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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF CHEMISTRY AND SOILS
In Cooperation with the Iowa Agricultural Experiment Station

SOIL SURVEY
JONES COUNTY, IOWA

BY

A. M. O'NEAL, Iowa Agricultural Experiment Station, in Charge
and R. E. DEVEREUX, U. S. Department of Agriculture

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SOIL SURVEY

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SOIL SURVEY OF JONES COUNTY, IOWA

By A. M. O'NEAL, Iowa Agricultural Experiment Station, in Charge, and R. E. DEVEREUX, United States Department of Agriculture

COUNTY SURVEYED

Jones County is in the east-central part of Iowa, in the second tier of counties west of the Mississippi River. The county is 24 miles square and contains 569 square miles, or 364,160 acres.

Physiographically, Jones County is part of a broad plain covered with glacial drift and loess. It has been thoroughly dissected by a complete drainage system. The main streams, which cut across the county in a general northwest-southeast direction, have carved valleys whose floors lie from 100 to 200 feet below the crests of the higher ridges. The greatest relief is found adjacent to the rivers and larger creeks. The most thoroughly dissected areas are west of Anamosa, the south side of Maquoketa River, northwest of Monticello, and in the extreme northeast corner of Scotch Grove Township. Throughout the western half of the county such areas are narrow and extend back only 1½ or 2 miles from the streams before they merge abruptly with the more undulating or gently rolling upland. In the eastern half of the county, however, rolling, strongly rolling, and hilly land predominates.

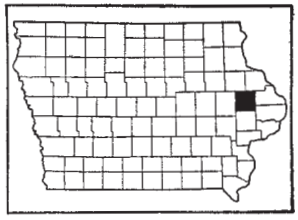

FIG. 1. Sketch map showing location of Jones County, Iowa

The alluvial lands in Jones County are not extensive. In the vicinity of Monticello, Olin, Oxford Junction, and Cascade, where the rivers flow through the more gently rolling plains, the first and second bottoms in many places reach a width of 1 or 2 miles. Throughout the rougher sections, however, the first bottoms are narrow. First and second terraces are along most of the larger creeks.

The elevation of Jones County above sea level ranges from 1,100 feet 3 miles west of Langworthy to 700 feet in the extreme southeast corner where Wapsipinicon River leaves the county. The greater part of the uplands, however, ranges in elevation from 800 to 1,000 feet. Anamosa, in the west-central part, has an elevation of 829 feet;[1] Monticello, in the northern part, of 925 feet; Cascade, in the northeastern part, of 832 feet; Wyoming, in the southeast section, of 813 feet; Oxford Junction, in the extreme southeast corner, of 727 feet; and Olin, in the south-central part, of 757 feet. The general slope of the surface is toward the southeast.

[1] Gannett, Dictionary of Altitudes.

85335°—28——1

The greater part of the drainage of Jones County is carried by the Wapsipinicon and Maquoketa Rivers, which flow diagonally through the southern and northern parts of the area. A small area in the extreme northeast corner is drained by North Fork Maquoketa River which, like the Maquoketa, meanders through a comparatively narrow valley for the first 5 miles, then enters a rock-bound valley for the rest of its course. The tributaries of these rivers, with their many lateral drainage ways, afford excellent drainage for all parts of the county. In the eastern part some of the larger creeks have cut deep, narrow valleys through the underlying rock.

The rivers are sufficiently large and have enough fall to supply water power, and at present plants are in operation at Anamosa, Monticello, and Cascade. The power is used to generate electric current. A small saw and grist mill is operated by water power in the northeast part of Scotch Grove Township.

Most of the water supply for home use and for livestock comes from bored wells. Gasoline engines and windmills are in general use for pumping. Permanent water is found at a depth varying from 75 to 300 feet.

Jones County was named and the boundaries established on November 12, 1838. The first settlement was made about two years earlier when the first pioneer took up his abode in the neighborhood of Monticello. The early inhabitants all came from neighboring States to the east and south. The population of the county, as reported by the 1920 census, is 18,607, of which practically all are native born. Richland and Washington Townships are inhabited largely by people of Irish descent, Scotch Grove Township by Scotch, and Oxford Township by Bohemians. Between Monticello and Cascade the farmers are largely of Swiss extraction.

Anamosa, in the west-central part of the county, is the county seat and the largest town. According to the 1920 census it has a population of 2,881. Monticello, with 2,257, is the town next in importance. Oxford Junction and Oxford Mills, with a combined population of 948; Wyoming, with 690; Olin, with 718; Center Junction, with 225; Onslow, with 218; Martelle, with 156; Morley, with 125; and Amber, with 100 follow in size in the order named. Cascade, located largely in Dubuque County, is an important trading center. Langworthy, Hale, and Scotch Grove are smaller villages which are more or less important as shipping points.

The main line of the Chicago, Milwaukee & St. Paul Railway cuts through the southern half of the county and affords an excellent outlet to the markets of the east and west. The Cedar Rapids-Farley division of this same system runs through Anamosa and Monticello, and another branch connects Monticello with the main line at Oxford Junction. A spur line of the Chicago & North Western Railway leaves the main line at Clinton, runs through Onslow, Center Junction, and Amber, and reaches its terminus at Anamosa. The extreme northeast corner of the county is served by a spur of the Chicago, Milwaukee & St. Paul Railway. This spur is just outside the county and terminates at Cascade.

The quarrying of stone, although not so important as it formerly was, is still the source of considerable revenue. At Stone City commercial quarries still ship to outside points, and at Anamosa the in-

mates of the State reformatory mine stone for State use. A large produce house is located at Anamosa, and chickens and eggs are shipped to all parts of the United States. A canning factory, brick and tile works, produce house, and factory for the manufacture of dairy machinery are at Monticello. Five creameries are located in various parts of the county.

The road system of Jones County is complete. Most of the roads have been graded and ditched, and they dry quickly after rains. It is the usual custom to use a road drag after rains, and during dry seasons the highways are very good. No surfacing has been done, except on one highway which has been graveled from the Linn County line to Monticello. A number of churches and schools are located at convenient places throughout the county. Of late years many of the smaller schools have been discontinued, and consolidated schools are located in the larger towns.

Rural telephones serve all parts of the county, and rural mail delivery is enjoyed by most farmers. Power lines deliver electric current to some farms in the vicinity of Anamosa and Monticello.

Chicago, Cedar Rapids, and Sioux City are the principal outside markets.

CLIMATE

The climate of Jones County is healthful and favorable for the production of staple crops, particularly corn.

The mean annual precipitation is 32.66 inches. The greater part of this falls during the spring and summer. The fall generally shows a lower recorded mean, and the weather is usually excellent for harvesting. Droughts occur occasionally, but the crops seldom suffer as the major soil types are very retentive of moisture. During the year of the survey (1924) an excess of rain during June, July, and August caused considerable damage. In fact, of late years there has been more likelihood of crops suffering from an excess of moisture than from drought, especially on the glacial-drift soils. The lowest annual precipitation recorded at Olin, in the south-central part of the county, is 23.9 inches in 1901. The highest annual precipitation recorded at the same station was 47.3 inches in 1919. In this year the rainfall for the summer was 14.27 inches. Winds and heavy rains occasionally do considerable damage to the growing crops. Hail storms sometimes occur but are local in extent.

