

SOIL SURVEY OF CRAWFORD COUNTY, MISSOURI.

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LOCATION AND BOUNDARIES OF THE AREA.

Crawford County lies in the southeastern part of Missouri, about 80 miles from the city of St. Louis. It is bounded on the east by Washington County, on the southeast by Iron County, on the south by Dent County, on the west by Phelps and Gasconade counties, and on the north by Gasconade and Franklin counties. The dimensions are approximately 24 miles from east to west and 35 miles from north to south, but the southern boundary is irregular. The land surface comprises about 747 square miles, or 478,080 acres. Steelville, Cuba, Bourbon, and Leasburg are small towns in the county, supported only by agriculture. Steelville, located in the center of the county, is the county seat. Many other smaller stations and post-offices are scattered over the county.

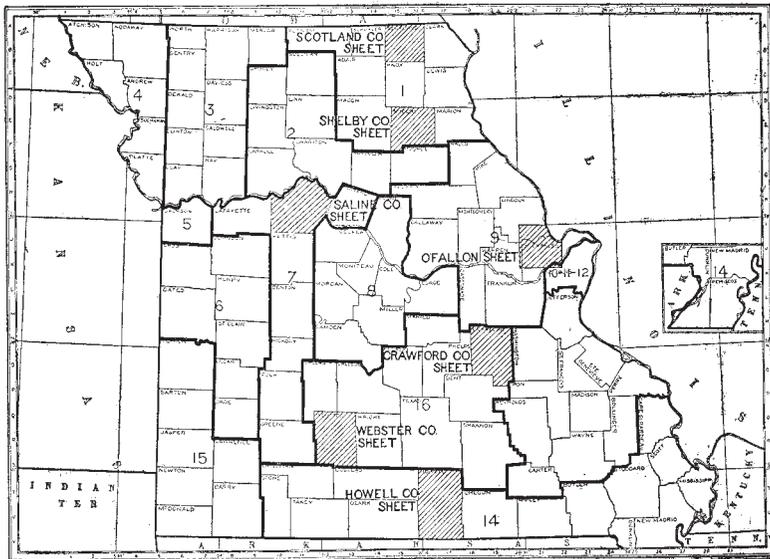


FIG. 36.—Sketch map showing location of the Crawford County area, Missouri.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

The present boundaries of Crawford County were established in 1829, about eight years after the first permanent settlement had taken place. The early settlers, who came mostly from Tennessee, Ken-

tucky, and Virginia, selected bottom lands along the Meramec River or the larger tributaries of that stream. They grew chiefly corn, wheat, and oats, and used the open forest and prairie lands as pasture.

Between the early settlement and the construction of the railroads was a period of slow but steady growth. Mills began to be built in the early thirties. The town of Steelville was founded in 1835. About 1850 settlement extended along the St. Louis and Springfield road, and Cuba, situated on this highway and now the second town in importance in the county, was laid out in 1857.

The Missouri Pacific Railway was extended through the county in 1861, and a branch from Cuba to Salem in 1871. These roads gave great impetus to local industries, especially the mining of lead and iron and lumbering. The latter had a decided influence on stock raising, as wide areas of the open oak forests were cut over and the pasture ruined by the springing up of a dense second growth of oak. The timber was cut mainly for railroad ties.

CLIMATE.

By reason of its elevation, good drainage, and excellent water, Crawford County possesses a very healthful climate.

The data given in the appended table, showing the normal monthly and annual temperature and precipitation, are taken from the records of the Weather Bureau stations at Rolla and Ironton. Rolla is distant 24 miles west from Steelville, and Ironton lies 50 miles southeast of Steelville. The average of the records of these two stations probably represents with fair accuracy the climatic conditions in the county. The rainfall is ample and is fairly well distributed throughout the year, although occasional periods of drought occur during the months of July and August.

Normal monthly and annual temperature and precipitation.

