

SOIL SURVEY OF WINNEBAGO COUNTY, ILLINOIS.

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LOCATION AND BOUNDARIES OF THE AREA.

Winnebago County is one of the most northern counties in Illinois, situated along the Wisconsin line, about midway between Lake Michigan and the Mississippi River. Boone, Ogle, and Stephenson counties form its eastern, southern, and western boundaries, respectively. The county lies between north latitude $42^{\circ} 12'$ and $42^{\circ} 30'$ and west longitude $88^{\circ} 55'$ and $89^{\circ} 24'$. Chicago is less than 100 miles distant to the southeast. In shape the county is almost square; the eastern half, however, extends about $3\frac{1}{2}$ miles farther south than does the western. The distance through the county from north to south and from east to west is about 24 miles. The area of the county is 526 square miles, or 336,768 acres.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

The first white man to make his home within the present area of Winnebago County was Stephen Mack, who built a cabin in a grove about one-half mile above the mouth of the Pecatonica River

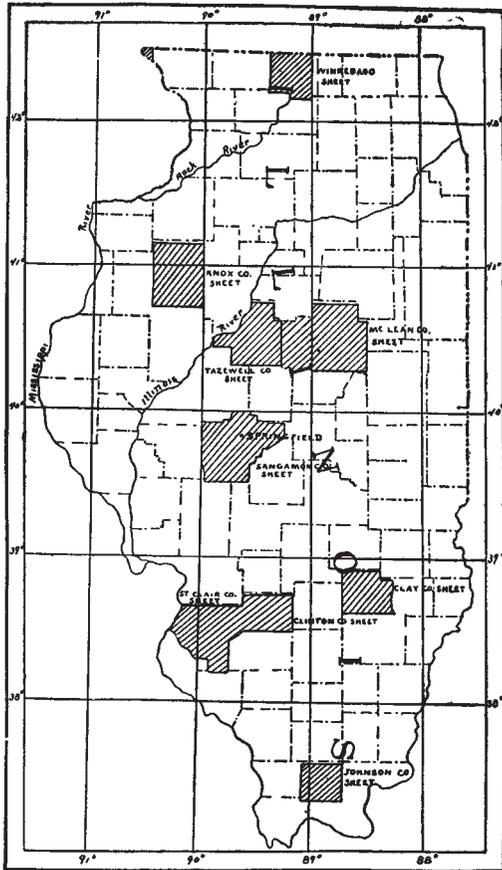


FIG. 37.—Sketch map showing location of the Winnebago County area, Illinois.

some time about 1829. The settlement of the county, however, really began when, in 1834, Germanicus Kent and Thatcher Blake erected their log house on the north side of Kents Creek, within the present limits of the city of Rockford. Settlements rapidly spread from this point, and by 1845 had reached to every part of the county. In 1835 rapid immigration set in, and was kept up from this time forward. In 1837-38 it was phenomenal. The roads were thronged with immigrants, many of them driving cattle, horses, and hogs. The census of 1840 showed a population of 4,609.

As the number of inhabitants increased the necessity for some kind of local government became apparent, and in the summer and fall of 1835 an agitation looking toward the organization of a county was begun. In January, 1836, an act was passed by the legislature creating the new county of Winnebago—so called from the tribe of Indians of that name which once inhabited the region. As originally constituted it included all of its present area and the whole of Boone County and two tiers of townships along the western border of Stephenson County. Its present boundaries were established in the winter of 1836-37.

The early settlers came principally from the New England States and New York. Very few came from the South. The Irish were found in considerable numbers among the first immigrants. About 1850 Swedes began to arrive, and their numbers have increased until they form a large and important part of the population. The Scotch have a large settlement around Argyle, which was founded about 1834. Some Germans have come in also.

The general appearance of the country when first visited by the white men was quite different from what it is to-day. Much of it was prairie. A broad area extending through the center of the county in a northeast and southwest direction was almost entirely treeless. Other portions of the county contained a considerable amount of timber. The bottoms along the Rock River had very few trees upon them. The bottoms and bluffs along the other streams were generally heavily timbered. The prairies were covered with grass and flowers and furnished fine pasturage. The first settlements were made in the timber but soon spread to the prairies, and their natural covering of wild grass and flowers rapidly gave place to fields of grain.

The crops usually grown in this section of the country were planted by the early settlers, and the primitive methods of that time were employed in the cultivation and harvesting of these crops. Corn, oats, and wheat were staple products, and the first two of these are still the most important grains grown. Wheat was tried for several years, and as late as 1875 nearly 2,000 acres were sown in Winnebago Township alone. It winter-killed badly, and was also attacked by insects and diseases. Spring wheat was introduced, but was not con-

sidered a very profitable crop, and its production has decreased until practically none is grown at the present time. Broom corn was at one time grown in considerable quantities, especially around Cherry Valley, where two broom factories were located. In 1877 one farmer in this locality planted 300 acres in this crop. Its production has been discontinued. The raising of stock has always been given much attention by the farmers of Winnebago County, and its importance has increased until it is now one of the leading industries.

The agricultural development of Winnebago County has been gradual, but substantial. Lack of transportation facilities for marketing the surplus products was a retarding influence in its early history. The building in 1852 of what is now the Chicago and Northwestern Railroad was a great stimulus to production.

An agricultural society, organized in 1841, has been of much assistance to the farmers, and to it is due much credit for the development of the agricultural resources of the county.

CLIMATE.

The Weather Bureau has three stations in Winnebago County, and the following tables were compiled from its records at these places:

Normal monthly and annual temperature and precipitation.

Month.	Kishwat see.		Winnebago.			Rockford.	Month.	Kishwaukee.		Winnebago.			Rockford.
	Temperature.	Precipitation.	Temperature.	Precipitation.	Precipitation.	Temperature.		Precipitation.	Temperature.	Precipitation.	Precipitation.		
	° F.	Inches.	° F.	Inches.	Inches.		° F.	Inches.	° F.	Inches.	Inches.		
January.....	20.1	2.53	20.9	2.05	2.64	August.....	70.0	3.14	70.9	3.24	3.07		
February....	21.6	2.25	20.5	1.76	2.43	September..	62.9	2.73	63.2	3.42	3.18		
March.....	32.3	2.55	32.0	2.63	2.59	October.....	51.2	2.85	51.2	2.21	2.74		
April.....	48.3	3.13	48.4	3.12	2.79	November...	36.2	2.29	34.9	2.03	2.38		
May.....	57.8	3.90	58.1	4.08	4.14	December...	27.2	2.12	26.2	1.79	2.21		
June.....	69.7	4.42	69.5	3.98	4.65	Year.....	47.6	35.44	47.4	34.05	36.95		
July.....	73.9	3.53	73.5	3.74	4.13								

The average annual rainfall for the three stations is 35.48 inches. This is not uniformly distributed throughout the year. Of the total rainfall 18.57 per cent falls in winter, 27.17 per cent in spring, 31.88 per cent in summer, and 22.38 per cent in fall. June is the wettest month, with an average of 4.35 inches, and December, with an average of 2.04, is the driest. The rainfall in August is very variable. The irregular distribution of the precipitation throughout the year is of great advantage to agriculture, as the greatest amount occurs during the growing season, when a copious supply of moisture is necessary for the maturing of the crops. There is greater danger of loss from a deficiency than from an excess of moisture, but there is never a total loss from either cause, unless it be upon a soil which is underlain near the surface by a bed of gravel or sand.