The temperature of Jones County is characterized by wide and sometimes sudden variations. The recorded annual mean is 47.7° F. The winters are long and often severe, with a mean temperature of 21.9° and an absolute minimum, recorded in December, of −28°. Snowstorms are very common. They are frequently accompanied by northwest winds. At such times the cold is intense, and unprotected livestock suffers. The early settlers avoided these winds by taking up their abode in the valleys and throughout the forested areas, and to-day all farm dwellings have shelter belts to the north and west.

The summer season is short and hot. Rainy spells, when the temperature falls below normal, occur at intervals. Sudden changes are rare, and as a reule the range in temperature during the frost-

free season is small. The mean temperature for the summer months is 71.5° F., although an absolute maximum of 107° has been reported.

The date of the latest killing frost recorded at Olin is May 23 and of the earliest is September 12. The average date of the last killing frost is May 2 and of the first is October 4. This gives an annual frost-free season of 154 days. Early killing frosts occasionally injure a certain percentage of the corn crop, especially during years when late spring rains delay planting.

The following table, compiled from the records of the Weather Bureau station at Olin, gives the normal monthly, seasonal, and annual precipitation and temperature for Jones County:

Normal monthly, seasonal, and annual temperature and precipitation at Olin

[Elevation 760 feet]

Month	Temperature			Precipitation		
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1901)	Total amount for the wettest year (1919)
	° *F.*	° *F.*	° *F.*	*Inches*	*Inches*	*Inches*
December	25.0	58	−28	1.49	1.82	0.40
January	18.9	53	−27	1.38	2.34	Trace.
February	21.9	63	−27	1.53	1.34	3.20
Winter	21.9	63	−28	4.40	5.50	3.60
March	34.3	79	−10	2.33	3.41	2.25
April	48.7	88	18	2.65	1.20	5.25
May	60.5	94	24	4.70	1.69	6.95
Spring	47.8	94	−10	9.68	6.30	14.45
June	69.2	100	37	3.32	5.09	6.70
July	73.7	107	41	3.52	1.08	2.40
August	71.5	103	36	4.70	.64	5.17
Summer	71.5	107	36	11.54	6.81	14.27
September	63.0	99	28	3.20	2.85	4.80
October	50.8	83	18	2.38	1.44	6.00
November	35.1	78	0	1.46	1.00	4.18
Fall	49.6	99	0	7.04	5.29	14.98
Year	47.7	107	−28	32.66	23.90	47.30

AGRICULTURE

The early settlers of the county located only in the forested areas along streams where trapping could easily be engaged in and where there was protection from the cold winds of winter. Since the pioneers had to produce practically everything needed in the way of food, their attention was turned from the beginning to agriculture. Small areas of the fertile prairies were reclaimed and planted to wheat, corn, oats, and vegetables.

The first railroad was built in 1857 and gave a decided impetus to farming. Wheat was grown extensively, as yields varying from 25 to 40 bushels to the acre made its production profitable. It continued to be the principal cash crop up to 1865, when the ravages of the chinch bug and the low prices caused a decided slump in its produc-

tion. Corn, at this time, replaced wheat as the major crop. As conditions became more favorable for the growing and marketing of farm products, agricultural growth became more rapid. Dairying and livestock farming increased in popularity, and these industries are largely responsible for the prosperous conditions of to-day.

The value of all farm property per farm practically doubled for each 10-year period, beginning with 1880, except for the decade from 1890 to 1900. The value of buildings and implements remained about the same, but domestic animals declined sharply in number, no doubt because of the increased use of tractors and automobiles. Land values since 1900 have increased more than 100 per cent for each census period.

In the following table are given the data relative to the land and farm areas of the county. The decrease in the number of farms between 1880 and 1890 and between 1900 and 1920 was not caused by the abandonment of the farms but by two or more farms being operated by one man or by a consolidation of farms. The fact that the percentage of improved land in the farms has remained about stationary but that the number of acres has increased is probably the result of the inclusion of acreage formerly unimproved.

Land and farm areas in Jones County, Iowa, in census years

Year	Farm area	Total farms	Area in farms		Improved land	
			Total	Per farm	In farms	Per farm
	Acres	*Number*	*Per cent*	*Acres*	*Per cent*	*Acres*
1880	364,242	2,429	91.4	137.0	81.3	111.5
1890	364,242	2,136	92.5	158.0	84.8	133.7
1900	364,242	2,373	97.2	149.5	81.9	122.0
1910	364,242	2,110	93.7	161.8	82.6	133.6
1920	364,160	2,090	93.2	162.4	81.3	132.0
1925	364,160	2,163	94.4	159.0	81.0	128.7

The acreage and production of the staple crops for the census periods 1880 to 1925, inclusive, can be readily seen by a study of the following table:

Acreage, production, and yield per acre of the principal crops in stated years

Year	Corn			Oats			Wheat			Tame hay		
	Acres	Bushels	Bushels per acre	Acres	Bushels	Bushels per acre	Acres	Bushels	Bushels per acre	Acres	Tons	Tons per acre
1879	95,825	4,207,611	43	25,253	867,095	34	11,988	74,636	6	------	------	------
1889	75,816	3,121,885	41	32,044	1,264,888	39	823	9,395	11	------	------	------
1899	90,906	3,920,390	43	37,440	1,406,840	37	1,350	25,170	18	47,624	71,110	1.5
1909	80,509	3,895,731	48	27,462	967,300	35	559	10,340	18	55,518	92,507	1.6
1919	68,121	3,134,038	46	36,015	1,166,040	32	2,193	37,046	17	51,753	85,093	1.6
1924	57,319	1,385,633	24	41,091	1,722,740	42	619	15,205	24	------	------	------

The value of livestock products in 1900 amounted to $2,279,853. This increased to $3,964,795 during the next 10 years, and the 1920 census reports a total of $6,317,566. The 1925 farm census reports a total value of livestock and livestock products of $6,227,017.

Agriculture at the present time consists of the production of general farm crops, the raising and feeding of cattle and hogs, and of dairying. Practically all the grain and forage crops are fed on the farms of the county, and the income is derived from the sale of the animals and animal products.

Corn is the principal crop. The average yield for the last 40 years, according to the census reports, was 44 bushels to the acre. On the better farms much larger yields are obtained, many farmers reporting 60 and 80 bushels to the acre. The uplands are as a rule more productive than the bottoms. The yields are lowest on the sandy soils, because of their lack of available plant-food elements and their low moisture-holding capacity. Reid Yellow Dent and improved strains of this variety are grown almost exclusively, with the exception of a small acreage of Iowa Silvermine and Bloody Butcher. The seed corn on the majority of farms is selected at husking time and a small percentage is tested for germination. A few farmers are attempting to work exclusively into the raising of seed corn. Practically all the corn is planted in checkrows and cultivated three or four times. The larger part of the crop is husked in the field. A small acreage is harvested with a binder and stacked in the field, where it remains until it is required for feed. Some corn is cut for fodder, and a few fields are "hogged down." There are a number of silos in the county and considerable corn is cut to fill them. Where this is done it is a growing practice to grow soy beans with the corn as this crop enriches the silage. The larger part of the corn crop is fed on the farms to the work animals, beef cattle, hogs, and dairy cattle. The supply is not always equal to the demand, and in the eastern part of the county it is not an uncommon practice to ship in a number of carloads of corn each year. During bumper years a very small percentage is sometimes shipped to outside markets.