Month.	Ironton.		Rolla.	Month.	Ironton.		Rolla.
	Temperature.	Precipitation.	Precipitation.		Temperature.	Precipitation.	Precipitation.
	° F.	In.	In.		° F.	In.	In.
January.....	31.7	2.80	2.26	August.....	75.9	3.25	3.49
February.....	33.2	3.49	2.70	September.....	66.6	3.01	3.35
March.....	43.9	4.02	3.80	October.....	56.1	2.77	2.40
April.....	55.9	4.11	4.77	November.....	43.0	4.09	2.44
May.....	62.0	5.13	5.08	December.....	34.0	3.17	2.55
June.....	71.9	5.11	4.28	Year.....	54.2	45.33	41.63
July.....	75.7	4.38	4.51				

The dates of the last killing frost in the spring and the first in the fall show a growing season for the tenderest plants of about one hundred and fifty-five days. In a region with so great a difference in

topography there will be local differences in climate, and particularly in the temperature. The difference of even a few degrees, such as may occur between the valleys and uplands, is a very important factor to be considered in the growing of fruits and early vegetables. Sometimes a warm spell in April forces the fruit buds, so that they are killed or damaged by later frost, but on the whole the climate is favorable to the growing of tree fruits, berries, and general farm crops. The weather is usually mild enough to allow the grazing of live stock from the last of April to the first of December.

PHYSIOGRAPHY AND GEOLOGY.

Crawford County lies in the physiographic region known as the Ozark Uplift. Its surface has a general northerly slope. In the central, eastern, and southern parts it is rolling, very broken, or hilly, while the northwest part is only moderately rolling. Consequently there are two distinct physiographic divisions. The main line of the Frisco System is located on the ridge which marks these divisions and forms the drainage divide between the waters flowing into the Gasconade River and those emptying into the Meramec River.

The country to the north of the railroad, comprising about one-fourth of the county, consists of broad, gently rolling to rolling areas, with hilly and rough areas near some of the streams. The elevation at Fanning is 1,057 feet, at Cuba 1,033, at Bourbon nearly 1,000, at Jake Prairie about 970, and at Oak Hill 750 feet. Good drainage for this division of the county is effected through Prairie Valley and Brush creeks and the Little Bourbeuse River and their tributaries. The level areas along the streams give rise to the Wabash silt loam, the gently rolling and rolling areas to the Clarksville silt loam and Gasconade silt loam, and the roughest areas to the Clarksville stony loam.

The second division, including practically all the country south of the railroad, has a very diversified surface configuration. The dome-shaped hills seen here and there usually rise 50 to 75 feet above the surrounding country. Several sink holes, formed by the falling down of the roofs of limestone caverns, were observed. The interstream areas in some places constitute broad, rolling plateaus, but many of the ridges are so narrow that only a small proportion of comparatively gently rolling land is found. The largest body of gently rolling land is found between Steelville and Cherryville. The bottom lands are comparatively level or have a gradual slope with the direction of the flow of the stream. The roughest surface is encountered in the vicinity of the streams. Along many of these steep escarpments are seen, and in some places perpendicular walls of limestone rise from 50 to 150 feet.

The limestone formation is extensive, and consists of hard, close-grained, light to dark gray magnesian rock. The large amount of chert found in the county is due to the resistant character of portions

of this limestone. Although the chert occurs over much of the county, it is more plentiful in the southern and eastern parts. A few areas of thick-bedded, soft, white noncrystalline rock and of slightly crystalline gray limestone were encountered.

The sandstones occur sometimes in massive and sometimes in laminated structures. They vary from a soft crumbling rock to almost quartzite, and in color from white to brown, or even red. Generally they are fine grained and compact, and would make a fair grade of building stone. A few layers of Crystal City sandstone similar to the beds at Pacific were seen.

SOILS.