The annual precipitation has varied widely, from a minimum of

23.90 inches in 1874 and 25.12 in 1891 to a maximum of 49.93 inches in 1892 and 47.65 inches in 1884. It has been stated^a that "a month with a rainfall of not more than 2 inches may usually be considered as a dry month, especially in spring or summer." During the twenty-seven years that records have been kept at Rockford, there have been 7 Aprils, 3 Mays, 3 Junes, 5 Julys, 11 Augusts, and 12 Septembers which have shown less than 2 inches of rainfall.

Winnebago County has cold winters and warm summers. January, the coldest month, has an average temperature of 20.5° F., while July, the hottest month, gives an average of 73.6° F. The average temperature for the year is 47.5° F. The temperature often undergoes great variation within short periods of time.

PHYSIOGRAPHY AND GEOLOGY.

The surface features of Winnebago County are those of a rolling plateau, through which the streams have carved out valleys of irregular width. The rolling plateau is traversed by the extensive valleys of the Rock, Pecatonica, Sugar, and Kishwaukee rivers, as well as by minor ones along the smaller streams. The streams usually follow their preglacial valleys, but Rock River, below the mouth of the Kishwaukee, and the latter stream from New Milford to where it forks, do not follow preglacial lines, and their valleys here are very narrow. Rock River, instead of turning to the southwest below Rockford, continued southward, and the old valley is still plainly discernible. Above the mouth of the Kishwaukee the valley of Rock River varies from 2 to 5 miles in width and is marked by a broad, level to gently rolling terrace about 50 feet above the stream. Sometimes there are three or four terraces present. The Pecatonica and Sugar rivers have valleys from 1 to 3 miles wide, but the gravel terrace, which is a constant feature along the Rock River, is absent, and the bottoms are low and often wet. The valleys along the minor streams are often very irregular in width, due probably to the partial filling in of portions of them with glacial material. Generally the valleys are inclosed by bluffs from 50 to 150 feet in height, but sometimes they slope gradually into the uplands without any prominent line of demarcation.

The upland is less broken, depending somewhat upon the distance from the larger streams. The surface is rolling and uneven, with many undulations and only very limited areas of level land. Although the entire county has been subjected to glacial action, the deposit of drift material is so thin, especially west of Rock River, that the general character of the surface is determined very largely by preglacial topography. During a long period preceding the advance of the ice sheet the country was subjected to the ever active agencies of erosion, and many valleys were carved out, between which were left ridges of

^a Bul. No. 86, Ill. Exp. Sta.

limestone. These valleys were usually only partially filled with glacial material, and the limestone ridges, with their thin covering of drift, form a prominent feature of the landscape, especially in the central, northwestern, and northeastern parts of the county. There are, east of Rock River, drumlinoidal ridges of till, which, with the associated knolls of nearly conical form, give to the surface a semimorainic aspect. The surface in Winnebago and Seward townships is less rolling and broken, while the opposite is true in the northwestern and northeastern portions of the county.

The valleys usually lie between 700 and 800 feet above sea level and the uplands between 800 and 900 feet. In the southwestern, northwestern, and northeastern parts of the county are areas which rise to an elevation of more than 900 feet. The highest point is in Laona Township; the lowest is where Rock River leaves the county, the former being 990 feet and the latter 680 feet above tide water. This gives a vertical range of 310 feet.

The geology of Winnebago County is not complex. The underground geology consists of nearly horizontal beds of Lower Silurian limestones. This formation is here represented by the three well-known divisions of the Trenton, outcrops of which are seen along the streams, on the hills, and in the railroad cuts. The uppermost division is the Galena, a yellowish or cream-colored, porous, crumbly limestone, with many sand cavities. This rock is used as piers for bridges, for burning lime, and for road material. It is found principally south of the Pecatonica River, and has a thickness of about 100 feet. The middle division is the Blue limestone, a thin-bedded bluish-gray limestone, with a thickness of about 35 feet. It is developed chiefly in the northern and northwestern parts of the county. Underlying this formation and outcropping along some of the streams is the Buff limestone, estimated at 45 feet in thickness. A few outcrops of St. Peter sandstone were seen in the northwestern part of the county, and it must come near the surface in the vicinity of Rockton and Beloit.

The underground formations sometimes outcrop, but they are usually buried beneath a coating of glacial debris or drift. This drift is composed of a heterogeneous mass of ground-up rock fragments, containing boulders, gravel, sand, silt, and clay in varying proportions, deposited during the movements of the great continental ice sheet over this portion of the country. There are some local spots of almost pure sand and gravel, but the drift usually contains enough fine material to give to it a somewhat sticky character and to enable it to stand up in almost perpendicular sections.

There have been at least two different periods of glaciation in Winnebago County. The Illinois glaciation covered the entire area, and was followed at a much later day by the Iowan. Leverett^a gives the

^a Mon. 38, U. S. Geol. Survey, pp. 131-132.

western boundary of the Iowan as following the valleys of Sugar and Pecatonica rivers to the western boundary of the county, thence returning eastward to Rockford, following very closely the old State road, thence south, a little west of Rock River, to where this stream leaves the county. The deposits west of this irregular line he classes as "probably" Illinoisan. It will be noticed on the map that the soils in the latter area are much more uniform than in other portions of the county.

The drift varies a great deal in thickness. West of Rock River the coating is very thin, except in the preglacial valleys, and wells usually enter rock at less than 20 feet. East of the river there is generally a heavy deposit of drift, and rock is seldom struck at less than 100 feet, while along and near the border of Rock River Valley the preglacial valley floor is from 250 to 300 feet below the present stream bed.