Oats are grown on practically every farm, and this crop ranks third in acreage. Yields fluctuate widely from year to year, no doubt because of seasonal variation, but the average yield since 1880 is 35 bushels to the acre. The Iowar, Richland (Iowa 105), Albion (Iowa 103), and Silvermine are the best-liked varieties. Most of the oats are broadcast, but a small percentage is drilled in. The crop is practically all threshed from the shock. All the oat crop is fed on the farms of the county, except in the southern part, where a small tonnage is sold and shipped to outside markets. In the northern part of the county it is a general custom to import some oats each year to help supply the demand.

Hay and forage crops rank next in importance. In 1919, according to the 1920 census, 51,753 acres were devoted to tame or cultivated grasses and 11,932 acres to wild grasses and forage crops. Timothy and clover, grown separately and together, are credited with the largest acreage among the hay crops. All of the hay is used on the farms as winter feed for the work animals, beef cattle, and dairy cows, and in some sections of the county the supply is not equal to the demand. A few farmers dispose of their surplus locally.

Clover, mostly the medium red variety, is grown extensively. It is highly prized because it furnishes hay of high feeding value and is an excellent crop for soil improvement. The clover is usually mixed with timothy and sown with oats as a nurse crop. Although

it is well adapted to the soils of Jones County, the yields on many farms have been greatly increased by the generous application of ground limestone. Most farmers cut the first crop for hay, and the second crop is either pastured, saved for seed, or turned under as green manure. The yields of clover hay average between 2 and 2½ tons to the acre.

Alfalfa, though grown on a comparatively small acreage, is a highly prized crop which will no doubt be more extensively grown. The census of 1910 reports only 16 acres in alfalfa in 1909, whereas the 1920 report gives the total acreage as 141 in 1919. Since that time the increase has been more rapid. The 1925 farm census reports 456 acres of alfalfa in 1924. Hardy Dakota is the variety commonly grown. Practice has demonstrated that to insure good stands the seed must be inoculated and the land well limed. Alfalfa is sown, at the rate of about 15 pounds to the acre, with oats in the spring or alone in the fall. Equally good results are procured from both seedings. The second year alfalfa is cut two or three times and yields from 2 to 3 tons of hay to the acre.

Sweet clover is grown on a few farms. It also grows luxuriantly along ditches and road cuts. The crop is generally seeded with oats in the spring. The greater part is pastured in the fall, and the residue is turned under the following spring. When it is used for hay, sweet clover should be cut before it has become woody and hard.

Soy beans are grown with corn that is to be cut for silage or is to be "hogged down." The beans are planted with a special attachment on the corn planter. A small acreage is harvested and threshed for seed.

Sweet corn is grown in the vicinity of Monticello to supply the canning factory located there. Most farmers grow this crop under contract.

Barley is produced on some of the farms and is grown like oats in the general rotation. According to the census of 1920, the 5,154 acres in this crop in 1919 produced 111,552 bushels. This is just half the acreage and yield of 1909. The 1925 farm census reports 973 acres yielding 34,001 bushels in 1924. All the grain is fed on the farms.

Prior to 1865 wheat was grown extensively. The 1880 census reports wheat as the crop third in importance, with a total acreage of 11,988 acres in 1879. The yields had dropped to 6 bushels to the acre, no doubt because of the ravages of the chinch bug, and this low yield, together with the low price, made its production unprofitable. The acreage reported in the 1900 census reflects this, but it will be noted that the yields increased. Since then the wheat acreage has shown wide fluctuation, but the average yield has been approximately 17.5 bushels to the acre. Spring wheat is most extensively grown, though there is a small acreage in winter wheat. The entire crop is used in the county. It is either mixed with oats and fed to hogs or is sold for chicken feed.

Rye is of minor importance. The census of 1920 reports 781 acres in this crop in 1919. The total yield was 11,829 bushels. Rosen rye is the best-liked variety. This crop is grown mostly on the sandy soils. It is planted in the fall, about September, and is harvested the following June. The entire crop is used locally as hog feed.

Buckwheat is grown as a catch crop on a few farms. The 1920 census reported a total of 71 acres in 1919. A very small acreage is devoted to sorgo (sweet sorghum) which is grown for forage and for sirup. The 1920 census reports that 6,746 gallons of sirup were produced in 1919.

During the progress of this survey, a number of fields of rape were observed. This crop is generally sown with the corn at the last cultivation or with oats at the time of seeding. It is used entirely for hog pasture. Some Sudan grass is grown.

There are small gardens on practically all farms, and vegetables are grown to supply in part the demands of the home. The State reformatory, at Anamosa, maintains a large truck garden and during favorable years grows enough vegetables to supply that institution. Northeast of Scotch Grove, a 15-acre truck garden is devoted entirely to the production of cabbage and onions. Excellent yields are obtained. The entire output is sold locally. Strawberries, raspberries, and blackberries are grown on a few farms. Fruit growing is of minor importance. There are a few small apple orchards, but the trees receive so little care that the fruit is, in general, faulty. Some cherries, plums, and pears are grown.

Livestock and livestock products are the principal sources of revenue. The census of 1920 estimates the value of animals sold and slaughtered in 1919 as $4,638,454, an increase of approximately a million and a half dollars over their value in 1909. In like manner, the value of dairy products, excluding those for home use, increased from $569,482 in 1909 to $928,609 in 1919 and to $992,866 in 1924. The southern part of the county is predominantly a feeding section. As a rule the greatest number of cattle are fed in Wyoming, Madison, Scotch Grove, Clay, and in the southern part of Oxford Townships. The farmers of the northern part of the county devote more attention to dairying and to the production of grain for feeding hogs. In the vicinity of Cascade there are a few livestock breeders who sell their livestock to the farmers of the southern half of the county.

Cattle raising and feeding are among the most important industries, and beef cattle furnish one of the chief sources of revenue. The feeders prefer good grade cattle of either the Shorthorn, Hereford, or Angus breeds. In Madison and Washington Townships the dual-purpose cattle are coming into favor, and many farmers are making use of milking strains of Shorthorn. Some of the feeders are bought within the county from neighbors who have a surplus, but as a rule they are shipped in from Sioux City, St. Paul, Omaha, and Chicago. The common practice is to buy 2-year-old animals and feed them for a period varying from 60 to 100 days. A few farmers feed as many as four lots a year. Corn, corn silage, cottonseed meal, and clover hay are used to finish the animals for market. The cattle are either shipped in car lots to commission men or are handled by the shipping associations of the county.

Hogs are raised on all farms and this industry is very important. On January 1, 1925, there were 86,177 hogs in the county. The number fluctuates widely and is largely influenced by crop yields and prices. Duroc-Jersey, Poland China, and Hampshire are the three leading breeds, although a few Chester White and Tamworth hogs are raised. The average farmer keeps 10 or 12 brood sows and breeds

them to purebred sires. The average number of hogs to the farm is 48. It is the general practice to pasture the animals on clover and finish them on a ration of corn, supplemented sometimes by tankage. The practice of "hogging down" corn is increasing. Some hogs are sold to supply the local demand, and the remainder are marketed through shipping associations. Most of the hogs are shipped to Chicago.