The soils of Crawford County have been classified into four distinct types. These are so closely related that they merge almost imperceptibly into one another, and in many cases the boundaries had to be arbitrarily drawn. Spots of stony loam, too small to be represented upon the soil map, occasionally occur in the silt loam areas, and vice versa. Small spots of rock outcrop can also be seen here and there.

The following table shows the actual and relative extent of each of the types of soil:

Areas of different soils.

Soil.	Acres.	Per cent.
Clarksville stony loam.....	324,608	67.9
Clarksville silt loam.....	109,760	23.0
Wabash silt loam.....	42,112	8.8
Gasconade silt loam.....	1,600	.3
Total.....	478,080

CLARKSVILLE STONY LOAM.

The soil of the Clarksville stony loam consists of a pale yellow to gray stony silty loam, with a depth of 8 to 15 inches. Gravel or fine angular fragments of chert occur in nearly all areas of this soil, varying in quantity from 5 to 30 per cent, while the proportion of large stones ranges from 10 to 60 per cent. Sometimes where there is a large quantity of small fragments there will be a small percentage of large stones, and vice versa. Occasionally in small spots the surface is completely covered with cherty fragments and is practically devoid of soil. In a few places sandstone rock caps the limestone on the hills, thus giving a shallow sandy loam soil, practically useless for agriculture. Such areas are too small to be represented upon the soil map. Spots of black silty loam are frequently seen at or near the foot of the hillsides, where there has been a considerable quantity of organic matter deposited and where a thick forest growth still exists. The

less stony areas on the gentle slopes are not difficult to till, as a large proportion of the fine material is silt.

The subsoil is a heavy red clay, tenacious and compact, and highly charged with iron. Bordering the Clarksville silt loam in several places the subsoil is a brown or chocolate-colored silty clay. As a rule, in typical areas there are only small quantities of stones in the subsoil, but in some places the subsoil is completely filled with broken fragments of chert and grades into the bed rock. The limestone outcrops in many places on the stream banks and hillsides.

The Clarksville stony loam is the most widely distributed type and covers a little more than two-thirds of the county. The largest unbroken areas lie in the southern and eastern parts of the county. In the northwestern part it occurs in small bodies and narrow strips scattered throughout the Clarksville silt loam areas.

The topography of the Clarksville stony loam is rough and broken. It possesses the widest range in elevation of any type in the county. The highest point is near Dillard, in the southeastern part of the county, and it gradually slopes to the north to the Meramec River. The type occupies the hillsides, ridges, and rolling areas. Some of the hillsides are quite precipitous, rising 200 feet or more in less than one-fourth of a mile. The streams have cut deep, narrow channels, and the areas are badly dissected. A few dome-shaped hills loom up over the county, while some sink holes here and there indicate the former presence of large caverns beneath the surface.

The Clarksville stony loam, by reason of its rolling and hilly topography, has excellent natural surface drainage. The rain water runs down the hillsides so rapidly that severe erosion sometimes takes place. The soil is warm and early, and yet owing to the character of the subsoil retains considerable water, while the stones not only tend to prevent washing, but also help to mulch the surface and conserve moisture.

The Clarksville stony loam is a residual soil, derived chiefly from the limestone formations. However, in a few places it is modified to a very limited extent by the weathering of a sandstone formation, which occasionally caps the limestone hills. The softer parts of the limestone have been thoroughly weathered, while the more obdurate parts are left as cherty fragments. Cellular limestone and quartz crystals also occur in the soil.

Only a very small proportion of the Clarksville stony loam is cultivated. In some localities the type still supports some merchantable timber, chiefly oak. In places a good quality of cross-tie timber is found, while in some other areas only mine props and cord wood can be secured. The largest wooded areas have been cut over during the last fifteen years, and on these there has grown up a dense growth of oak brush. The clearing of such areas, not necessarily for cultivation,

but to enable the native grasses to grow again and fit them for use as pasture, is a difficult matter. In some cases it can be done cheaply by cutting and burning the sprouts, but in others this is not feasible. Goats have been used and are said to do the work well, and at the same time to give a profit from the sale of their increase.

