed rapidly. There was a steady increase in population, largely from the North Central States, and the acreage of cultivated land was greatly extended. The ease with which the vast

stretches of prairie could be brought under cultivation and the ready shipping facilities combined to cause the rapid development of the region.

About 1880 the advent of the railroads marked the beginning of a change in the form of agriculture generally practiced. Cattle raising gave way to general farming, but the raising of live stock has remained the most important agricultural pursuit, and the present prosperous condition of the county is due to this industry.

The varied soils of Barton County are adapted to a wide range of crops. Despite the large number of crops grown, however, only a few have important places in the agriculture of the county.

According to the census of 1910, the average size of the 2,465 farms in the county is 136.6 acres. The average value of all property per farm is \$7,220, and the average value of land per acre is \$35.62. About 88 per cent of the total land area is in farms, and 91.8 per cent of the farm land is improved. Of the farms in the county, 58.4 per cent are operated by the owners. Land rent ranges from \$2 to \$6 per acre, depending on location and quality of land. Where the share system prevails, the landlord receives from one-third to one-half of the crop. Nearly the entire population is engaged in agricultural pursuits, and appearances indicate an increasing degree of prosperity.

Corn has been the most important cultivated crop from the earliest history of the county, both in acreage and value. According to the 1910 census, a total area of 111,477 acres was devoted to this crop in 1909 with a production of 2,447,238 bushels. Practically all of the corn produced is used for feeding the live stock. The stalks are usually left standing for early winter pasture, only a small part of the crop being cut and shocked. This practice is losing favor, however, as the food value of corn stover is being more fully appreciated. All the common varieties of corn are grown, and on all types of soil, but in general the Bates soils are considered the best corn land and are most extensively used for this crop.

Marked improvement has lately taken place in corn culture throughout this section. The land is being broken deeper, shallow cultivation is becoming more popular, and more attention is being given to seed selection and the problem of fertilization as well as to the systematic rotation of crops, including the legumes.

Wheat is a crop of comparatively little importance. In 1909 it was grown on a total of 11,683 acres, with a production of 147,059 bushels. Maximum yields of 30 bushels are reported, but the average is about 13 bushels per acre. Only the red winter wheats are grown. This crop gives best results where the land is thoroughly prepared and contains sufficient organic matter to prevent excessive baking during dry spells. The silt loam prairie soils with heavy clay subsoils are well adapted to the crop, and since the decreasing fertility

of the land, due to continuous corn growing, makes the adoption of systematic crop rotations imperative, wheat, as one of the most profitable of the small grains, might be more extensively grown. Commercial fertilizer is used on practically all of the wheat land with good results.

The oat crop is relatively unimportant, and the acreage varies from year to year. The soils of Barton County are adapted to this crop, but the climate is frequently unfavorable. In 1909 there were devoted to this crop 9,724 acres. In 1911 the total area was only 2,400 acres. In yields, too, the crop is variable, ranging from almost complete failure to a production of 40 or 50 bushels, depending on the season. Spring oats are grown almost exclusively. The importance of sowing the seed as early as possible in spring can not be over-emphasized, for the plants thrive best during the cooler weather of early summer. The value of oats in the rotation and as a nurse crop for clover is being more appreciated.

Rye is a crop of no economic importance in Barton County. Occasionally a small patch is sown as a winter cover crop and for late winter and spring grazing. This crop is valuable for supplying humus, especially when plowed under green preceding corn or cow-peas.

Among the crops that have grown in great favor recently are kafir and several of the sorghums. A small patch of the former is grown on nearly every farm and is used for forage. Three tons per acre is considered an average yield. The acreage of this crop varies with the season, but is greatest in dry years, when the kafir supplies an abundance of supplementary feed. Kafir is either drilled in rows, like corn, or broadcasted. A few farmers grow milo with good results. These crops, on account of their drought-resisting properties and adaptability to all soils, are especially valuable as forage crops. Some sorghum is grown for the manufacture of molasses. The best quality of molasses is produced on the Bates soils. Two hundred gallons from an acre is considered a good yield. In the southeastern part of the county several hundred acres of broom corn are grown annually. In favorable years this is a profitable crop, and its acreage is steadily being increased.

In the early agriculture of the county, flax, castor beans, and tobacco were extensively grown, but these crops were abandoned many years ago. On many of the farms small patches of rape are grown to furnish pasture for hogs and sheep.

Alfalfa is not grown, and probably never will be a crop of economic importance in this region. The factors which tend to prohibit its production are the heavy subsoils and the rather low fertility of the surface soils. It is probable that alfalfa would thrive on well-drained areas of the Osage soils and the better areas of the Bates silt loam,

where it has a deep, loose subsoil, provided heavy applications of lime, manure, and bone meal are made and a good weed-free seedbed is provided.

Red clover is grown to a very limited extent in several parts of the county, but what has been said of alfalfa applies to a certain extent to this crop. The acreage varies from year to year, depending largely on climatic conditions. The young plants are frequently destroyed by the late summer droughts. It is probable that the crop can be made to succeed on any of the Bates soils. Moderate applications of barnyard manure or commercial fertilizers, or both, should be made on impoverished soils. On land rich in organic matter there is less danger of heaving and winter killing of the plants. The growing of red clover as a soil renovator should receive greater attention.

Japan clover grows wild throughout the county, but its value in the pasture seems not to be fully appreciated. A number of wild legumes, such as *Petalostemum candidum* (prairie clover), *Tephrosia virginiana* (hoary pea or catgut), and *Psoralea tenuiflora*, grow on the prairie lands, and afford good grazing.