Dairying is of importance and is the source of considerable revenue. Five creameries are located in the county; the one at Monticello is the second largest in the State. Dairying is carried on largely as a side line, and only about 20 per cent of the farms can be classed strictly as dairy farms. On most farms, from 3 to 10 milk cows are kept. The cream is separated on the farm and is either delivered by the farmer or is collected by trucks which make scheduled rounds. A system of scoring, a practice that has had a tendency to improve conditions, has been inaugurated by two of the creameries. The dairy cows are mostly Holstein, grade Shorthorns, and a few Guernsey. All the surplus butter is shipped to Chicago and New York.

A few small flocks of sheep, mostly in the rougher sections along the rivers, were seen during the progress of the survey. In some years western sheep are brought in about August and are fed until November or December, when they are shipped to market. The Shropshire is the most popular breed.

Poultry raising is an important side-line industry on all farms. Increased output has resulted from the greater care given to the flocks. According to the 1920 census, the value of poultry and eggs in 1919 amounted to $734,836. In 1924 the value was $725,213. The chickens and eggs are sold to the commission houses and are shipped to outside markets.

The farmers of Jones County, as a rule, pay little attention to the adaptability of crops to certain soils. The Carrington, Tama, Muscatine, Clinton, Waukesha, Buckner, and Jackson soils are universally used for the production of staple crops, principally corn. During wet seasons the loess soils, no doubt because of their open friable subsoils, are regarded as having a slight advantage over the glacial drift soils. The Clyde and Wabash soils are used largely for pasture, on account of poor drainage. Potatoes, melons, and all kinds of truck crops grow best on the sandier soils. The rougher sections of the county, including largely areas of the Shelby, Lindley, and Clinton soils, should be left in their natural state and utilized for pasture.

Crop rotation is practiced more or less. On the better type of farms, corn is seldom planted on the same land more than two years in succession. This practice is seldom followed by the tenant farmers. A four-year rotation consisting of corn, corn, oats, and clover, seems to be most popular. In some cases this is varied to corn, oats, corn, and clover. The growing of corn and oats alternately is still practiced in some sections of the county.

Barnyard manure is considered a valuable fertilizer and on most farms is carefully saved and used. It is generally distributed with a manure spreader on the fields that are to be planted to corn. During the year of the survey considerable ground limestone was used

especially where clover and alfalfa were to be grown. As most of the soils are acid, limestone has proved of great benefit, and its use should be extended. It should be applied in sufficient quantities to remedy the acid conditions. The quantity needed can be determined by having the soils tested.

Farming operations in Jones County center around the production of corn. Where corn follows clover, the land is pastured late in the fall and is plowed and disked the following spring. If the corn is to succeed itself, the land is thoroughly plowed and disked in the fall and disked again in the spring before planting. When small grains follow corn in the rotation the land is prepared by plowing, disking, and harrowing, and the seed is sown with a drill or broadcast seeder.

The majority of the farms in Jones County are small enough to be managed without much additional help, except during harvest time. According to the 1920 census, 1,319 farmers reported an expenditure of $678,622 for labor in 1919. This is an average of $514.50 to the farm. Efficient laborers, especially day laborers, are hard to obtain. Farm hands hired by the year are paid from $35 to $50 a month. During the threshing season an exchange of labor by neighbors aids materially in solving the labor problem. Day laborers receive from $2 to $4 a day with board. Corn huskers' wages vary with the value of the corn. During the year of the survey the wages ranged from 5 to 7 cents a bushel.

The census of 1920 reports that 64.2 per cent of the farms were operated by tenants, 34.6 per cent by owners, and 1.2 per cent by managers. Most of the land is rented for cash, livestock shares, or grain shares. The landowner commonly furnishes the grass seed, and on the livestock-share basis he furnishes one-half of the livestock. Cash rents range from $3 to $7 an acre.

Farm lands vary widely in price. The value depends largely on the improvements, location, surface features, and the condition of the soil. In the rougher sections the average is $50 an acre, whereas the better type of farm land sells for $200 or $225 an acre.

SOILS [2]

Jones County is in the prairie region of the United States. The soils over the greater part of the county developed under the influence of a grass vegetation. Throughout the undulating or moderately rolling sections a luxuriant growth of grasses flourished for a long period of time. Conditions here were not favorable to tree growth. In the rougher sections, however, the prairie conditions did not prevail. Instead a forest flourished, encouraged no doubt by more thorough drainage and better aeration. These factors of environment have produced striking differences in the characteristics of the soils in these two regions.

[2] Jones County adjoins Delaware and Dubuque Counties on the north, Cedar County on the south, and Clinton County on the east. In certain small areas the soils of these counties do not seem to agree. These apparent discrepancies are due to changes in correlation resulting from a fuller knowledge of the soils of the State, as where the Memphis silt loam of Clinton County is changed to Clinton silt loam in Jones County and the Knox fine sand in Cedar County to Lindley fine sand. The Lindley fine sandy loam of Delaware County and the Genesee very fine sandy loam, Gasconade loam, and Wabash stony loam of Dubuque County have not been extended into this county on account of their very small area.

The soils have developed from parent materials which differ widely in composition, but it is believed that the characteristics of the soils depend more on the degree of weathering, leaching, oxidation, and accumulation of organic matter than on any differences that may have existed in the original material.

The soils of Jones County can, therefore, be divided according to their principal characteristics into two main groups, light-colored and dark-colored soils. The light-colored soils occur almost entirely in the rougher sections where conditions have favored tree growth, the only exception being the few small areas of alluvial soils which consist of material washed from the light-colored uplands. The light-colored soils are predominantly light brown or grayish brown and have subsoils which vary from pale yellowish brown to brownish yellow. The subsoil materials are in most places heavier in texture than those of the topsoils and have a granular or nutlike structure. Below a depth of 3 feet, the substratum material is less heavy and has a mottled grayish-brown, gray, or rust-brown color. The soils which belong to this group are classed in the Clinton, Lindley, Jackson, and Genesee series.

The dark-colored soils, which cover approximately 70 per cent of the county, are coextensive with the boundaries of the prairies where a luxuriant grass vegetation flourished. Certain alluvial soils are also included. Since these soils, in the process of formation, have been affected more or less by drainage, it is well to further classify them acording to characteristics which have resulted from different conditions of drainage that prevailed during the development of the soils.

The more extensive of the dark-colored soils were formed under conditions of good drainage. The typical profile, and one which may be regarded as mature for this region under normal conditions, shows a number of characteristic layers or horizons. The upper or surface layer, which is about 10 inches deep, has a dark grayish-brown color and a loose silty or finely granular structure. The color of this layer results from the organic matter present and is uniform. The next lower layer is transitional in color and texture between the layer above and that below. The color changes downward from the dark grayish brown of the upper part of this layer to brown in the lower part. The texture becomes heavier with increasing depth. Where the surface soil is loam or silt loam, the texture in the lower part of this layer is heavy loam or silty clay loam and the structure is distinctly granular. The granules are well formed and are larger than those of the surface soil. The color results from the presence of organic matter which has been carried down from the surface and has coated the granules. When the granules are crushed, the color of the resulting material is much lighter than that of the surface of the granule. The dark coating becomes thinner with increasing depth and finally disappears. This transitional layer is underlain, at a depth varying from 18 to 22 inches, by brown or yellow-brown clay loam or silty clay loam material. This is the heaviest layer in these soils. It may be distinctly granular throughout, but in places the granulation is well marked in the upper part but becomes indistinct in the lower part. This layer continues to a depth which varies from 30 to 36 inches. The next

lower layer is yellowish brown, but in glacial-drift areas it is splotched with red or gray. These colors result from variations in the substratum material. The substratum material is not so heavy in texture as the layer above and is commonly more friable. This material in most places is structureless and breaks into irregular clods. This represents the material from which the soils have developed and may consist of glacial-drift material, loess, or of older alluvium or sediments.