The Clarksville stony loam is admirably adapted to grazing purposes when the land is cleared of brush so as to allow the native bluegrass and white clover to grow in profusion. It is also adapted to apples, pears, plums, grapes, and peaches. Tobacco can be grown in a limited way on the more gently rolling and less stony areas. Although not suited to general farming purposes, the soil when manured produces fairly good crops of corn, wheat, clover, potatoes, and berries.

Land of this type sells at from \$3 to \$10 an acre, depending on location and distance from the railroad. Much of it is held by nonresidents and corporations on account of its prospective mineral value.

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

Mechanical analyses of Clarksville stony loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
13450, 13454.....	Soil.....	1.2	4.2	6.9	9.1	4.4	53.7	19.1
13451, 13455.....	Subsoil.....	.2	1.1	2.1	2.4	1.5	21.9	69.9

In a wire-basket test, using a sample of virgin soil, this type produced a remarkably large growth of plants, and the results indicate that it is not in need of any kind of fertilization. A very small increase in growth was obtained by the use of cowpeas and lime, also with nitrate of soda. Acid phosphate, sulphate of potash and lime, used separately or in combination, failed to increase the growth of plants. In this test only the fine earth was used. In the fields stone and gravel constitute about half of the soil. The soil is also shallow, and continuous cropping would probably cause it to decline rapidly in crop-producing power and to make fertilizers necessary at an early period.

In these tests wheat plants were used as an indicator, and the results obtained are not held to be applicable to unrelated crops or to soils which have had their productiveness reduced by cropping.

CLARKSVILLE SILT LOAM.

The Clarksville silt loam, known locally as "clay ridge" land, is the second most extensive type in the county, covering 109,760 acres, or 23 per cent of the area surveyed. The surface soil, which has an average depth of 7 inches, consists typically of a gray, ash-colored, or pale

yellow silt loam, with a variation in some places to a brown color. The subsoil, for a few inches or sometimes to a depth of 36 inches, is a heavy silt loam, usually grading into a brown silty clay. Sometimes this clay is found immediately beneath the soil and rests on a light friable loam, lying on the unweathered sandstone or on a mass of soil and broken rock. Another variation in the subsoil occurs in some areas along the Meramec, where a red clay is found. Occasionally a blue clay, tough and tenacious when dry, and plastic and sticky when wet, occurs at a depth of 30 or 36 inches.

The largest areas of the Clarksville silt loam are found in the north-western part of the county. The main line of the St. Louis and San Francisco Railroad forms the general boundary between the area where this type preponderates and that where the Clarksville stony loam forms almost the only type. Several bodies of the Clarksville silt loam are located in the south-central part of the county between Steelville and Cherryville and to the west and east of Steelville. Many smaller areas are scattered over the other parts of the county.

The general surface of this type is gently rolling and rolling, while in the southern part of the county it occurs on the flat to gently rolling tops of the largest interstream areas. On the hillsides the surface is quite rolling, but several gently undulating second-bottom areas were observed. Generally the type occupies the highest elevations in the vicinity where it occurs, being well developed about the 1,000-foot contour, though it is found in some places at only 750 feet above sea level.

Owing to the rolling surface, the drainage is good. The subsoil in most areas does not allow the free passage of seepage waters, though in some cases it is more friable and the subdrainage is adequate. Open ditches and tile drains would prove beneficial in draining out this soil in many places. An idea of the general condition of the subdrainage may be gained from the fact that cattle are provided with watering places by simply digging a hole to a depth of 2 or 3 feet and puddling the subsoil. Such places fill with water during the rains and afford practically the only source of water used by stock on this type.