Barton County produces more prairie hay than any other equal area in the State. All of the common cultivated grasses also do well, the silt loams with heavy subsoils being especially adapted to timothy, orchard grass, and bluegrass. Timothy produces 1 to 2 tons per acre, and the hay is of high quality. The pastures consist largely of bluegrass. Orchard grass is well suited to this region, but is not extensively grown. The flat land extending from Minden to Irwin, and consisting largely of the Cherokee and Gerald soils, is as yet mainly virgin prairie, and produces an exceptionally high quality of wild prairie hay. The average yield is from 1 to 2 tons per acre, and from 30,000 to 35,000 tons are shipped out of the county annually. Although the recent higher prices of hay have made its production more profitable, the acreage of prairie grass is steadily being reduced by the extension of cultivated fields. Many of the older mowings frequently become badly infested with broom sedge (*Andropogon virginicus*), and in order to eradicate this grass it is necessary to plow the fields.

Cowpeas are, all things considered, one of the most valuable crops grown in the county. Their value as a soil renovator, and as a green manuring, pasture, or hay crop is being more appreciated. Since the soils are generally deficient in humus, and since clover can not be grown very successfully, the necessity of growing cowpeas, which thrive in all parts of the county, as a legume fertilizer is apparent. They improve the land whether grazed, cut, or turned under. The hay makes a very nutritious feed, equal to clover, for all kinds of stock. The most popular varieties are the Whippoorwill, Clay, and New Era. Cowpeas produce from 1 ton to 3 tons of hay per acre,

and, with favorable climatic conditions, a large yield of seed. Cow-peas are sometimes sowed after wheat or oats with good results where these crops can be harvested early. They are also sowed in the corn fields at the last cultivation.

Fruit growing is of very little importance in Barton County. There are usually a few apple and peach trees on each farm to supply the family needs. Peaches do well on the sandy soils of the Bates series, and apples thrive on the Bates silt loam. The flat prairie soils are not adapted to fruit production. The growing of truck and small fruit has not been developed on a commercial scale, though enough of each is grown to supply the home demand. Strawberries and blackberries do particularly well on the lighter Bates soil.

As a source of revenue live-stock raising is the most important industry in the county. The splendid adaptation of a large acreage of land to nutritious forage crops and grasses offers attractive opportunities for raising cattle, hogs, horses, and mules. The surplus product of all live stock in 1912 was valued at \$750,000. According to the census of 1910 there was a total of 27,596 cattle, 11,670 horses, 3,374 mules, 29,466 swine, and 7,817 sheep in the county in 1909. A large number of cattle are raised each year, but the number prepared for market is variable, depending on the size of the corn crop. When this crop is small not enough grain is produced to fatten all the stock, and many feeders are shipped out. Formerly cattle were driven into Barton County from northern Missouri, Arkansas, Texas, and Oklahoma to "winter." The climate is so mild that it is often unnecessary to furnish other shelter than that afforded by the belts of forest along the streams. Hog raising is carried on in conjunction with cattle raising, and is practiced on every farm. A few sheep are raised, and it is probable that this industry could be extended with profit. The raising of horses and mules is an important industry, and although no single farm is devoted entirely to this practice, a large number of farmers have a few horses and mules for sale each year.

Dairying is one of the growing industries of the region, and is an indication of an advance in agricultural methods. Dairying has its greatest development in the southeastern part of the county, where 3 to 10 milch cows are kept on almost every farm. The farmers do not make dairying a specialty, but the extension of this industry would not only prove profitable but would also result in a general improvement in the fertility of the land. Good markets are readily available, and shipping facilities are good.

In general, the type of farming now practiced and the methods in common use seem well suited to the soils and present conditions in the county. Agriculture will probably always be based on the growing of corn and grass in conjunction with stock raising. It is very likely,

however, that farming will become more diversified, owing to agricultural and economic reasons. The continuous growing of corn in many cases has greatly reduced the fertility of the soil and different methods must be adopted. The systematic rotation of crops, the rotations to include leguminous crops, is the most satisfactory means of building up the soil. The wheat acreage is being extended, and, to permit the keeping of more live stock, the various forage crops are being grown more extensively to supply feed.

The soils of Barton County are deficient in humus or organic matter, as is indicated in many places by their light color, poor physical condition, and low moisture-retaining power. Such soils require a system of farming that will result in the production of the largest possible amount of organic matter to be returned to the land. The live-stock farmer can increase this humus content most rapidly by feeding all of his crops to the stock and returning it to the soil in the form of manure. The grain farmer must depend more upon the growing of special crops, such as clover and cowpeas, to be turned under.

The Missouri Agricultural Experiment Station recommends, as a good general rotation for this region, corn one year, cowpeas one year, and wheat one year, followed by timothy for one or two years. Where clover can be made to succeed, it may be used alone for the fourth year of the rotation, or mixed clover and timothy may be used and allowed to stand two years. If this gives too small an acreage of corn for the live stock, a second year of corn may be inserted the second season, thus making the rotation corn, cowpeas, corn, wheat, and clover and timothy one or two years. The rotation will tend to increase the productiveness of the soils by improving their physical condition, and it will further increase crop yields by keeping in check the diseases and pests that prosper most when fields are kept continuously in those crops which are naturally affected.<sup>1</sup>

Commercial fertilizers are extensively used throughout Barton County, and are growing in popularity. They are applied to practically all the wheat fields and to much of the corn fields.