These dark-colored soils have all been well leached and the carbonates have been removed to a depth of 3½ or more feet except where the surface covering rests directly on the underlying limestone. This group of soils includes the members of the Carrington, Shelby, Tama, and Dodgeville series of the uplands, and of the Waukesha and Buckner series of the terraces.

The dark-colored soils developed under conditions of poor drainage have, in practically all areas, very dark brown or black surface layers which contain a large quantity of organic matter. The layer is usually mellow and friable, except in the heavier members where the content of clay is high. The subsoils in most places are heavier than the topsoils. The color, however, is variable, ranging from brown and grayish brown to mottled brownish yellow, grayish brown, and rust brown, determined by the depth to which oxidation has been effective. Where the level of the water table is within a depth of 3 feet, only the subsoil has developed under conditions of poor drainage. To this class of soils belong the Muscatine soils of the uplands. In most areas, however, both topsoil and subsoil are saturated the greater part of the time. The Clyde soils of the uplands, the Bremer soils of the terraces, and the Wabash, Cass, and Genesee soils of the bottoms are included in this group of poorly drained soils.

The Iowan drift, on which approximately 45 per cent of the soils of Jones County have developed, occurs throughout the western half of the county. The two principal areas, one following the more level parts of the divide between Wapsipinicon and Maquoketa Rivers and the other occurring south of the loess hills which border Wapsipinicon River, gradually narrow toward the east and finally disappear under the mantle of loess in the eastern quarter of the county. In a few small, isolated areas along North Fork Maquoketa River and in several other places, the loessial covering is either entirely lacking or has been removed by erosion. In its unweathered state, the drift, as observed in cuts, consists of a yellowish or brownish-yellow mass of clay and sandy clay in which are a few beds of sand and gravel and some bowlders. The weathering of this material, under the conditions described above, has given rise to the Carrington, Shelby, Lindley, and Clyde soils.

The Mississippi loess, which mantles approximately 50 per cent of the county, consists of yellowish siliceous silt. In the western half are loess hills which have a general northwest-southeast trend. Most of these hills border the drainage ways, though there are a few islandlike areas, some of which, in the southern part of the county, resemble pahas. To the east, the mantle becomes thicker and lies not along the streams but throughout most of the interstream divides. Erosion has been very active, so that along some of the teeper V-

shaped valley walls limestone and the Iowan-drift material crop out. This drift material, however, has had very little influence upon the surrounding soils. Throughout the rougher sections the Clinton soils predominate, and in the undulating or gently rolling areas the Tama soils are most common. In loess areas, where the surface is flat or gently sloping and underdrainage is restricted, the Muscatine soils have developed.

The alluvial soils consist of materials which have been washed from the loess and glacial drift areas and deposited during periods of overflow.

The soils of Jones County have been grouped in series according to their important characteristics, origin, surface features, and drainage. Each series includes soils which are differentiated on the basis of texture. Accordingly, 28 types of soil, which represent 16 series, have been mapped in Jones County. In addition, undifferentiated bottom-land soils have been mapped as meadow.

The topsoils of the Carrington soils are predominantly dark grayish brown and the subsoils are yellowish brown or light brown. The subsoils are noncalcareous, the carbonate having been removed by long weathering and by leaching to a considerable depth. Members of this series are extensive throughout the area of the Iowan glaciation. The Carrington series is represented in Jones County by Carrington silt loam, Carrington loam, and Carrington fine sandy loam.

The topsoils of members of the Shelby series are dark grayish brown and are usually rather shallow. The subsoils are predominantly yellowish brown, though reddish-brown streaks are present in many places. Lime-bearing material occurring mostly in streaks 2 or more feet below the surface is not uncommon. As a rule, the subsoils contain a high percentage of sand and gravel. Shelby fine sandy loam is the only member of this series mapped in the county.

The topsoils of the members of the Lindley series are light brown or grayish brown and are rather shallow. The subsoils are yellowish or yellowish brown, though in a few places they may be reddish brown. In most places the subsoils are heavier in texture than the topsoils and contain a considerable quantity of sand and gravel. Iron concretions are also present. These soils have resulted from the weathering of glacial-drift material. The Lindley series of soils is represented in the county by the fine sand, fine sandy loam, and silt loam members.

The topsoils of members of the Clyde series are very dark grayish brown or black and contain large quantities of organic matter. The subsoils are gray and yellow, usually mottled. Iron concretions and small fragments of the parent glacial till are commonly present in the material at a depth of 3 feet. Both topsoil and subsoil are noncalcareous. Clyde silt loam and Clyde silty clay loam have been mapped.

The topsoils of members of the Dodgeville series are very dark grayish brown or nearly black. The upper part of the subsoils varies from yellowish brown to reddish brown and is in general rather heavy. Limerock occurs at a depth varying from 2 to 2½ feet. Dodgeville loam is the only Dodgeville soil mapped in the county.

The Tama soils have noncalcareous, dark grayish-brown topsoils and subsoils which vary from yellowish to yellowish brown. These

soils were derived from Mississippi loess. One soil type, Tama silt loam, with a light-colored phase, is mapped.

The Clinton soils are characterized by light-brown or grayish-brown topsoils and light-brown or yellowish-brown heavier and somewhat compact noncalcareous subsoils. These soils have resulted from the weathering of Mississippi loess. Clinton silt loam and Clinton very fine sandy loam are mapped.

The topsoils of members of the Muscatine series are very dark grayish brown and are commonly from 12 to 18 inches deep. The upper part of the subsoils is brown or dark grayish brown and the lower part is mottled with yellow, gray, and brown. Neither topsoil nor subsoil is calcareous. These soils have resulted from the weathering of loess under conditions of poor underdrainage. Muscatine silt loam is mapped.

The Bremer soils have very dark brown or black topsoils and dark-gray, brownish-gray, or yellowish-brown subsoils which are commonly mottled. Most of the subsoils are heavy and tenacious. Bremer silt loam and Bremer silty clay loam occur in Jones County.

The topsoils of the members of the Buckner series are dark brown, and the subsoils are lighter brown. In these soils, the texture of the subsoil does not differ greatly from that of the topsoil. These soils are rententive of moisture, and neither topsoil nor subsoil is calcareous. The Buckner soils consist of materials washed from the loessial and glacial uplands and deposited during overflow. Four members of the Buckner series, the loam, silt loam, fine sandy loam, and fine sand, have been mapped.

The soils of the Waukesha series are characterized by dark grayish-brown topsoils and yellowish-brown or light-brown subsoils. The subsoils are heavier than the topsoils but are not compact or impervious. Neither are they calcareous. This series is represented in Jones County by Waukesha silt loam.

The Jackson soils have light-brown or grayish-brown topsoils and lighter-brown or yellowish-brown subsoils. The subsoils are rather heavy and compact and in places are mottled. These soils are noncalcareous. They commonly occur adjacent to large areas of light-colored upland soils. Jackson silt loam was mapped in this county.