In some portions of the county, especially in Winnebago, Seward, Durand, and East Guilford townships, the drift is covered to a depth of from 1 to 10 feet by a deposit of loesslike silt. This silty layer usually rests directly upon the unweathered glacial material, but two instances were noticed in the western part of the county where the two are separated by a dark layer, or old soil, about 2 feet thick, showing that here a considerable length of time elapsed between the periods of deposition of the two.

The terraces along Rock River, composed of a thick bed of water-worn gravel overlain by about 2 feet of soil, belong to the Champlain epoch, and Mr. I. M. Buel, in a private conversation with the writer, suggested that the silts along the Pecatonica River were probably deposited in the dammed-up waters of this stream about the same time. Recent deposits of alluvium are found upon the lower levels along the streams.

SOILS.

The soils of Winnebago County are quite varied. The different types pass into one another so gradually, and they occur so independently of the topography, as to make it a matter of some difficulty to determine accurately their boundaries. Eight types of soil, including Miami gravel and Meadow, were recognized, the names of which, with the relative extent of each, are given in the following table:

Areas of different soils.

Soil.	Acres.	Percent.	Soil.	Acres.	Percent.
Marshall silt loam	90,624	26.9	Miami fine sand	8,832	2.6
Winnebago sandy loam.....	84,160	25.0	Miami gravel	5,184	1.5
Miami silt loam	62,464	18.5	Muck	2,176	.6
Meadow	44,800	13.3	Total.....	336,768
Sioux sandy loam	88,528	11.4			

MARSHALL SILT LOAM.

This important type of soil consists of a very slightly coherent, rather crumbly silt loam, which, in areas near the Winnebago sandy loam, may show a small percentage of coarse to medium sand, though generally the texture is quite uniform. The soil is open and porous, and very absorbent of moisture, which it retains so well that crops do not suffer quickly in times of dry weather. This property of absorbing the rainfall readily does much to prevent the washing of the fields during heavy rains. When tramped by stock or poorly managed it gets rather hard, but does not bake nor crack open much in dry weather, and there is little tendency to granulate. The color is brown or chocolate brown, and varies somewhat, according to the amount of organic matter present. In some of the lower, more level-lying areas, it is a dark brown, and the texture is slightly heavier also. This character of material extends to an average depth of 10 or 12 inches; then a change in color begins, the soil becoming more yellowish and slightly more clayey in character, until at 15 inches it grades into a slightly clayey but usually friable silt. The subsoil is usually compact, but nonplastic, although some very limited areas, especially where the limestone comes near the surface, are somewhat inclined to be sticky. The color of the subsoil is a rather pale yellow, with few streaks or stains. This layer of silty material is usually 4 or 5 feet thick and rests upon gravelly till or limestone, which sometimes comes within less than 3 feet of the surface. Occasionally this material may outcrop, giving small patches of sandy or gravelly material.

The mechanical analyses of samples of the Marshall silt loam are given below:

Mechanical analyses of Marshall silt loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
8919	1½ miles SE. of Winnebago.	Brown silty loam, 0 to 12 inches.	2.78	0.00	0.40	0.30	0.74	4.75	71.10	22.06
8917	6 miles SE. of Winnebago.	Brown silty loam, 0 to 10 inches.	2.95	.00	.50	.52	.80	4.28	69.90	23.30
8915	4¼ miles S. of Pectonica.	Brown silty loam, 0 to 12 inches.	3.32	.20	.38	.28	.70	7.54	66.20	25.10
8918	Subsoil of 8917.....	Brown clayey silt, 13 to 36 inches.	.56	Tr.	.24	.38	.64	5.14	76.70	16.02
8916	Subsoil of 8915.....	Yellow clayey silt, 14 to 36 inches.	.86	Tr.	.14	.24	.46	8.26	71.70	18.72
8920	Subsoil of 8919.....	Yellow clayey silt, 14 to 36 inches.	.42	.00	.20	.24	.50	3.86	75.44	19.20

The largest continuous area of this type of soil lies in the southwestern part of the county, where it occurs in a broad, extensive, almost unbroken area occupying nearly all of Seward and Winnebago townships. It covers also a large part of Durand and Guilford townships, and smaller tracts are seen scattered through the central part of the county. Very little is found in the northern tier of townships.

The topography of this soil is less uneven than that of the other upland types. The surface is rolling, being more broken along the streams. It is made up largely of broad limestone ridges with intervening depressions. Sometimes it is found in the hollows between ridges covered with Winnebago sandy loam, but the boundary between the two types is seldom determined by the topography.

The rolling character of the topography generally gives to this type of soil good drainage. Some of the more level areas, especially the one in the southeastern part of the county, have been tiled, and tile drains are also used occasionally in the depressions between the ridges, but the natural drainage over the greater proportion of the area is such as not to require the employment of artificial means.

The drift over a large part of the county is covered by a deposit of loesslike silt, which varies in depth, but is usually 3 to 5 feet deep. The weathering of this material has given rise to two different types of soil, the Marshall silt loam and the Miami silt loam. The former in most instances was originally prairie, the latter was, and considerable areas are still, timbered. Much more organic matter is found in the Marshall silt loam, due probably to the less rolling character of the topography. The water here did not run off so quickly, and its presence prevented the rapid oxidation of the organic matter, while each succeeding season added its contribution from the luxuriant prairie vegetation until a rich, brown silty loam was formed.

The Marshall silt loam is the most valuable type of soil in the county for general farming purposes, and all the crops commonly seen in this section of the State are grown upon it. Corn, oats, and hay are the most important. The yield of corn, as well as of all other crops, varies a great deal, according to the season. When good seasons are had many farmers secure from 65 to 75 bushels per acre, while in unfavorable years yields of 25 to 35 bushels are common. The average for a period of years is probably from 35 to 40 bushels per acre. Oats are next in importance to corn, and the average yield is about 40 bushels. Many of the best farmers, however, obtain 65 to 75 bushels, and even larger returns are reported. The best crops are often partially lost from lodging. Hay is also an important crop, and from 1 ton to 1½ tons are usually cut from an acre, but twice the latter amount is sometimes obtained. Timothy is the grass most extensively used for

this purpose. Clover is often mixed with this, and many fields of clover without the timothy were noted. Rye is grown, but much less extensively than any of the crops mentioned above. The average yield is about 15 bushels per acre.

The Marshall silt loam is well adapted to the crops grown upon it. The proportion of corn to the other crops is greater than upon the other soils. Tobacco has been grown with success upon this type in the adjoining State of Wisconsin. It is a fine soil, easily cultivated, and with proper treatment will continue to give handsome returns to its owners.