In order to ascertain the most profitable methods of fertilization and soil management for the permanent improvement of the soils of this region, the Missouri Agricultural Experiment Station established in 1905 an experiment field near Lamar. This field is located on soil mapped as Cherokee silt loam, but the results obtained thereon are applicable in a general way to all the soils of this region. The results of the experiments are published in Bulletin No. 84, Missouri Agricultural Experiment Station. They are particularly applicable to Barton County and should prove valuable to the farmers in suggesting the proper methods of handling their soils.

---

<sup>1</sup> See Bulletin No. 84, Missouri Agricultural Experiment Station.

## SOILS.

Barton County lies almost wholly in the Great Plains Region of western Missouri, and the soils belong to the group known as the Residual Soils of the Western Prairies. They are the direct product of the weathering of local rocks, and their distribution and character are determined by the underlying material. The rocks consist of shale associated or interbedded with sandstone and limestone. They belong to the lowest part of the lower Coal Measures. They dip slightly to the north and west, so that the higher or younger beds are exposed in the northwestern part, and the oldest or lowest beds in the southeastern part of the county. The higher beds have been most important in the formation of soils.

The shale beds vary in thickness from a few inches to more than 50 feet, and in color from light yellow to drab. They are soft and micaceous, and break down readily. They are generally protected by overlying sandstone beds, but are sometimes exposed by stream erosion or road cuts.

The sandstones are generally coarse grained, micaceous, and often ferruginous, and vary from brown to red. The lower beds are very coarse, sometimes having the character of a conglomerate, and are markedly ferruginous.

The limestones of the region belong to the Carboniferous Age, and contain variable amounts of chert, so that the soil derived from them usually is moderately gravelly. The limestone occurs in the southeastern part of the county along the western edge of the Ozark Border region.

The rocks are disintegrated to a depth of 1 foot to 50 feet or more, the greatest depth of the soil mantle occurring where the softer shales are exposed. None of the soil types found can be said to be derived from any one of the formations exclusively, as all of the formations have contributed more or less material to each soil.

The upland soils are included in the Summit, Clarksville, Bates, Cherokee, and Gerald series, while the Neosho and Osage series are alluvial or stream-bottom and terrace soils.

The Bates series includes soils derived from shale and sandstones. These have brownish surface soils and mottled reddish and yellowish subsoils.

The Summit soils are dark gray to black in the surface portion and yellowish or mottled grayish and yellowish in the subsoil. Shale and limestone have contributed the bulk of soil material.

The Clarksville soils are derived from the cherty limestone of the Ozark portion of the county. The surface material is grayish and the subsoil reddish. Chert fragments are common to these soils, especially in the lower subsoil and substratum.

The Cherokee type is derived principally from shale. It has a light-gray or ashy surface soil, and a compact, tough clay subsoil of a brownish or dark-drab color. The Gerald soil, on the other hand, though derived from shale, has a brownish color at the surface. The subsoil material is essentially the same as that of the Cherokee. The Gerald occupies more undulating and better drained country than the Cherokee.

The Neosho type is the only soil recognized on stream terraces. It is similar in many respects to the Cherokee silt loam. The Neosho soil, however, represents the weathered products of old alluvium. The material was deposited at a time when the streams were flowing at higher levels than at present.

The Osage series includes first-bottom soils. These soils are brownish to black, and are underlain by somewhat lighter colored subsoils. The material of the first-bottom alluvium, as well as that of the second bottom, was washed from the upland prairie soils.

The following table gives the name and extent of each of the soils mapped in the county:

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Bates silt loam.....	130,432	34.2	Neosho silt loam.....	5,440	1.4
Cherokee silt loam.....	63,616	16.7	Bates loam.....	5,248	1.4
Bates very fine sandy loam.....	55,360	14.5	Summit stony loam.....	2,944	.8
Gerald silt loam.....	53,760	14.1	Summit silty clay loam.....	2,688	.7
Osage silt loam.....	18,112	5.2	Osage fine sandy loam.....	2,432	.6
Brown phase.....	1,792		Clarksville gravelly loam.....	2,176	.6
Bates fine sandy loam.....	13,440	3.5	Clarksville silt loam.....	576	.2
Bates stony loam.....	9,152	2.4			
Summit silt loam.....	8,256	2.1	Total.....	381,440	.....
Osage loam.....	6,016	1.6			

BATES FINE SANDY LOAM.

In its typical development the Bates fine sandy loam consists of a brown, reddish-brown, or grayish-brown, mellow, light loam to fine sandy loam, underlain at about 10 inches by a brown to reddish-brown material of about the same texture as the soil, or only slightly heavier. Below 20 inches the subsoil is usually a bright mottled red and brown or gray, red, and yellow, friable loam or sandy clay loam. The bedrock is generally reached within the 3-foot section, often within 12 to 24 inches of the surface, and fragments of sandstone are scattered through the soil and subsoil.

This type occupies the slopes in the rolling sections of the county. It has a more rolling topography than the Bates very fine sandy loam. The crop adaptations of these types are about the same, but yields

are lower on the fine sandy loam. This soil is not very drought resistant, and much of it is forested or is in prairie sod. While it is a rather poor soil naturally, it can be cultivated without difficulty, and with proper management can be made to produce fair yields, especially of early summer crops, truck, and fruit. Additions of commercial fertilizer and vegetable matter result in materially increased yields.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Bates fine sandy loam:

*Mechanical analyses of Bates fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
342823.....	Soil.....	0.0	0.5	0.7	38.2	17.7	33.6	9.2
342824.....	Subsoil.....	.9	.6	.9	37.7	12.0	27.2	20.5

BATES VERY FINE SANDY LOAM.