The Clarksville silt loam is a residual soil and is probably derived from the weathering of limestone. It is modified to some extent by the weathering of the fine-grained sandstone that immediately underlies the greater part of this type. A few sandstone fragments occasionally occur on the surface. The limestone, being susceptible to the forces of weathering, has entirely broken down, forming a silt loam, while the sandstone, being more resistant, has been less thoroughly weathered. In the northeastern part of the county, along the Meramec River, the subsoil, as before stated, is a red silty clay, and here a few limestone fragments were seen on the surface.

The Clarksville silt loam is cultivated extensively, but there still remain large areas covered with brush and some smaller, more heavily timbered areas. Corn is one of the principal crops, and yields from 10 to 40 bushels per acre. Wheat yields from 5 to 15 bushels. Timothy does fairly well, while clover gives good returns upon a part of the type. Apples are one of the money products from this soil, and many orchards were observed. Peaches, pears, plums, and grapes are grown to a limited extent. Alfalfa has been tried, and does fairly well. Tobacco is grown only for home use. Berries, sweet and Irish potatoes, and vegetables do fairly well. The Clarksville silt loam in its natural state is a comparatively unproductive soil, but it is capable of being brought to a high state of productiveness if properly managed. In many places the soil is acid, more especially in some of the flat forested areas, where drainage is imperfect. This acidity can be corrected by applying lime. The soil is decidedly deficient in organic matter. This should be supplied by turning under clover or cowpeas and by using barnyard manure. By liming the soil and inoculating it, clover ought to give good yields. Apple orcharding is suited to this soil where the bed rock is more than 3 feet beneath the surface. Tobacco, cantaloupes, and berry crops should be more extensively grown, as they would likely prove profitable crops.

The improved land of this type around Cuba sells at from \$20 to \$30 an acre, while some of the unimproved, several miles distant from the railroad, can be bought at from \$5 to \$10 an acre.

The average results of mechanical analyses of typical samples of the Clarksville silt loam are shown in the following table:

Mechanical analyses of Clarksville silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
13444,13448.....	Soil.....	0.7	2.0	2.4	8.6	10.7	51.1	24.5
13445,13449.....	Subsoil.....	.1	1.5	2.9	5.8	1.5	44.5	43.5

In order to ascertain the manurial requirements of this soil a large sample was collected and tested by the wire-basket method. The field from which the sample was taken has been in cultivation over twenty-five years, no manure or commercial fertilizer being used. The field is now in orchard, being cropped between the trees, but has been uncultivated half the time for the past eighteen years. The average yields are low, that for corn being 20 bushels, wheat less than 10 bushels, oats less than 20, and potatoes 50 to 100 bushels.

The results of the wire-basket tests indicate that a good increase in productiveness may be obtained by the use of cowpeas and lime, or by acid phosphate alone, or in combination with sulphate of potash,

or nitrate of soda; and that a very small increase may be obtained by the use of sodium nitrate, sulphate of potash, lime, or a complete fertilizer.

In these tests wheat plants were used as an indicator, and while the results are held to be strictly applicable only to related crops and to the particular field from which the sample was taken, it would seem that they might prove of more general value, as a large extent of this soil is under like conditions of cultivation.

WABASH SILT LOAM.

The Wabash silt loam, to a depth of 10 to 12 inches, is a light-brown to a dark or reddish-brown silty loam. It is spoken of locally as "bottom land" or "valley land," the latter name applying to the narrow strips along the small streams. The greater part of the type is free from stones, but there are a few small stony and gravelly areas in some localities. Spots of sandy loam are not of infrequent occurrence. The subsoil is a heavy brown silty loam, usually grading into a silty clay or a clay loam at 24 inches. In a few places the subsoil is a drab clay loam, tenacious and somewhat plastic, and sometimes at 20 inches a gravelly loam is found. Sand bars and gravel beds of insufficient size to be represented upon the map are found in many places along the streams.