The Wabash soils are characterized by very dark brown or black topsoils and brown, gray, and black subsoils. They comprise first-bottom land which is subject to overflow. Wabash silt loam and Wabash silty clay loam have been mapped.

The surface layers of the Cass soils are predominantly very dark brown or black. The subsoil materials are in most places lighter in color and texture, and grade downward to loose sand and gravel within a depth of 3 feet. These soils comprise first-bottom lands which are subject to overflow. This series is represented in this county by Cass loam.

The soils of the Genesee series have light-brown or grayish-brown topsoils and lighter colored subsoils. The subsoils are commonly heavier in texture than the topsoils, though many of them consist of stratified sand and silt. Both the topsoil and subsoil are lacking in lime. These soils occur in first-bottom positions and are subject to overflow. Genesee silt loam and Genesee very fine sandy loam are the only members of this series which occur in Jones County.

Meadow includes miscellaneous alluvial materials.

The distribution of the soils of Jones County is shown on the soil map which accompanies this report. The names and the proportionate extent of the various soils are given in the following table:

Acreage and proportionate extent of the soils mapped in Jones County, Iowa

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Carrington silt loam	57,408	15.7	Clyde silty clay loam	320	0.1
Carrington loam	35,776	9.8	Dodgeville loam	2,176	.6
Carrington fine sandy loam	13,760	3.8	Lindley silt loam	1,472	.4
Clinton silt loam	125,760	34.5	Lindley fine sandy loam	2,368	.6
Clinton very fine sandy loam	3,200	.9	Lindley fine sand	8,256	2.2
Tama silt loam	41,088	12.5	Shelby fine sandy loam	1,024	.3
Light-colored phase	4,288		Jackson silt loam	1,024	.3
Muscatine silt loam	2,048	.6	O'Neill loam	384	.1
Bremer silt loam	16,768	4.6	Wabash silt loam	11,456	3.1
Bremer silty clay loam	640	.2	Wabash silty clay loam	64	.1
Buckner silt loam	640	.2	Cass loam	960	.3
Buckner loam	320	.1	Genesee silt loam	3,392	.9
Buckner fine sandy loam	1,472	.4	Genesee very fine sandy loam	832	.2
Buckner fine sand	1,536	.4	Meadow	3,520	1.0
Waukesha silt loam	3,200	.9			
Clyde silt loam	19,008	5.2	Total	364,160	

CARRINGTON SILT LOAM

Carrington silt loam, to an average depth of 10 inches, consists of dark grayish-brown silt loam. In virgin areas the surface layer, 3 or 4 inches thick, is filled with grass roots which form a turf. The soil material in this turf is largely formed into fine, soft granules, to which the grass roots cling rather tenaciously. There is also some fine silty material among the granules. In the lower part of this layer the grass roots are present but are not so abundant as in the upper part. The soil granules are more distinct and well formed and include the greater part of the soil material. The next lower layer, which continues to a depth of about 18 inches, is transitional in color between the layer above and the brown layer below. The color grades downward from dark grayish brown in the upper part of this layer to brown in the lower part. This layer is composed entirely of well-formed particles or granules, larger than those in the surface soil. The dark color is imparted to this material by black organic matter which has penetrated downward and formed a coating over the surfaces of the granules. When the granules are crushed, the material is much browner than is the surface of the granule from which it was taken. The coating of organic matter becomes thinner with depth and the dark color finally disappears, except where dark streaks or tongues penetrate downward and mark the position of former cracks, root holes, or animal burrows through which the dark organic material has penetrated. The texture also changes with depth in this layer, grading from silt loam to silty clay loam. This layer is underlain to a depth of 36 inches by brown or yellowish-brown granular clay loam material, the heaviest layer developed in this soil. It is only slightly compact and nowhere has the nature of a hardpan. In many places, particularly in loess soils, this layer is weakly developed and differs little in texture or compactness from the layers above and below it. Underlying this layer is the parent material from which the soil was developed, glacial drift of the Iowan glaciation. It consists of yellowish-brown clay loam material

not so heavy and in most places more friable than that in the layer above. The color may be variegated or splotched with red and gray, the colors being those of the parent material and not the result of poor drainage. Iron stains and concretions may be seen in the upper part of this material and both the iron accumulations and the gray coloration become more abundant below a depth of 5 feet. Glacial gravel and bowlders occur in all parts of the soil but are less abundant in the silty surface soil. However, bowlders are seen on the surface here and there. The stone fragments are abundant in the upper part of the weathered soil, as the softer rocks have been disintegrated by weathering, but in the parent material they are more abundant. Lime carbonate is not present in any part of this soil in sufficient quantity to be detected by simple tests. Leaching would probably have removed the lime to a depth of 2 or 3 feet, but it is very probable that the Iowan drift of this section was originally poor in lime.

Throughout the county Carrington silt loam is comparatively uniform in color, depth of surface soil, and texture. However, minor variations occur, the most important being on the north side of Wapsipinicon River in sections 23 and 26, T. 84 N., R. 3 W. Here the soil is dark-brown mellow silt loam from 12 to 15 inches deep, underlain by yellowish-brown sandy or gritty clay loam. Fine gravel and angular rock fragments are present, in many places, below a depth of 2 feet and in a few areas the weathered drift comes well within a depth of 3 feet. On some of the slopes where erosion has been more active the surface covering over small areas has been almost entirely removed, exposing the underlying yellowish-brown sandy clay loam material.

Where this soil occurs in close association with the Tama and Muscatine soils, considerable difficulty was experienced in mapping. Even the presence of bowlders on the surface did not always indicate that the surrounding soils were glacial, as many borings proved that they were of loessial origin. The establishment of soil boundaries in such cases was more or less arbitrary, the only basis of separation being the presence in the lower part of the subsoil of a small quantity of glacial material, the particles of which often retain their angular outline.

Carrington silt loam occurs in all parts of the county, but the largest areas are in the north-central part and in the southwest quarter.

In general, areas of this soil range from gently undulating to gently rolling, although a few areas are rolling. Surface drainage is sufficient for all needs, except in the more level sections where tiling is necessary. The subsoil is retentive of moisture and crops seldom suffer from drought.

Carrington silt loam was originally prairie and at present the only tree growth consists of trees that have been set out to the north and west of farm dwellings for shelter. All of this soil, with the exception of the building sites, is under cultivation. It is considered important agriculturally.

Corn is the principal crop and has the largest acreage. Yields[3] average 44 bushels to the acre, though on the better type of farms where improved cultural methods are in practice the yields have

[3] All yields given represent information obtained from the farmers.

been increased to 70 and 80 bushels. The grain is all fed on the farms to beef cattle, hogs, and work animals. A small acreage of corn is cut for silage.

Oats rank second in importance and are grown on all farms. The yields vary considerably with the season. During favorable years yields of 65 to 70 bushels to the acre have been reported, although the average is between 40 and 45 bushels. Barley and wheat also are grown, mostly for hog feed. The yields range from 18 to 22 bushels to the acre for the former and from 18 to 20 bushels for the latter. The principal hay crop, timothy and clover, yields from 1½ to 2½ tons to the acre. Sweet corn which is sold to the canning factory at Monticello is grown to a small extent in the north-central part of the county. Alfalfa, sweet clover, and soy beans, now of minor importance, are increasing in favor each year.