MIAMI SILT LOAM.

Associated with the type just described is another silty loam, the Miami silt loam, which is very similar to it in mechanical composition, although it is different in agricultural value. The soil is a silty loam, containing also a small percentage of very fine sand, and its appearance in the field would indicate a larger amount than is shown by the analyses. It contains much less organic matter than does the Marshall silt loam, and is much more floury and ashy in character. Some tendency to run together is shown, but when it is plowed up and pulverized it is very loose and often looks considerably like ashes. The color varies from a light brown to almost white, depending upon the amount of organic matter present. Where a heavy application of stable manure has been used, or where green manures have been turned under, the soil shows a darker color to the depth to which it has been plowed. Where the surface soil is of a light-brown color, a very light gray, floury, silty layer, from 2 to 6 inches in thickness, underlies the surface soil, and this is a rather common feature in this type of soil. It is open and porous and absorbs moisture readily, which it retains to such a degree that crops do not suffer quickly in dry weather. Its porosity assists in preventing washing, but when a gully is started it deepens very rapidly unless the field is protected. The soil is usually from 10 to 12 inches deep, but on some of the steep and exposed slopes it has been almost entirely removed and the subsoil is often turned up by the plow.

The subsoil is almost identical with that of the Marshall silt loam, but is slightly more friable, and the glacial material or limestone is more often struck at a depth of less than 3 feet.

The texture of typical samples of the Miami silt loam is shown in the table on the following page.

Mechanical analyses of Miami silt loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
8907	2½ miles NE. of Durand.	Gray silty loam, 0 to 9 inches.	1.55	0.00	0.80	0.80	1.96	7.70	72.40	15.90
8909	3 miles NW. of New Milford.	Silty loam, 0 to 9 inches.	1.68	.30	1.52	1.64	2.78	7.56	69.70	16.50
8911	3 miles SE. of Winnebago.	Yellow silty loam, 0 to 12 inches.	1.60	.20	.92	.76	1.16	6.36	70.80	19.24
8912	Subsoil of 8911.....	Mottled yellow silt, 15 to 36 inches.	.21	Tr.	.40	.30	.70	7.54	73.20	17.08
8908	Subsoil of 8907.....	Yellow clayey silt, 9 to 36 inches.	.48	Tr.	.36	.38	.90	6.66	72.02	19.16
8910	Subsoil of 8909.....	Yellow clayey silt, 11 to 36 inches.	.37	.00	.82	1.56	2.46	8.26	60.80	25.90

The soil is most extensively developed in the northwestern part of the county, following the bluffs along the northern and western boundaries of the valleys of the Pecatonica and Sugar rivers, and covering almost the entire surface of Laona Township. Other areas of considerable extent are found along the north bluffs of Rock River in southern Winnebago and Rockford townships, and along the Kishwaukee River, in Cherry Valley, as well as in eastern Roscoe Township. Smaller areas are scattered about in other parts of the county. A singular occurrence of this type was seen in the Pecatonica bottoms, where it is found as a second bottom, situated 5 to 10 feet above the usual level. It appears to have occupied formerly a larger area here, part of which has been removed by stream action.

The topography of the Miami silt loam varies. It is usually more uneven than that of the Marshall silt loam. Along the bluffs and smaller streams it is broken and hilly; away from the streams it is made up of rolling ridges, while in the bottoms it is almost level. The broken character of the topography permits the water to run off readily, the drainage being well established, and artificial drains are not necessary.

The origin of this soil was referred to in the description of the Marshall silt loam. It is derived from the weathering of the same character of material as that type, but the more rolling character of the topography caused the erosion to be more active here, the water ran off more quickly and permitted the more rapid oxidation of the organic matter, and the luxuriant prairie growth was not present to add by its decay large amounts of vegetable matter; therefore a shallower, lighter colored soil was formed.

The Miami silt loam was all originally covered with a heavy forest growth, principally oak, and there are some large tracts which are still timbered. The first settlers cleared and cultivated the timber land in preference to the prairie. It costs now from \$10 to \$15 to clear the stumps from an acre of ground.

The same crops are grown upon this type of soil as upon the Marshall silt loam, but the average yields are less. Yields of 50 and 60 bushels of corn per acre are reported, but the average is about 25 or 30 bushels. Some of the best farmers secure a much higher average. About the same number of bushels of oats as of corn are obtained per acre. Usually from 1 ton to 1½ tons of hay are cut from an acre. Some rye, barley, and potatoes are also grown.

This is not a fine corn soil, although by careful treatment and the use of manures good crops are obtained. It is better adapted to the cereals than to corn. Grass does well also and furnishes excellent pasturage. Very little attention has been given to the growing of fruit of any kind, but it is believed that small fruits—such as raspberries, blackberries, and strawberries—as well as apples and other orchard fruits, could be successfully grown if proper care were given them.

The Miami silt loam is a soil which requires careful management to maintain its productiveness. While it is easily improved and is very retentive of fertilizers, careless treatment is quickly shown by a decrease in the yields and a deterioration of the soil. Every means of adding organic matter to the soil, such as the use of stable and green manures, should be taken advantage of, as this will make it more like the Marshall silt loam, and will increase its productive capacity. A rotation, or change of crops, and the use of more legumes—such as clover, soy beans, cowpeas, and alfalfa—should be more generally practiced.

WINNEBAGO SANDY LOAM.

There is a greater variation in the texture of the Winnebago sandy loam than in either of the types already described. The soil is a sandy loam or heavy sandy loam which, in many places, shows a good deal of silt. The heavier phase is the more common, except in the northeastern portion of the county where the soil is more sandy than elsewhere. There are usually enough fine particles present to hold the soil together and to give it some of the characteristics of a loam. The sand present is usually coarse to medium and the grains are generally stained brown, but where it has been beaten out by rains the particles are seen to be composed largely of quartz, many of the grains being clear and crystalline. The color of the soil is brown, and sometimes it is slightly reddish brown. It is practically the same as that

of the Marshall silt loam, so that the color does not assist any in locating the boundary between these types.