The soil of the Bates very fine sandy loam is a grayish-brown to brown or dark-gray very fine sandy loam, underlain at an average depth of about 10 inches by yellowish-brown fine sandy loam, and at about 14 to 18 inches by mottled red and yellow, or red, yellow, and gray, friable fine sandy clay. The subsoil may extend to a depth of 3 feet without any important change, but in many places the texture becomes lighter with increase in depth, and bedrock is encountered within the 3-foot section. Occasionally, on the steeper slopes, bedrock is reached within 12 or 14 inches of the surface. Sandstone fragments and chips of shale are often disseminated through the soil material and more noticeably through the subsoil. In such situations the drainage is complete, and the subsoil is better oxidized and of a more uniform reddish color.

The type occupies the higher ridges and the gradual slopes in the broken parts of the county. The ridge phase is usually from a few feet to about 30 feet above the surrounding prairie soils. The surface is characteristically undulating to rolling, permitting easy cultivation. The type has its greatest development in the north-central and northeastern parts of the county. The soil material is largely derived from fine-grained sandstone, but some shale enters into its composition.

Many farmers consider this soil the best in the county. It is drought resistant, and crops endure wet weather well. Both surface drainage and underdrainage are good. All the type is in cultivation, being used largely for the production of corn and sorghum. Origin-

nally most of it was forested. A few small areas now support a growth of oak and elm.

The value of this soil is about the same as that of the Bates silt loam. Irish potatoes and vegetables do well on it. It is fairly well adapted to apples and peaches. Grain, corn, and kafir give fair yields. The type is considered especially suitable for the production of a high grade of sorghum sirup. The soil is most in need of organic matter and lime.

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

*Mechanical analyses of Bates very fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medtium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
342819.....	Soil.....	0.6	0.7	1.4	18.2	23.5	40.6	14.6
342820.....	Subsoil.....	1.1	1.5	1.8	15.7	24.8	36.0	19.0

#### BATES LOAM.

The surface soil of the Bates loam is a grayish-brown or brown to dark-brown mellow fine loam, which grades into yellowish-brown material of about the same texture. The subsoil beginning at about 10 to 15 inches is a mottled yellow and red friable fine sandy clay, the mottling usually increasing with depth. The subsoil varies in places to a loam, fine sandy loam, or fine sandy clay loam. A few black oxide of iron concretions are encountered in the lower subsoil of some areas. In places on slopes the subsoil has a more uniform light red or yellowish red color. Bedrock is frequently encountered within the 3-foot section, generally at about 20 to 24 inches, although it is much nearer the surface on some of the narrower ridges and steeper slopes. Sandstone outcrops are common, and in places on slopes and ridges where the rock is near the surface the type approaches a fine sandy loam, and has a light-red color, but these areas are too small to be mapped separately. Shale fragments are frequently disseminated through the soil and subsoil.

The type is developed principally in the northwestern part of the county, where it occupies the isolated ridges and hillocks and the steeper slopes along the streams. The surface is gently rolling, with prevailing moderate to gentle slopes.

The Bates loam is derived from shale and fine-grained sandstone.

Where the slopes are not too steep and where the type is not broken by rock outcrops, this is a fairly good farming soil. Crops are apt to suffer from lack of moisture in protracted dry seasons. The type produces good yields of corn and is valued highly as a fruit and truck

soil. The steeper slopes and shallow areas are used for pasture. In places they support a scrubby growth of persimmon, sumac, and oak. The soil is deficient in humus. Its improvement requires the addition of organic matter through the incorporation of stable manure and the growing of legumes. These elements will tend to make the soil more resistant to drought and highly productive. Its physical properties are good.

#### BATES STONY LOAM.

The soil of the Bates stony loam is a brown or grayish-brown light loam to sandy loam. The sand content is variable, but is greatest on the steeper slopes. Large and small sandstone fragments are so abundant in the soil as to preclude cultivation. Bedrock is usually encountered at less than 12 inches.

The material is residual from sandstone and shale, mainly sandstone, and outcrops of that rock are common.

The type has its greatest development along Horse and Little Dry Wood Creeks and their tributaries, and in the western part of the county. The topography is gently rolling to hilly, although a few areas along Horse Creek are sufficiently precipitous to be classed as Rough stony land, and would have been shown as such on the map if they had been of sufficient size. The greater part of the type is covered with blackjack oak, black oak, and hickory. The cleared areas, mainly in the western part of the county, are used for pastures. They could be used for fruit growing where not too broken.

#### BATES SILT LOAM.

The Bates silt loam is a grayish-brown, or brown, rather light-textured, friable silt loam, underlain at 8 to 12 inches by a yellow or yellowish-brown friable silt loam or silty clay loam. At about 18 to 20 inches this grades rapidly into a crumbly silty clay or fine sandy clay, highly mottled with red, brown, and yellow. This grades downward into a mottled red, yellow, and gray moderately stiff clay, which becomes lighter in texture and color with increase in depth. Over a large part of the type the soil contains noticeable quantities of very fine sand. The red color is more conspicuous in the subsoil of the better drained, more sloping areas than in that of the lower, less well-drained, and more nearly level areas, where the color is often mottled yellow and gray. Bedrock is generally nearer the surface on the slopes, and frequently in such places small fragments of sandstone and shale are present throughout the soil section. The type as developed in the central part of the county generally has a heavier subsoil and is lighter in color than those areas in the northwestern corner in which the soil is usually dark brown and the subsoil friable and highly mottled. The soil in the latter areas is considered the stronger, but has a more rolling topography.