Gardens are maintained on all farms to supply in part the home needs. A few small apple orchards were observed, but the fruit is poor because of lack of care.

The present fertility of this kind of land is largely the result of the system of livestock farming that has existed for years. In addition to the feeders that are brought in each year, a number of high-grade animals are raised on the farms. Dairying is an important side line and the source of considerable revenue.

The value of this land ranges from $175 to $225 an acre, depending on location and the condition of the improvements.

Most of the Carrington silt loam is acid. The application of lime will not only correct the acidity but will improve the physical condition of the soil. Deeper plowing, the use of systematic crop rotations in which legumes play an important part, and the turning under of green-manure crops are strongly recommended.

CARRINGTON LOAM

Except in texture, Carrington loam has the same characteristics as Carrington silt loam. Coarse materials, consisting mainly of medium and fine sand with some coarse sand and gravel, are present in the topsoil of Carrington loam.

This soil is fairly uniform in texture, except in certain localities. In the northwest corner of the county, in sections 16, 17, and 18, T. 86 N., R. 4 W., where the land is gently sloping or almost flat, the topsoil is slightly darker in color and is deeper and more friable. The subsoil is dark-brown silty clay loam which grades, at a depth of 22 or 24 inches, to grayish-brown or slightly yellowish brown sandy clay loam or sandy clay. In places small angular rock fragments are present below a depth of 2 feet. Where this soil occurs in association with Carrington silt loam or the loess soils, the textural change is gradual, and in many cases the boundaries were difficult to determine. Scattered throughout mapped areas of this soil are a number of small depressions in which silty material has accumulated. There are small knolls of fine sandy loam, as well as patches where the lower part of the subsoil is much lighter in texture than typical. Such patches are too small to indicate on the map.

Carrington loam occurs most extensively in the northwest quarter of the county, although smaller areas, more or less disconnected,

occur in all parts. The surface varies from rolling to gently undulating. The slopes are gentle and the ridges are well rounded.

The drainage of Carrington loam is sufficient for all crops, and in only a few areas along the lower part of the slopes is tiling necessary. The subsoil is retentive of moisture. When well tilled, these soils are capable of conserving sufficient moisture to prevent marked reduction in yields even during periods of severe drought. This soil warms up early in the spring, thus hastening the maturity of crops.

Carrington loam is considered a valuable agricultural soil and is highly prized. There is practicaly no waste land. With the exception of the small plots set aside for farm buildings, all this land is under cultivation or is in pasture. The only tree growth consists of the windbreaks which have been set out to the north and west of all farm dwellings to protect them from the cold winds of winter.

Carrington loam is used principally for the production of corn. The greater part of the crop is husked in the field, and the grain is fed on the farms to the work animals, beef cattle, hogs, and dairy cows. A small acreage is "hogged down." An increasing acreage is cut for silage, used mostly as feed for dairy cows.

Oats rank second in importance. With the exception of a very small quantity that is shipped to outside markets, the crop is used locally. Some barley and wheat are grown for hog feed. Timothy and clover constitute the principal hay crops. In the vicinity of Monticello, a small acreage is devoted to the production of sweet corn which is sold to the canning factory located at that place. Alfalfa and sweet clover are minor crops, but they produce excellent yields where the land is limed and the seed inoculated. On all farms gardens are maintained to supply the demands of the home, and in a few places some potatoes are grown for sale. A few small apple orchards were observed during the progress of the survey. The fruit was of poor quality, probably because the trees receive very little care.

Corn yields on Carrington loam range from 35 to 80 bushels to the acre, with an average of about 42 bushels. Oat yields range from 40 to 45 bushels; wheat from 18 to 20 bushels; barley from 18 to 22 bushels; and hay from 1½ to 2½ tons to the acre.

The raising and feeding of beef cattle, the raising of hogs, and dairying are the principal livestock industries. On most farms, feeders are brought in each year and fed for an average period of 100 days. Dairying, except in a few cases, is carried on as a side line. The cream is separated on the farms and is delivered by the farmers either to the creameries or to the trucks which make scheduled rounds.

With few exceptions the farmers on this soil carefully save the barnyard manure. The bulk of this is scattered over the corn land in the spring, though a considerable quantity is used on the pasture and clover sod. Of late years, an increasing quantity of ground limestone has been applied with excellent results. Most farmers broadcast the limestone in quantities varying from 2 to 4 tons to the acre, then disk or harrow it into the soil to a depth of 2 or 3 inches. Commercial fertilizers, except on a few experimental plots, are not used in the production of the staple crops. On land for sweet corn, however, a small quantity of acid phosphate has proved profitable.

Carrington loam, because it is mellow and friable, is easily cultivated. Most farmers break the land to a depth varying from 5 to 8 inches, and the seed bed is kept in a good state of tilth. On many farms fall plowing is done with a tractor. The following spring the land is thoroughly disked and harrowed. This soil warms up earlier in the spring than the more compact silt loam.

The value of crop rotation is recognized. Where the land is cultivated by owners, corn is seldom planted more than two years on the same plot of ground. It is also a custom to seed a considerable acreage each year to clover. The tenant farmers, on the other hand, are more interested in immediate results and do not seed any more of the land to clover or grass than is necessary. The two rotations usually practiced are (1) corn, corn, oats, and clover and (2) corn, corn, oats, corn, oats, and clover.

The current value of this kind of land varies from $175 to $225 an acre, depending on location with reference to towns, railroads, and dirt roads, and the condition of improvements.

Carrington loam is a strong soil and produces good yields of all staple crops. Its fertility, however, can be greatly increased by the use of better cultural methods. More land should be seeded each year to red clover or some other legume. An excellent practice is to keep at least 20 or 25 per cent of the farm in clover. As most of the soils are acid, the application of limestone will always prove of value. This not only increases the yields but improves the physical condition of the soil. Deeper plowing and more thorough preparation of the seed bed are strongly urged.

CARRINGTON FINE SANDY LOAM

Carrington fine sandy loam, to a depth of 16 or 18 inches, consists of dark-brown, even-textured fine sandy loam which contains considerable organic matter. This is underlain by a layer of brown or yellowish-brown heavy fine sandy loam material which grades, at a depth of 30 or 33 inches, to lighter-textured fine sandy loam material which contains more fine gravel and fragments of the parent glacial till. The subsoil contains some silt and clay and is more coherent than the surface soil.

North of Maquoketa River in Richland and Lovell Townships, where this soil occurs in close association with Lindley fine sandy loam, the soil differs from typical in that the surface soil is brown loamy fine sand underlain by yellowish-brown or yellowish slightly sticky loamy fine sand or medium sand. Small areas of soil which possess similar characteristics occur near Hale in sections 4, 5, 9, and 10, T. 83 N., R. 2 W., and in the western part of Cass Township, in sections 7, 18, and 19. Where the soil occurs on low knolls in mapped areas of Carrington loam, the subsoils are predominantly heavier, varying in texture from sandy clay loam to sandy clay.

Carrington fine sandy loam commonly occurs in association with Carrington loam and Carrington silt loam, but at a slightly higher elevation. Back from the rivers, throughout the broader glacial-drift plain, it is nearly always found on the crests of the low ridges. The largest areas are south and east of Monticello, west of Hale, and in the western part of Cass Township.