The depth of the soil also varies considerably, depending somewhat upon the amount of erosion which has taken place. It will average about 10 inches, but in some places it is not more than 6 inches, while in others it is 20 inches. There is not very much difference in the texture of the soil and of the subsoil, but a change in color to a reddish brown occurs at the depths given above. The subsoil is a sandy loam or heavy sandy loam, which is underlain at from 18 to 36 inches by a gravelly till. The average depth at which this material is reached is about 24 inches. The till is composed of a heterogeneous mixture of particles of all sizes, from that of gravel 2 or 3 inches in diameter to the very finest particles or clay. There is usually enough of these finer grades of material present to hold the mass together and to give it a somewhat sticky character. These finer particles also enable it to retain the moisture so that crops are not quickly affected by dry weather. There are local areas, however, which have more gravel in the underlying material, that are not very retentive of moisture. These are of more frequent occurrence in the northeastern portion of the county. The drift is considerably modified by the character of the country rock. Fragments of limestone are very common, and sometimes the rock is found near the surface, or may even outcrop.

Mechanical analyses of samples of the soil and subsoil are given below. Samples 8931 and 8934 are drift material.

Mechanical analyses of Winnebago sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
8929	2 miles NE. of Roscoe.	Brown sandy loam, 0 to 7 inches.	1.85	1.10	7.38	15.18	29.78	7.76	27.00	11.80
8932	2 miles NE. of New Milford.	Brown sandy loam, 0 to 10 inches.	1.91	1.10	9.20	16.96	25.10	8.10	21.84	17.60
8930	Subsoil of 8929....	Yellow sandy loam 7 to 12 inches.	.78	1.00	7.10	16.10	28.70	8.10	27.90	11.02
8931	Subsoil of 8929....	Yellow loam, 14 to 36 inches.	.51	1.20	8.22	14.62	27.32	8.44	19.62	20.40
8933	Subsoil of 8932....	Brown sandy loam, 10 to 22 inches.	.86	.70	11.00	13.80	22.60	7.50	22.38	21.68
8934	Subsoil of 8932....	Red loam, 22 to 36 inches.	.61	1.60	8.70	16.56	24.66	8.68	17.70	22.08

This is the principal type of soil in that part of the county which has been classed as belonging to the Iowan glaciation. It is most extensively developed in the central part of the county and along the eastern bluff of Rock River Valley. The southern boundary, west of Rock River, follows very closely the old State road. None of it is found north and west of the Pecatonica and Sugar rivers.

The Winnebago sandy loam represents areas where the glacial material was not covered by a deposit of silt or loess, or where a very thin layer at least was deposited. It has been formed, therefore, from the weathering of the glacial material into which organic matter has been incorporated by the decay of plants.

The surface is rolling and uneven, and there are practically no level areas. It is determined largely by the preglacial topography, although in the northeastern portion of the county drumlinoidal ridges are present, and the surface here is more broken than elsewhere. The greater proportion, however, of the area occupied by this type is not rolling enough to interfere to any great extent with cultivation. The character of the soil and topography give good natural drainage, so that underdrainage is never necessary.

The productive capacity of the Winnebago sandy loam varies with the character of the soil and the topography, being least in the more sandy and hilly areas. Generally better yields are obtained west of Rock River than east of it, but there are some tracts of as productive soil east as west of that stream. Corn is extensively grown, though less so than upon the Marshall silt loam. Some farmers raise 50 to 60 bushels per acre, but the average for the entire type is not more than 30 bushels. Oats are widely grown and yield about the same, or possibly a little more, than corn. A larger average would be obtained if it were not for their falling down, the largest crops being often partly, or almost entirely, lost on this account. Clover and timothy do well, especially on the heavier phase, and good yields are obtained. The average crop is about 1 ton per acre, but 2 tons are often cut by the best farmers upon the heavier phase. Rye is also grown in some sections, as well as some barley and millet, but these are of little importance as compared with the other crops.

The heavier phase of this type is suited to general farm crops, such as corn, oats, and hay, while the more sandy phase would be better adapted to crops which mature early, such as sweet corn, tomatoes, and other market-garden and truck crops.

The Winnebago sandy loam is a fair soil for general agricultural purposes. Careless treatment, however, reduces its productiveness, and many farmers say that it will not yield as large crops as formerly. It retains fertilizers fairly well, and can be much improved by the use of stable manure, and clover and other leguminous crops.

SIOUX SANDY LOAM.

The soil of the Sioux sandy loam varies from a sandy loam to a heavy sandy loam, and there are some small, low ridges which are quite sandy. These are more frequently met with northwest of Rockton. The lower areas are heavier and more loamy in character, but upon the whole the type is fairly uniform for an alluvial deposit. The sand is coarse to medium and is very largely composed of quartz. It is stained brown or reddish brown, but when washed out by rains it becomes white or clear and crystalline. There is a considerable amount of organic matter present, and this influences the color of the soil. The soil varies in depth from 10 to 24 inches, and there is little change in texture until the underlying bed of gravel is reached. At an average depth, however, of from 12 to 14 inches there is usually a change in color from a brown to a reddish brown, due probably to the smaller percentage of organic matter present. At a depth of from 18 to 36 inches, with an average of 22 inches, this material is underlain by a thick deposit of almost pure waterworn gravel and sand. This gravel is used by the railroads for ballast, and in some places they have made excavations 25 feet deep without cutting through it. Wells indicate that it has a depth of 50 to 75 feet. This underlying layer of gravel forms the most important difference between the Sioux sandy loam and the Winnebago sandy loam.

The following table gives the mechanical analyses of typical samples of the fine earth of this soil:

Mechanical analyses of Sioux sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
8927	2 miles NW. of New Milford.	Brown sandy loam, 0 to 10 inches.	1.60	0.50	11.30	23.02	22.74	5.04	21.48	15.24
8925	2 miles E. of Rockton.	Brown sandy loam, 0 to 10 inches.	1.94	1.70	15.16	14.66	17.38	4.80	25.60	20.70
8928	Subsoil of 8927....	Brown sandy loam, 12 to 36 inches.	.53	.60	10.18	24.36	22.68	5.38	21.30	15.56
8926	Subsoil of 8925....	Brown sandy loam, 10 to 20 inches.	.85	.80	11.84	15.34	18.96	5.46	24.52	22.90

The Sioux sandy loam is found principally upon the east side of Rock River, although some small areas occur west of the stream. Its most extensive development is where the river enters the county, the valley here being more than 5 miles wide. The usual width, however, is about 2 miles. It occurs upon a terrace—or sometimes three or four

terraces may be present—some 40 or 50 feet above the river, and is usually spoken of as “second bottom.” A few small areas also are found along the Kishwaukee River.

The surface of this type of soil is level to gently rolling. It does not all lie at the same elevation above the stream, for sometimes, as stated, three or four terraces are present. Some small streams running down from the upland have cut out small valleys through these terraces.