The Wabash silt loam is fairly well distributed along the streams in all parts of the county. It occurs in long, narrow bands, varying from one-sixteenth to one-half mile in width. Its greatest development is along the Meramec River, Little Bourbeuse River, Huzzah, Courtois, Dry, Crooked, and Brush creeks. The areas generally lie only a few feet above the normal water level of the streams, and are subject to occasional overflow, but crops are seldom destroyed by high water.

The drainage of the greater part of the type is fairly good, especially where the gravelly loam subsoil is found. There are a few wet areas devoted to natural meadows and pastures that will have to be ditched before grain crops can be grown upon them.

The Wabash silt loam in the main is of alluvial origin and consists of fine sediments which have been brought down from the stony loam and silt loam areas and deposited by the streams. It is considerably modified in many places by colluvial wash, giving rise to the gravelly spots and other irregularities of the type. Each overflow deposits a thin coating of sediment, and this annually enriches the soil in many places.

The Wabash silt loam is naturally the most productive soil in Crawford County, and was so recognized even by the pioneer settlers. Generally the surface is regular and the soil is easily tilled, the use of machinery being practicable. Most of the type has been under con-

stant cultivation for many years, and good yields are still obtained. Corn averages from 25 to 50 bushels per acre, wheat 10 to 25 bushels, timothy 1 to 2 tons, and clover does exceedingly well. Alfalfa, judging from the few fields seen, would be a profitable crop if introduced more generally. Potatoes, berries, garden vegetables, and melons do well. A part of the type is in natural meadow or forested with sycamore, oak, walnut, and other hardwoods. The soil seems best adapted to corn and grass crops, although it is a good general-purpose soil. The more sandy spots are well suited to berries, cantaloupes, and melons. Some good fruit can be grown on areas situated on the gravelly phase at the heads of the valleys or in coves. The improved land of this type sells at about \$40 an acre.

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

Mechanical analyses of Wabash silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
13438.....	Soil.....	0.4	2.5	3.4	6.6	3.2	62.3	21.6
13439.....	Subsoil.....	1.2	2.9	3.1	6.2	4.8	53.5	27.9

In order to ascertain the manurial requirements of this soil a large sample was collected from a field that had been in cultivation many years and received no manure or commercial fertilizer. No data concerning the crops grown on this particular field is available. The results of the tests indicate that a moderate increase in productivity may be obtained by the use of cowpeas and lime or stable manure, but that commercial fertilizers in any form will not prove beneficial.

In these tests wheat plants were used as an indicator and the results obtained are not held to be applicable to unrelated crops or to fields which have received treatment different from that from which the sample was taken.

GASCONADE SILT LOAM.

The Gasconade silt loam, to a depth of from 8 to 12 inches, is a dark-gray to black silt loam. The subsoil, to a depth of 36 inches, is a mottled heavy silt loam, grading imperceptibly into a gray and red mottled silty clay, which in some places extends to a depth of several feet and in others rests upon unweathered limestone at a depth of 4 to 6 feet. The silty clay is frequently quite plastic and tenacious, showing a rather large percentage of clay.

The Gasconade silt loam is confined exclusively to the northwest corner of the county, where it occurs in three areas. The largest body

lies just north of the town of Jake Prairie. It occupies the gently rolling and rolling uplands, with an elevation of about 950 feet. Its rolling surface insures good surface drainage for the greater part of the type, but in a few places open ditches or tile drains would prove of considerable benefit.

The soil is residual in origin, being derived from the weathering of limestone rock, probably the Jefferson City limestone. A few limestone fragments are sometimes seen on the surface, while the bed rock is only a few feet beneath the surface in several places.

The Gasconade silt loam is a productive upland soil. Nearly all of the type is under cultivation. Corn averages from 20 to 45 bushels per acre. Wheat, timothy, and clover do well. Apples, peaches, plums, and berries give fair returns. Alfalfa, although an untried crop on this type, would, it is thought, prove profitable.

Land of this type of soil is worth in open market from \$20 to \$35 an acre, depending upon improvements.