The Bates silt loam is derived from interbedded sandstone and shale, the latter having contributed the greater part of the material. In the southeastern part of the county large fragments of chert occur locally in the substratum. This is apparently derived from limestone lying below the sandstone and shale giving rise to the soil material. The topography of the type is undulating to gently rolling or nearly level. This soil is rarely flat like the Cherokee or Gerald types, but occupies slight slopes and low mounds or hillocks. Practically all of the type can be easily cultivated.

Of the extensive soil types, the Bates silt loam is probably the most highly prized in the county. It is easily cultivated, has good surface drainage and underdrainage, and is more drought resistant than the flat prairie soils. It is used for the production of all the staple crops, such as corn, wheat, oats, grass, sorghum, and cowpeas. Very little of it remains as prairie sod. The soil is well adapted to corn, and with good treatment yields of 40 to 70 bushels per acre are obtained. Red clover does well, and fruit is grown successfully. The application of stable manure results in marked improvement. Lime and commercial fertilizers are used with good results.

In the northwestern part of the county areas of this soil occur in which the surface material is a dark-red or reddish-brown, mellow silt loam, approaching a loam. At about 15 inches the soil grades into a red, friable, silty clay, or silty clay loam changing to a yellowish brown at lower depths. Numerous shale fragments are disseminated throughout the soil and subsoil.

This phase usually occurs on gentle slopes, and the material is well drained and thoroughly weathered. The Bates soils as a whole tend to be more nearly red in such well-drained situations than where the drainage is poor. The phase is more productive than the typical soil and is highly prized for corn and fruit.

There are only a few small areas of this phase, the most important lying 2 miles east of Oskaloosa and in section 3, township 33, range 33.

#### SUMMIT STONY LOAM.

The Summit stony loam consists of a dark-gray to dark-brown silty loam to heavy silt loam, underlain by brownish or yellowish, heavier material. A practically impenetrable stratum of chert with some sandstone underlies the soil at a depth of about 10 to 12 inches. Large chert fragments and some sandstone fragments are present on the surface and in the soil in sufficient quantities to preclude, or at least to interfere considerably, with cultivation.

The type occurs on gentle slopes and as undulating country somewhat higher than the surrounding prairie lands. A part of the type is forested, but most of it is prairie land. It is adapted to fruit

trees. Where the stone fragments are not too numerous, fair to good corn and grain crops are grown. Most of the land, however, is used for pasture.

#### SUMMIT SILT LOAM.

The Summit silt loam as mapped in this county consists of a dark grayish brown or dark gray to black, mellow silt loam, underlain at an average depth of 10 to 15 inches by a grayish-brown or mottled grayish and yellowish, friable heavy silt loam or silty clay loam. This grades at about 20 to 24 inches into a yellowish-brown or yellow, plastic, stiff clay, having in places a greenish tinge or being mottled with shades of brown and yellow. In places the subsoil is a dark-brown, crumbly, silty clay, mottled with yellowish-brown and reddish colors in the lower part. A few chert fragments are scattered over the surface and through the soil, and frequently the lower subsoil contains large quantities of such material. The surface soil in places is nearly black. While this soil is not altogether typical Summit silt loam, not being quite as dark in the surface section and containing more chert material in the subsoil, its origin and general characteristics are sufficiently like those of the established type to warrant correlation with this type.

Several fairly large areas of the Summit silt loam are developed in the southeastern part of the county, where it occupies gentle slopes and broad-topped ridges or slight elevations. Other areas are found in the northwestern part of the county just north of Burgess and in the vicinity of Oskaloosa.

The material is derived from cherty limestone, shale, and sandstone, the latter contributing only a small part of the material.

This soil is considered one of the most desirable in the county. Corn and wheat are grown almost exclusively. Corn yields about 50 bushels and wheat about 20 bushels per acre. Grass, clover, cowpeas, and apples do well. The more extensive growing of clover and cowpeas as a green manure to increase the organic-matter content would materially improve the soil.

Land of this type sells for \$70 to \$100 an acre.

#### SUMMIT SILTY CLAY LOAM.

The soil of the Summit silty clay loam is a black, mellow silty clay loam, grading at 12 to 15 inches into a dark-drab, drab, or olive, heavy, waxey, tenaceous clay, which at about 30 inches usually grades into yellowish or grayish-yellow, friable clay, mottled with different shades of brown and yellow. In places the subsoil is an almost black clay grading below into a drab-colored material. The type is characterized by its black surface soil and heavy subsoil, and is locally known as "gumbo land."

The type is developed in the northwestern part of the county. It occurs in relatively small areas, always at the base of or adjacent to a hillock or ridge. The topography is smooth to gently rolling.

Limestone outcrops and fragments are common to the type, indicating that the soil is derived partly from limestone. Shale, however, is the largest contributor of soil material.

This soil is not very resistant to drought, and crops do not withstand the effects of wet weather very well. The type is highly prized for the production of corn. Large yields of wheat and grass are secured. The lower lying areas receive seepage water from the adjoining higher lands. By providing both surface drainage and underdrainage this land, especially the seepy areas, could be greatly improved

#### CLARKSVILLE GRAVELLY LOAM.

The Clarksville gravelly loam is a gray, fluffy, silt loam, underlain at about 6 or 8 inches by buff or light-red to reddish-yellow brittle or friable silty clay. The soil contains many small, angular chert fragments, frequently in sufficient quantity to make cultivation impossible, or at least difficult. In the smoother areas less gravel is present and cultivation is more practicable. The lower subsoil is a layer consisting principally of chert.