The thick deposit of gravel which lies so near the surface in this type of soil allows the water to run very rapidly away as soon as it reaches this depth, instead of being stored where the crops can draw upon it when the moisture in the surface soil is not sufficient to supply the needs of the plants; therefore crops suffer very quickly in dry weather, and there is sometimes almost a total failure from lack of moisture. This thorough underdrainage, however, causes the soil to dry out and warm up early in the spring, and the farmers say that crops are two weeks earlier here than upon the uplands. The fact that this gravel permits water to pass readily through it is forcibly brought out by the drying up of some of the streams when they reach the bottoms.

The Sioux sandy loam is an alluvial deposit. The gravel was brought down during the Champlain epoch, or about the end of the Glacial period. There must have been a strong current in the stream, due probably to the melting of the ice. The layer of soil was deposited over this gravel after the current had become very much slackened.

Corn and oats are the most important crops. The yields are very irregular, depending very largely upon the season. When showers are frequent during the growing season, yields of 40 to 50 bushels are obtained, but if a dry spell comes at a critical period in the growth of these crops almost a total failure may result. The average is probably 25 bushels. Rye and barley are grown in small quantities and fair returns are secured. Timothy and clover do fairly well, and a considerable percentage of this type is devoted to these crops. In some places, especially near Rockford, quite a little truck farming is carried on, and several fields of cucumbers, tomatoes, onions, and sweet corn were seen.

The Sioux sandy loam is not well adapted to general farming, but is better suited to those crops which will mature early, thus eliminating much of the danger of drought. The sandy character of the soil and its early warmth adapt it to the growing of early vegetables and canning crops, and more attention should be given to these.

MIAMI FINE SAND.

The Miami fine sand consists of a light-brown, slightly loamy sand from 6 to 18 inches in depth, with an average depth of 9 inches and

underlain by a loose, incoherent yellow sand, medium to fine in texture and extending to a depth of from 2 to 5 feet. Some of the lower lying areas near the streams are underlain by a sandy loam, rather than a sand, which is more retentive of moisture. This formation may rest either upon limestone or till. Where most subject to washing the soil is more shallow and there are a few spots where the yellow sand appears on the surface. In these places, also, the sand is usually coarser and becomes nearly pure quartz sand. Such spots often fail to produce anything. The soil does not pack nor become hard, even with much tramping, and is always easy to cultivate.

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

Mechanical analyses of Miami fine sand.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
8905	5 miles NW. of Rockton.	Brown loamy sand, 0 to 9 inches.	0.89	0.30	3.82	13.10	59.72	8.66	9.90	4.12
8903	2½ miles NW. of Rockton.	Brown loamy sand, 0 to 9 inches.	1.34	.50	6.24	15.32	49.02	8.68	14.30	5.96
8906	Subsoil of 8905....	Yellow sand, 10 to 36 inches.	.21	.20	4.78	14.42	60.00	7.90	9.00	3.20
8904	Subsoil of 8903....	Yellow sand, 12 to 36 inches.	.18	.30	6.04	17.24	51.32	7.90	13.00	4.20

The largest area of this soil lies on the northern edge of the county, where a strip from one-fourth mile to 1¼ miles wide extends 6 miles east from Sugar River. It is also seen in isolated areas in other parts of the northern half of the county. Practically none is found in the southern half of the county. The same soil type in Wisconsin was mapped under the name Afton fine sandy loam.

This type in its most extended development occupies the rolling country and rounded hills in the north, and also nearly level areas near some streams, occasional small areas on the slopes and tops of hills in other sections, and sometimes low ridges and hills near areas of Meadow. Near the county line some few dunes and ridges formed by wind action are also seen, but these do not affect the character of the country to any great extent.

Owing to the texture and the topography this soil is naturally well drained. Even on the nearly level areas the open nature of the soil allows water to percolate readily through it, so that crops rarely suffer from too much rain. This ready drainage allows the soil to be cultivated much earlier in the spring and sooner after rains than the more

silty types, which is a distinct advantage for some crops. It also prevents washing to as great an extent as the coarse character of the soil would indicate.

This formation probably represents a deposit from glacial waters which has been reworked to some extent by wind and streams. Isolated areas were formed by deposits from currents in the body of the ice, or possibly by wind action. The more level lands near the streams are redeposited sands carried by the streams in former times. The growth and decay of plants have added some organic matter to the soil and colored it slightly brown. These and other weathering agencies have made the surface somewhat loamy.

No attempt has yet been made to grow other than the ordinary crops of the area upon this type. On the more rolling portions corn averages 20 to 25 bushels, oats about the same, and rye 9 to 12 bushels. Where the surface is more level the soil is somewhat more fertile, and the yields of all these crops are a little larger. A considerable proportion of the more rolling parts is not cultivated. This is a rather poor soil for ordinary crops, and this is reflected in the character of the farm buildings, which are much inferior to those on the more productive lands. Crops, especially corn, suffer from drought in dry years. Fair yields can be obtained in wet years, but the soil will not stand continuous cropping without manures or legumes. Clover does only fairly well, and is apt to be injured in dry years. No timothy is grown on this type.

The sandy texture of this soil makes it a very good truck soil and it is also a fairly good soil for small fruits. There are cities near, which should furnish good markets, and it is believed better returns can be secured from crops of this character than from the ordinary farm crops. The more sandy areas are well adapted to watermelons.

MEADOW.

The term Meadow in this area is used to designate the low-lying land along the streams, which is usually known as "first bottom." The classification is based upon topographic position rather than soil characteristics. The soil varies a great deal in texture in different areas, as well as in the same area. The most of the bottom land or Meadow is a heavy loam or silty loam, about 18 inches deep, underlain by a yellowish-brown or bluish clayey silty loam, which often contains some sand in lower depths or is underlain by sand or sandy loam but a few feet below the surface. The extensive area east of Durand is largely composed of this phase and is more uniform than any other area. In some places, usually small in extent, the soil is almost a pure sand. In the western part of the area northeast of Durand almost pure sand is struck within a few inches of the surface, and water is usually found at less than 3 feet. The Meadow along

Rock River is generally a sandy loam, and the area south of Cherry Valley also shows much sand. Along the Pecatonica River are found a great many old stream channels or sloughs in which the soil is much heavier, and this is also often true of the areas which lie along the bluffs.

The Meadow is found along nearly all the streams in the county, but its greatest development is along the Pecatonica and Sugar rivers and Coon Creek. A considerable area is also found along the north and south branches of the Kishwaukee River. Very little occurs along the Rock River.