Below are given the results of mechanical analyses of typical samples of this soil:

Mechanical analyses of Gasconade silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
13456.....	Soil.....	0.3	1.8	1.3	2.5	3.1	67.1	23.5
13457.....	Subsoil.....	.3	1.6	1.5	3.0	1.2	57.5	34.9

AGRICULTURAL METHODS.

The soils are seldom plowed to a greater depth than 5 inches, while, considering their texture and tendency to wash, they should be broken to at least 8 inches and preferably 10 inches. The depth should, however, be increased gradually from year to year, so that only a little of the subsoil will be brought to the surface at any one time. In connection with this deeper plowing there is need for a more careful pulverizing of the soil before the seed is sown and often more frequent cultivation during the progress of growth.

In the transition from the open-range system of cattle raising to the less extensive agriculture developing in the county it is but natural to find practices more or less inadequate, in certain particulars, to the new order of things. For instance, too little attention is paid to the accumulation, protection, and proper use of barnyard manure. Much live stock is kept, the soils produce the grasses luxuriantly, and there is every opportunity to increase the productivity of the soils through the natural method of applying to them unleached composted animal waste.

The matter of the rotation of crops has also been given but little attention by the farmers of Crawford County as a whole. At present the prevailing practice on the upland soils—Clarksville stony loam and Clarksville silt loam—is to sow clover in the wheat and to plow the clover sod the second year and again sow wheat, the clover reseeding itself. It is said to be unprofitable to keep the fields in clover longer than one year. Very little corn is grown in the upland, because of drought, so that under the present practices this crop would not generally do as one in a more extended rotation, although with the deeper plowing of the soil and the incorporation of coarse manures the moisture conditions may be so improved as to permit a much more general use of corn upon the uplands than at present. Cowpeas and alfalfa do well, however, and the former could be included in the rotation where a short rotation is desired and alfalfa in a more extended scheme. By sowing timothy with clover the fields can be kept in grass for three years instead of one, as where clover is sown alone. Owing to the prevalence of rust, the farmers have practically abandoned the production of oats. This crop may be grown, however, whenever the season will permit sowing as early as March. With these local conditions in view a complete rotation, as practicable as any that now suggests itself, would be: Corn, cowpeas, wheat, oats, clover and timothy. Manure should be applied to the clover and timothy sod before plowing.

The production of apples is the most prominent agricultural specialty in the county, and a large area of land has been given to the orchards. A good many have failed in their efforts to establish orchards on a paying commercial basis. In so far as these failures have been the result of improper orchard management or mistakes in the selection of varieties, the question is outside of the domain of the soil survey, but in a number of instances noted the main trouble was the selection of orchard sites where soil conditions were not favorable to tree growth. Surface conditions can not be trusted to determine the suitability of given areas to deep rooted growths like the apple tree. In all cases where there is any doubt as to subsurface conditions borings should be made and no plantings attempted where bed rock is found within 3 feet of the surface. The selection of sites for orchards should also be governed by the question of air drainage, and positions likely to be subjected to erratic frosts avoided as far as practicable.

AGRICULTURAL CONDITIONS.

The farmers in Crawford County have been generally prosperous for the last few years. The drought of 1901 left many of them in debt, but they readily recovered from this temporary setback and are now gradually improving in a material way. The best farm dwellings, which consist of neatly painted frame buildings, are seen on the

Clarksville silt loam, in the vicinity of Cuba, Jake Prairie, and Oak Hill, and on the Wabash silt loam along the Meramec River and Huzah and Courtois creeks. The buildings on the Clarksville stony loam are usually log houses, and the general surroundings would indicate less prosperous conditions, yet it frequently happens that here the farmers have considerable means and are making a comfortable living easily. While a few good barns are seen in the county, the most of them are small and inadequate for storing the crops, housing the stock, and protecting the machinery. As a rule considerable improved farm machinery was seen on every good farm, and even the small farmers have binders, mowers, and improved plows.