This soil occupies undulating and gently rolling country in the southeastern part of the county. It is derived from cherty limestone.

The type is largely forested with blackjack, black, and post oaks, and hickory. The soil is fairly productive but needs organic matter. It is used for the production of corn and for pasture and orchard land. It is adapted to fruit production. Clover does well.

#### CLARKSVILLE SILT LOAM.

The Clarksville silt loam is a gray or grayish-brown silt loam, underlain at 6 to 14 inches by a yellow to reddish-yellow or light-buff, brittle silty clay, which in the lower portion is generally mottled with red, brown, and gray, becoming lighter in color and texture with increase in depth. Frequently the subsoil below about 18 inches is a brownish, brittle clay. A few small chert fragments are scattered over the surface and disseminated throughout the body of the soil.

The type is not extensively developed. One nearly level to undulating area is found along Muddy Fork of Spring River northwest of Golden City. A somewhat smaller area occurs northeast of Newport.

The material is derived largely from limestone, although sandstone and shale seem to have entered into the composition. The type was originally forested, but is now cleared and used for all the staple

crops. It is best suited to pasture, grass, and small grain. Fruits, berries, and vegetables do fairly well. The soil is rather poor and needs heavy applications of organic matter in order to produce profitable crops. It is easy to handle and responds readily to applications of manure.

#### CHEROKEE SILT LOAM.

The Cherokee silt loam consists of an ashy-gray or brownish-gray, floury silt loam, underlain at 10 to 16 inches by a light-gray or nearly white to pale-yellowish, floury silt loam, somewhat more compact than the surface portion, and often slightly mottled with grayish brown and rusty brown. Small iron concretions are present in some areas. The change from the soil to the subsoil at about 18 or 20 inches is very sharp. The subsoil consists of a brown to dark-drab or nearly black, waxy, plastic, tough, compact, heavy clay, usually faintly mottled with reddish brown in the upper part and with yellowish or grayish in the lower portion. Below 30 inches some areas have a layer of somewhat friable material of a mottled yellow, gray, and drab color. In many places the subsoil is somewhat lighter colored than usual, and is mottled yellowish brown, yellow, and gray. In places, particularly in those areas having a lighter colored subsoil, there is an intermediate thin layer of crumbly silty clay between the soil and the subsoil. A few small areas have the subsoil near the surface, sometimes the surface material having a depth of only 3 or 4 inches, but these are of little importance.

The immediate surface when dry has a very light ashy gray color, and the type is known as "white ashy land." Below this the material has a slight brownish cast, especially when the soil is rubbed between the fingers, but it is not as brown as the soil of the Gerald silt loam. Frequently, however, the Cherokee grades into the Gerald silt loam in such a way that it is difficult to draw a definite boundary between the two types, particularly when the soils are dry, as the surface soil of both is then of an ashy color.

The type occupies flat, level prairie land, which is slightly lower than the surrounding undulating types. Occasionally, smaller areas, occurring along streams, resemble high, flat terraces, but as a rule the type is separated from the stream by a belt of Bates silt loam. It has its greatest development in the west-central part of the county and comprises the large, flat areas of the "Divide."

The Cherokee silt loam is derived from a fine argillaceous shale. It is distinctly a prairie soil, and prairie grass constitutes the original vegetation. At present the Spanish nettle spreads over the ground in cultivated areas to the exclusion of almost everything else during the late summer and fall.

The surface drainage is poor and the underdrainage very incomplete, owing to the impervious nature of the tough subsoil. Open ditches would improve the drainage conditions to some extent. This is not a drought-resistant soil, and frequent shallow cultivation is of especial importance during dry periods.

A large proportion of the type, especially in the western and northern parts of the county, remains in virgin prairie. The grass produces from 1 to 2 tons per acre of hay of good quality. The cultivated areas are used for corn and wheat. Corn yields ordinarily range from 20 to 40 bushels, but in dry years frequently average less than 10 bushels per acre. The type is best suited to grass and small grains, and in recent years the acreage in wheat has steadily increased. It is not considered a strong soil, and commercial fertilizers are extensively used.

Aside from drainage, the two main requisites for successful crop production on this soil are the maintenance of a good supply of organic matter and the conservation of moisture. The soil is naturally deficient in organic matter. This constituent is supplied by applying stable manure or by plowing under cowpeas or any other green-manuring crop. The deeper this is incorporated with the white subsurface soil, the better are the results. An increase in the organic-matter content will result in an increase in the water-holding capacity of the soil. The cultivation of corn with one-horse shallow cultivation beyond the time when corn is usually "laid by" and well into the season, assists in conserving moisture for the crop at a time when it needs much and usually gets little. Owing to the heavy subsoil and flat topography, there is little loss by leaching or washing when commercial fertilizers are used. The application of lime, at the rate of 2,000 to 4,000 pounds per acre, is beneficial to the soil.

The average results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Cherokee silt loam are given in the following table:

*Mechanical analyses of Cherokee silt loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
342801, 342804.....	Soil.....	0.2	0.5	0.6	3.6	8.9	72.3	13.5
342802, 342805.....	Subsoil.....	.5	1.7	.6	3.4	7.6	67.2	18.7
342803, 342806.....	Lower subsoil.	.4	.4	.3	2.4	5.4	45.8	44.9

GERALD SILT LOAM.