The surface of the Meadow is uneven, due to the presence of old river channels which have been deserted and partly filled with sediment. In some places these still exist as lagoons, in others as small swamps, covered with cattails and other swamp grasses. Still other depressions have been filled with detritus until they are now high enough to be cultivated. The smaller streams which flow into the rivers have changed their courses somewhat, and this is another cause of unevenness, although it is not so common as the former.

The Pecatonica River at one time built up its flood plain to a greater height than at present. This probably happened when the second bottom along the Rock River was being formed. The remains of this old flood plain are seen in the knolls of Miami silt loam which are scattered over the bottoms. The small tributaries did not build up their flood plains as rapidly as the main stream, and as a result these smaller streams spread out, forming swamps or probably lakes near their entrance into the main river bottom. Later the main stream began to deepen its channel and the process of drainage of the lakes or swamps has gone on until now they are partially drained. These areas are more level than the ones near the streams.

The Meadow is an alluvial deposit, and is subject to change. In many places it is still in the process of formation, additions being made to the soil by overflow of the streams, which takes place over the greater part of the Meadow land. There are some areas, however, that are seldom or never covered with water. A large part of the Meadow is low and wet, and some of it would be difficult to drain. In most cases, however, drainage is possible.

Most of this type is in pasture. Perhaps 20 per cent is cultivated. Corn is the principal crop, and when the seasons are not too wet good yields are obtained. Some of the areas will produce as good corn as any of the upland soils. Oats are grown, but they are apt to lodge, especially upon the heavier areas. Hay is a very important crop. Meadow grass is usually found and makes very good forage.

MUCK.

The greater part of the material mapped as Muck consists of finely divided and well-decomposed vegetable remains, but in some places the organic matter has not decayed, and is, in reality, peat. Some

mineral matter is usually mixed with it, but the quantity is not very great. The color is a deep black. The Muck generally extends to a depth of 3 feet, but a sticky, plastic, drab-colored silty clay is sometimes struck at less than this depth. This soil is found only in very small areas, usually along the smaller streams, but it may occur wherever the absence of proper drainage has developed conditions suitable to its formation. The water has prevented the rapid decay of the vegetable matter, which has accumulated to form this type. The areas are still wet and somewhat swampy, although they can all be drained.

The areas of Muck are now almost entirely devoted to pasture, although in a few instances some hay is obtained. Practically none of the type is at the present time under cultivation. Muck soils are especially well adapted to onions, cabbages, peppermint, and celery, and if these areas were drained it is believed that fine yields of these crops could be secured. In some sections of the country the Muck soils are among the most valuable lands.

MIAMI GRAVEL.

In Winnebago County the Miami gravel represents outcrops of the glacial gravels which underlie all the Sioux sandy loam and in many instances the soil of the hills. It also represents deposits of gravel on the tops of the hills, and in some places outcrops of limestone, which have been included in this type on account of their same general agricultural value.

Outcrops along the edge of the river terraces have from 1 to 8 inches of soil representing that of the Sioux sandy loam, underlain by the waterworn gravel or sand and gravel which underlies that formation. On the hills it is either a sandy gravel on the tops or a heavy gravelly clay on the sides, which it is almost impossible to cultivate. Areas where the limestone comes within 6 inches or less of the surface are also classed as Miami gravel.

This type occurs only in narrow bands or strips and in small patches, and is not farmed at all unless it occurs in the midst of a field, when it is easier to cultivate it than not. Generally it has a rather steep slope and supports no vegetation, except a scanty growth of grass. If carefully handled it might produce grapes or peaches, but the areas are too small to make this very profitable. The present agricultural value is almost nothing.

AGRICULTURAL METHODS.

The majority of the farmers of Winnebago County are alert to any improvements which can be made in the agriculture, and are willing to receive suggestions and to try new methods which may increase the productiveness of their fields. The careless methods used in the past led to the deterioration of the soil. This fact was evident to the farmers, and better methods have been generally adopted, though there is still need of improvement. Throughout the county the latest improved

farm machinery is in general use, and the farmers readily see the advantage of such machines and are quick to adopt them. Harvesters, mowers, hay loaders, self-feeding thrashers, and corn planters are numerous, and many corn binders and manure spreaders are seen. These are usually kept under cover when not in use.

The ground is prepared for the crops by walking, riding, or gang plows, and the disk plow is coming into use. The disk harrow and the ordinary smoothing harrow are the pulverizers commonly used. The crops usually receive good care, and surface rather than deep cultivation is practiced.

For the corn crop some of the ground is broken in the fall, but a much larger area is plowed in the spring. The seed bed is usually well prepared. Corn is both checked and drilled, the latter method being used principally when it is to be cut for fodder or for ensilage. The crop is cultivated from 3 to 5 times, riding cultivators equipped with small rather than large shovels being generally used.

Oats are usually sown broadcast and disked in, as careful farmers prefer this method to drilling them in. Some farmers have tried the formaldehyde treatment for smut and have found it very efficient. Perhaps one-half of the grain is stacked before thrashing.

Little difficulty is had in obtaining a stand of timothy, but clover requires more careful management and more favorable climatic conditions during its early growth. Usually the seed is sown with the oats as a nurse crop, and if dry and hot weather prevails about the time that the oats are harvested the clover is usually killed. Some farmers have begun the practice of sowing the seed in the corn at the time of the last cultivation and they have had good success. Much hay is stacked in the field, where it is damaged by the weather, and considerable loss, especially in the case of clover hay, results from this practice. It is believed that covered sheds or barns would prove economical.

The farmers generally have come to recognize the necessity for a change of crops, but the same crop is often grown too many years in succession and legumes are not introduced often enough into the rotation. Corn and oats follow each other too often without clover. The Marshall silt loam is usually planted to corn for 3 years, followed by oats for 1 or 2 years, and then by timothy or clover. If the clover fails to catch, it is put back into corn. On the other types a larger proportion of the area is given to oats. Some farmers have become discouraged with clover because of the difficulty of obtaining a stand, and some have quit trying to grow it, but no system of rotation should be considered which does not include the frequent introduction of some leguminous crop. In a dairying country like this a great deal of stable manure is made, and the farmers generally take good care of it and put it on the fields; but some allow this valuable manure to go to waste.

AGRICULTURAL CONDITIONS.