About 70 per cent of the farms in Crawford County are operated by the owners. A few farms are let for a cash rental, a few are operated by managers, and others are rented for a share, usually one-third of the crops. The cheapness of land enables those of even limited means to own their farms. According to the census of 1900 the average size farm in the county contains 139 acres. Of the total land surface only about one-half of it is included in farms, while of this amount possibly not more than 100,000 acres are improved lands. Large tracts of undeveloped land are held by individuals and corporations for an advance in price or for their prospective mineral values.

The farm laborers are practically all American-born whites. Labor is quite scarce, although fair wages are paid. The wood and cross-tie industries and mining interests call into service most of the transient workers, paying them higher wages than the farmers can afford to pay.

Corn is and has been one of the main crops in Crawford County, being grown to a more or less extent on each type of soil. Wheat is also quite widely grown. Clover ranks first as a hay crop, while a considerable quantity of timothy is produced. Oats, potatoes, and vegetables, together with some sorghum, millet, tobacco, buckwheat, and broom corn, are all grown for home consumption. Of the fruits, apples are most important, and many orchards of healthy trees are found. The early apples, of which only a few are grown, are the Red June, Red Astrachan, and Early Harvest. The next to ripen is the Maiden Blush. The Jonathan, quite widely distributed, is an early fall apple. Of the winter varieties, the Ben Davis is the leading commercial variety, while the Winesap, Missouri Pippin, Huntsmans Favorite, and Grimes Golden are grown in considerable quantities. A few peaches, pears, plums, grapes, and berries are grown.

Beef cattle, hogs, sheep, and poultry are among the important products of the county. The cattle run at large over the greater part of the county and are raised ordinarily at little expense. Several carloads of hogs are shipped annually. A considerable quantity of wool is shorn, and many lambs are sold. Poultry in carload lots and a

large quantity of eggs are exported. Dairy products are less important, and this industry can be greatly extended. Other sources of income to the farmers are cord wood, cross-ties, and mine props.

To emphasize a few of the salient features of the soils found in this survey a brief review is given here. The Clarksville stony loam is undoubtedly suited to grazing purposes on a large scale when cleared of the growth of brush now covering so large a part of it. It is also adapted to apples, pears, plums, grapes, and peaches. Only a small percentage of it is suited to general farming.

The Clarksville silt loam, while not a productive soil in its present state, can be made productive by green manuring, liming, etc. It is well adapted to apples where bed rock is more than 3 feet below the surface. Only fair yields of corn, wheat, and clover are secured. Alfalfa, tobacco, cantaloupes, grapes, and berries can in all probability be grown profitably on a commercial scale.

The Wabash silt loam is the best corn, clover, and timothy soil in the county. Good wheat is also grown. Alfalfa will do well. The sandy spots of this type are suited to melons and vegetables.

The Gasconade silt loam is a good all-round upland farming soil adapted to the crops of the county, including alfalfa.

Crawford County is well situated as regards transportation facilities. The main line of the St. Louis and San Francisco Railroad crosses the northwest portion of the county, while the Salem Branch of the same system runs south from Cuba through the county. In the southern part of the county there are three short railroad lines which are used chiefly for the transportation of iron ore, wood, etc. These are the Cherry Valley Railroad, Sligo Branch Railroad, and Sligo and Eastern Railroad. The dirt roads are, as a rule, in a bad condition. They could be macadamized economically, as the cherty limestone, an excellent material, is near at hand. Better roads would do much toward the advancement of agriculture in the county. More bridges should be constructed across the Meramec River, as often after a rain it can not be forded.

The market for practically all the products of Crawford County, as well as this section of the State, is St. Louis, which is less than 100 miles distant. The apples are usually sold to buyers who come into the county and superintend packing. They are shipped to cold storage plants in St. Louis. The cattle, hogs, and most of the poultry also go to this city.

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