The soil of Gerald silt loam is an ashy-brown, dark-gray or dark-brown, mellow silt loam, underlain at 6 to 10 inches by brown or

yellowish-brown, somewhat more compact silt loam faintly mottled in places with rusty brown or gray and containing a few iron concretions. The subsoil, ordinarily beginning abruptly at a depth varying from 12 to 18 inches, is a tough, waxy, compact, heavy clay of a dark-brown or yellowish-brown to dark-drab or nearly black color, more or less mottled with red or reddish brown in the upper portion and with yellow or gray at lower depths. The representative subsoil is essentially similar to that of the Cherokee silt loam. Occasionally the upper portion of the subsoil is somewhat crumbly and has a dark yellowish brown color, mottled with red, gray, or yellow, or all of these. This phase, especially that part in which there is much mottling with red, represents an approach toward the Bates silt loam. It is mainly confined to those areas of the type which have better drainage and a more uneven topography.

Typically, the Gerald silt loam occupies almost flat to very gently rolling or undulating country. It has better surface drainage than the more nearly level areas of the associated Cherokee silt loam. In the flatter areas of the Gerald silt loam the character of the soil approaches that of the Cherokee silt loam, the surface soil being somewhat lighter in color. This, coupled with the fact that the surface soil of both the types dries out to a light-ashy color, makes their separation difficult in places, especially in dry weather. The better drainage of the Gerald silt loam, however, and the more complete oxidation have given rise to a color which is decidedly more nearly brown, both in the surface soil and the subsurface soil. The subsoils of the two types, however, are essentially the same, being in each case a tough, impervious, heavy clay. The material of this type, like that of the Cherokee silt loam, is derived from shale.

The Gerald silt loam is an intermediate soil between the more nearly level Cherokee silt loam on one side and the more uneven Bates silt loam on the other. It is almost invariably associated with the Cherokee, and some small areas of the Cherokee too small to be mapped separately are included with this type, and vice versa.

Although the agricultural value of the Gerald silt loam is unquestionably somewhat superior to that of the Cherokee silt loam, few farmers claim any considerable advantage for the former. A greater relative proportion of the type is under cultivation, but several large tracts remain unbroken, being used for the production of prairie hay. The Gerald is a better corn soil than the Cherokee. The methods of handling and improving the soil, crop adaptations, yields, etc., discussed in connection with the Cherokee silt loam apply also to this soil.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Gerald silt loam:

*Mechanical analyses of Gerald silt loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
342807.....	Soil.....	0.6	1.5	0.6	0.7	4.2	73.5	18.8
342808.....	Subsoil.....	1.9	1.9	.5	.7	2.7	54.2	37.6

NEOSHO SILT LOAM.

The typical Neosho silt loam consists of an ashy-gray floury silt loam, underlain at 8 to 15 inches by a light-gray to nearly white, floury, compact silt loam, containing iron concretions and showing brown ferruginous stains. This passes abruptly at about 18 inches into dark-drab or dark-brown to nearly black, tough, plastic, waxy clay, faintly mottled with grayish or reddish colors, changing to a yellowish gray or drab, mottled with brown and yellow, in the lower part.

The Neosho silt loam occurs principally in the eastern part of the county, in the Muddy Fork of Spring River Valley.

In color, structure, profile arrangement, surface configuration, and crop value this type corresponds very closely with the Cherokee silt loam, but it occupies stream terraces and is composed of old alluvium, deposited when the streams were flowing at higher levels. These terraces vary from a few rods to 1 mile in width, and are 2 to 10 feet above the adjoining first-bottom land. Owing to the flat topography and low position of the type the surface drainage is poor. The soil lacks organic matter, and requires heavy applications of manure and lime. It is droughty, and good cultural methods are of especial value. Deep plowing or subsoiling and the addition of organic matter result in marked improvement in its moisture-holding capacity.

The type is best suited to small grains, grass, and cowpeas. Corn yields are small except where the soil is heavily fertilized.

OSAGE FINE SANDY LOAM.

The soil of the Osage fine sandy loam is a dark-brown to black, mellow fine sandy loam, grading at about 15 inches into slightly heavier and lighter colored material. The lower subsoil is a lighter brown fine sandy loam or loam, with an occasional lense or thin layer of pure sand. The lower stratum generally consists of medium to coarse sand. The greatest difference between the soil and subsoil is in the lighter color of the latter. A few areas of Osage silt loam

and loam, too small to be shown separately on the map, have been included with this type.

The Osage fine sandy loam occurs as areas of bottom land along the small streams. These areas vary in width from a few rods to one-fourth mile. In the wider areas the soil may grade toward the deep, gray silt loam.

The soil material is recent alluvium washed from the surrounding hills. It is one of the strongest soils in the county, and produces good crops of corn, wheat, and cowpeas. The type is adapted to vegetables.

#### OSAGE LOAM.

The soil of the Osage loam is a grayish-brown to dark-brown loam or silty loam, frequently mottled with rusty brown. The subsoil, which is encountered at about 10 to 12 inches, is generally a grayish or dull-yellow loam to fine sandy loam. There is no great change in color or texture of the material from the surface downward. There is a considerable local variation, however, in the texture, the range being from light loam or fine sandy loam through silt loam to silty clay loam.

The type occurs in narrow stream bottoms and as belts adjoining the streams in the wider bottoms. Like the other bottom lands, it is subject to occasional overflows.