In every section of the county are seen evidences of thrift and prosperity among the farming class. This is shown by the well-kept appearance of the farms and by the fine dwelling houses, large barns, and other outhouses, which are seen upon so large a proportion of the farms. According to the last census, the value of the farm buildings in Winnebago County was \$3,653,910. Very few of the farmers are in debt—unless they have recently bought more land—and a great many of them have money deposited in the banks. In fact, a very large percentage of the deposits in the Rockford banks are held by the farmers. Many of those who have made money cultivating the soil have remained upon the farm instead of moving to the towns, and have put the profits which they have obtained into improvements.

About 60 per cent of the farms are operated by the owners, while 40 per cent are rented. Two systems of renting are common, and about an equal amount of the land is rented under each system. The tenant may give a certain amount of money for the use of the land, or a certain proportion of the crops. The money rent paid varies with the quality of the soil. The best land rents for from \$4.50 to \$5.50 an acre. The poorer tracts or low lands along the streams, which are commonly used for pasture, bring from \$1.50 to \$2.50 an acre. When grain rent is given, one-half of the crop is the usual proportion.

The average size of the farms in Winnebago County is about 140 acres. The size varies much, however, and there are nearly a dozen farms in the area which comprise over 1,000 acres each.

There is a great difference in the agricultural value of the different types of soil. The Marshall silt loam has the highest value, and brings from \$75 to \$115 an acre. The Winnebago sandy loam is rated at from \$15 to \$30 less, and there is even a greater difference in some of the more sandy and broken areas of this type. The better areas of Miami silt loam will bring from \$50 to \$75 an acre, but the more broken areas can be bought for as low as \$35. The Meadow varies a great deal. The higher lying portions which are cultivated sell for about \$50, while the lower lying, wetter tracts would not bring one-third of that amount. The total value of all the farms and improvements, exclusive of buildings, was, at the time of the last census, \$15,123,440.

One of the most serious questions with which the farmers of this county have to deal is that of labor. Help is very difficult to secure at any time, and especially so at harvest time. A laborer is usually paid about \$25 a month, and in addition board for himself and also for a horse, if he wishes to keep one. Farmers paid as much as \$2 a day for labor during harvest this season, and as many hands as were needed could not be secured even at this figure. The scarcity of labor is due, in part at least, to the large number of factories in Rockford, and also

to the nearness of large cities. The labor obtained is generally efficient, but where employment is so easily secured there is always a certain amount of independence with which the employer has to bear.

Corn is the crop most extensively grown in Winnebago County, although the area devoted to oats is almost as large. The proportion of the area planted to corn is not near so large as in the central part of the State. Some of the corn is cut with the binder, and the proportion so harvested is increasing each year, but the largest proportion is husked from the stalk. A number of farmers cut corn for fodder, especially when there is a small crop of hay. A few silos were seen, but they are not common. Those who have used them are very highly pleased with the results which they have secured, and strongly recommend them to others. A large proportion of the corn is consumed in the county.

The oats crop is of almost as much importance as the corn. One great difficulty with oats is their lodging or falling down, especially if there is a very large yield. A great many farmers stack their oats, while many others thrash from the shock.

A number of fields of rye and some of barley were noticed, but these crops are of small value compared to corn and oats. No wheat was seen.

The hay crop is one of much importance. Timothy is the principal grass grown. Clover is often mixed with it, and sometimes sown alone. Clover is much better for the soil than timothy, as the bacteria which are found upon its roots have the power to take the free nitrogen from the air and add it to the soil, thus increasing its productiveness. Other legumes, like alfalfa, soy beans, and cowpeas, add nitrogen to the soil also. A few patches of alfalfa were seen, and these were doing well. It is believed that this legume could be grown with success, and it would be well for the farmers to try it. It will probably be necessary to inoculate the soil by getting some soil from a field where alfalfa has been successfully grown. A number of fields of millet were seen, and yields of from 3 to 5 tons per acre are secured. Some of the farmers prefer it even to clover hay for feeding dairy cows. The sowing of rape in the oats is practiced by a large number of farmers, the fields being used as pasture for hogs or sheep. It is considered a fine, economical feed for these animals.

Nearly every farmer has a small patch of Irish potatoes for home use, but very few have attempted to grow them upon a commercial scale. This crop does well and the acreage could be profitably increased.

The growing of vegetables and canning crops has received some attention, especially near Rockford, where a factory for canning corn and tomatoes is located. The sandy character and early warmth of the Sioux sandy loam give a favorable opportunity for the extension of this industry.

Fruit growing has not been given the consideration which it deserves. The Miami silt loam is well adapted to fruits, and with proper care these could be grown with profit upon it, especially upon the more hilly areas, which are not level enough to be suited to general farming.

The farmers of Winnebago County have taken great interest in stock raising and dairying, and these are among the most important and profitable industries in which they are engaged. The value of the live stock, according to the last census, was \$2,209,991, and that of the dairy products \$600,965. Nearly a billion gallons of milk, one-half million pounds of butter, and nearly 60,000 gallons of cream were produced, about two-thirds of which was sold to creameries. Every morning many wagons loaded with milk can be seen wending their way toward the creameries, many of which are situated in every section of the county. Some of the farmers haul their own milk, but usually a man collects the milk from several farms, and the little platform for the cans is seen in front of almost every house. The usual price for hauling the milk is 10 cents per 100 pounds. The milk sells at the creamery for about \$1.10 per 100 pounds, and if the farmer wishes the skim milk back he pays 10 cents per hundred for it. The greater part of the cream is shipped to Chicago. Good stock is usually kept and some fine registered cattle were seen. A great many hogs also are raised, and one of the largest breeders of registered Berkshire hogs in the world is located near Roscoe.

Winnebago County has a great variety of soils adapted to different kinds of crops. This fact, however, is not recognized by many of the farmers. Those who live on the heavier types of soil grow crops suited to these soils and those upon the lighter, more sandy ones grow very much the same crops. The Miami fine sand is not adapted to corn, oats, and hay, but to truck crops. Very little of it, however, is used for this purpose. The Sioux sandy loam is also better suited to vegetables and canning crops than to corn and oats.

The transportation facilities of Winnebago County are excellent. Railroads traverse the county in almost every direction and furnish ready means by which the products of the farm can be sent to market. Electric lines also connect Rockford with Beloit and Janesville, Wis., and with Belvidere. Another line will soon be completed between Rockford and Freeport.

In order for farming operations to be carried on successfully there must be markets at which the farmer can sell his products. Chicago is less than 100 miles to the southeast and Milwaukee is about as near, while many other smaller cities are within easy reach. Rockford, the county seat, is a city of nearly 35,000 inhabitants, and there are several smaller towns scattered over the county which furnish good home markets.

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