The material is derived from the residual prairie uplands. It is largely alluvial, but some of the narrower strips are partly colluvial in origin.

Most of the type was originally forested, but all of it is now in cultivation, and is highly prized as a corn soil. Where the drainage is good this is one of the best soils in the county for truck and potatoes. Alfalfa should do particularly well. The type is quite productive where proper drainage is established, and as a rule requires no special treatment, except the turning under of an occasional crop of cowpeas.

#### OSAGE SILT LOAM.

The Osage silt loam is a dark-gray or grayish-brown to black silt loam, underlain at 12 to 20 inches by a gray, floury, compact silt loam, faintly mottled with rusty brown. At about 24 to 30 inches a plastic silty clay or clay of a dark-drab color, mottled with brown, gray, and yellow, is encountered. In the wide, poorly drained bottoms along the Muddy Fork of Spring River the material has in places a lighter color than the typical soil; the subsurface soil consists of a light, ashy-colored material carrying many iron concretions, and the lower subsoil is a light-gray clay. Although the subsoil of the type is rarely a heavy clay it is rather impervious to the downward movement of water.

The type occurs in the flood plains of most of the streams in the county. It is an alluvial soil, composed of materials washed from the residual prairie soils, carried in suspension by running water, and deposited over the flood plains. Along the smaller streams it is sufficiently elevated to have good drainage, is easily cultivated, and very productive. Most of the type is subject to overflow, and after the surface water has drained off it takes the soil a long time to dry out. Much of the type along the Muddy Fork of Spring River remains forested, and has poor drainage. Willow oak, ash, hickory, elm, cottonwood, birch, and sycamore are the prevailing trees.

Drainage is the most important factor in the improvement of this soil. The rotation of crops and the plowing under of vegetable matter tend to improve the soil. The type is particularly in need of organic matter. It responds readily to the growing of clover and applications of manure and lime.

The lower, poorly drained areas are best suited to grass. The cultivated areas are used for the production of corn and wheat, and in favorable seasons large yields are obtained. The type is considered an especially good wheat soil.

Along the stream banks the soil is a yellowish-brown silt loam or fine loam, underlain by similar textured material somewhat lighter in color. This variation is not developed extensively enough to be shown separately, and is mapped with the main type. It is more productive than the gray, poorer drained part of the type. It is usually elevated somewhat above the main type, representing the natural levees along the streams.

*Osage silt loam, brown phase.*—The Osage silt loam, brown phase, is a brown to dark-brown, mellow, silt loam, grading at about 12 to 15 inches into a brown, friable, silt loam to silty clay loam. The color changes at lower depths to a lighter brown, slightly mottled with gray and yellow. In general there is but a slight variation in the 3-foot section, though the lower subsoil is usually a little lighter in color and slightly heavier in texture than the soil. In places this soil approaches a fine sandy loam in texture, but such areas are too small and irregular to be shown separately on the map.

This phase consists of recent alluvium, and is developed most extensively in comparatively narrow valleys in the northwestern part of the county. It is considered one of the best soils in the county, and is used almost exclusively for the production of corn. Where not subject to overflow, it is an excellent clover, alfalfa, and truck soil.

#### SUMMARY.

Barton County is situated in the southwestern part of Missouri, and has an area of 596 square miles, or 381,440 acres. The topogra-

phy is smooth to gently rolling. The county has a population of almost 17,000. The transportation facilities are good.

The mean annual temperature is 56.2° F., and the average annual rainfall 41.24 inches.

Agriculture is the leading industry of the county, and consists of general farming combined with stock raising. Prairie hay is produced in large quantities on the flat prairie lands. Farm practices as a whole are fairly good, but there is room for improvement in the adoption of systematic crop rotations, the more extensive use of legume crops, especially cowpeas, and of manure and more thorough cultivation. Commercial fertilizers are extensively used. Dairying is becoming a more important industry.

The soils of Barton County are mainly in need of organic matter, and may be greatly improved by any practice which tends to increase and maintain the organic-matter content. Liming is beneficial on the flat prairie land.

The soils may be divided into four broad groups, based on origin—shale soils, shale-sandstone soils, shale-limestone soils, and the alluvial soils.

The Cherokee silt loam and the Gerald silt loam are derived from shale, and occupy the flat upland prairie lands. They have gray surface soils, with heavy clay subsoils, and are low in organic matter. They are best suited to grass and small grain, though corn is extensively grown.

The Bates series, including the fine sandy loam, very fine sandy loam, loam, stony loam, and silt loam types, occupies the undulating and rolling land. These soils are derived from shale and sandstone. They are adapted to corn, cowpeas, and truck.

The Summit stony loam, silt loam, and silty clay loam, and the Clarksville gravelly loam and silt loam are derived from shale and limestone. They are highly prized for corn and wheat, and all but the stony areas are in cultivation.

The Neosho silt loam and the Osage fine sandy loam, loam, and silt loam are alluvial soils. They occur along the Muddy Fork of Spring River and the smaller streams. The first alluvial bottoms are subject to overflow and require artificial drainage, yet they comprise some of the most productive land in the county. The higher areas are suited to corn, wheat, alfalfa, clover, and garden truck.

[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.]

# **NRCS Accessibility Statement**

---

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at [ServiceDesk-FTC@ftc.usda.gov](mailto:ServiceDesk-FTC@ftc.usda.gov). For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at <http://offices.sc.egov.usda.gov/locator/app>.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotope, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.