Areas of this soil vary from undulating to gently rolling. Drainage is excessive, so that crops suffer during periods of drought. The soil warms up earlier in the spring than do the adjoining heavier soils, and corn is seldom damaged by early frosts in the fall.

Practically all of this soil is under cultivation or in pasture. It is farmed in conjunction with Carrington loam and Carrington silt loam. Yields, however, are much lower on this soil, except during wet years when they compare favorably with those obtained on the silt loam and loam members of the series. Sweet corn is grown extensively in the vicinity of Monticello. The yields range from 5 to 7 tons to the acre, with the use of commercial fertilizers.

This soil is usually sold in farms with Carrington loam and Carrington silt loam.

As this soil is inclined to be droughty, cultural methods should help to increase the moisture-holding capacity. More land should be kept in permanent pasture, and for this purpose bluegrass and alsike clover are recommended. The acreage of red clover should be increased and more should be turned under each year. Ground limestone would prove of benefit, as it increases the yields and improves the physical condition of the soil. Carrington fine sandy loam is particularly adapted to the growing of sweet corn, melons, and all kinds of vegetables. The acreage in these crops could, no doubt, be profitably extended.

CLINTON SILT LOAM

Clinton silt loam, to an average depth of 7 inches, consists of grayish-brown silt loam either single grained or imperfectly granular in structure. This layer is underlain, to a depth of 12 inches, by brown silt loam which differs from the layer above it in color and in having a more distinctly granular structure. The next lower layer is yellowish-brown heavy silt loam more firm than the layers above. This material, which breaks into a granular mass, continues to a depth of about 20 inches, where it is underlain, to a depth of about 28 inches, by light yellowish-brown silty clay loam, heavier in texture but no more compact than the layer above. The next lower layer consists of yellowish-brown silty clay loam which breaks into cubical clods having a thin coating of gray on the surface. The parent material, silty, loose, and without definite structure, lies, in general, below a depth of 40 inches.

Clinton silt loam varies rather widely in different parts of the county, depending on surface features and probably on differences in the parent material. The heavier layers are not uniformly developed, and in some parts of the county they are very little heavier in texture than the layers above and below them. The heavier layers also occur at various depths, in places immediately below the surface layer but in other places 3 or more feet below the surface.

On the crests of the broader ridges and at the base of slopes the accumulation of large quantities of organic matter has given the surface soil a slightly darker color. In such areas, the thickness of the surface layer is also greater. In small areas along the steeper slopes where erosion has been most active the surface covering is lacking, and the underlying yellowish-brown material is exposed. Such varia-

tions, however, are small and the difference in agricultural value is not sufficient to warrant separation in mapping.

Clinton silt loam supported a native vegetation of trees, mostly white oak, hickory, red oak, aspen, and some elm and maple. Hazel brush also made a dense growth. Most of the soil has been cleared and is used for the production of general farm crops or for pasture. The native forest growth now covers less than 10 per cent of the county.

Areas of this soil vary from rolling to rough and broken. Along Maquoketa River, in the northeast quarter of the county, west of Monticello, and along Wapsipinicon River and Buffalo Creek, the surface is more thoroughly dissected and consists of narrow, tortuous ridges and deep V-shaped valleys. In the other parts of the county, the more rounded hills and even slopes give the general landscape a more rolling or gently rolling appearance. Surface drainage is in many areas excessive, and many slopes are damaged by erosion. The subsoil is moderately retentive of moisture. During wet seasons these hill lands, where cultivated, seem to be better able to absorb larger quantities of water with less injury to crops than do the more level prairies.

Clinton silt loam is the most extensive soil in the county. At present about 85 per cent of it is under cultivation or in pasture. The livestock system of farming is most popular, no doubt because excellent pastures of bluegrass are available throughout the rough sections that would not be so desirable for general farming. Corn, timothy and clover hay, and oats constitute the principal crops. All the grain and hay are fed on the farms, and in some sections the supply is not equal to the demand. Feeders are bought each year to fill out the herds. After about 100 days of feeding, the cattle are sold and shipped to outside markets. In the northeast corner of the county, a few livestock breeders located on this soil raise beef cattle exclusively and dispose of their products locally. A considerable revenue is derived from the sale of chickens and eggs. Wheat and barley are occasionally grown for hog feed. The growing of alfalfa is becoming more popular and, where the land is limed and the seed inoculated, is profitable. Gardens are maintained on most farms and one small truck farm, where onions and cabbage were being grown on a moderately extensive scale, was observed north of Scotch Grove. There are some apple orchards, but seldom do the trees receive any care. Some cherries and plums are grown for home use.

The yields on this soil are somewhat lower than those obtained on Tama silt loam. Corn yields from 35 to 45 bushels to the acre, though larger yields have been reported. Oats produce from 35 to 50 bushels; wheat from 15 to 18 bushels; barley from 14 to 18 bushels; and clover and timothy hay from 1½ to 2 tons to the acre.

Clinton silt loam is not so easily cultivated as Tama silt loam, because of its rougher surface. However, throughout the more gently rolling areas it can be easily plowed and kept in a thoroughly mulched condition. The rougher areas are used largely for pasture, as they gully badly when they are brought under cultivation. Crop rotation is practiced more or less. Cropping centers about corn. When oats follow corn, the stubble land is disked and harrowed in the spring just before planting. Timothy and clover are generally

sown with the oats, which serve as a nurse crop. Fall plowing is practiced only on the more level areas, as the rougher land erodes badly when it is left uncovered during the winter months. Bluegrass grows luxuriantly.

Farms of Clinton silt loam vary considerably in value. Throughout the more gently rolling areas near the towns, improved farms are valued at from $150 to $175 an acre, whereas in the rougher sections the prices are much lower, varying from $45 to $60 an acre.

Chemical analyses of this soil in other sections of the State show that it is lacking in organic matter. Crop rotations in which legumes are grown extensively and turned under as green-manure crops should therefore be practiced. Barnyard manure should also be carefully saved and applied to the land. In the rolling sections the fields should always be plowed at right angles to the slopes. The rough broken areas should be left in their natural state and used for pasture.

In the following table are given the results of mechanical analyses of samples of the topsoil and subsoil of Clinton silt loam:

Mechanical analysis of Clinton silt loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
336424	Topsoil, 0 to 12 inches	0.0	0.5	0.4	2.0	20.5	62.1	13.0
336425	Subsoil, 12 to 20 inches	.6	3.2	1.7	5.4	21.2	56.1	11.6
336426	Subsoil, 20 to 50 inches	.2	1.2	.9	4.9	24.4	52.2	16.3
336427	Subsoil, 50 inches, +	.0	.0	.0	2.0	24.6	63.4	10.0

CLINTON VERY FINE SANDY LOAM

The surface soil of Clinton very fine sandy loam consists of grayish-brown very fine sandy loam, from 12 to 16 inches deep, in which the content of very fine sand is rather variable. With the exception of the texture of the surface soil, the different layers of this soil correspond in thickness, color, texture, and structure to those of Clinton silt loam. Included with this soil, as mapped, are a few patches of Clinton silt loam too small to show on the map.

Clinton very fine sandy loam occurs throughout the loessial uplands. It is not an extensive soil. The largest areas are north of Maquoketa River in Richland Township. This land is rolling or strongly rolling. Drainage, under ordinary conditions, is inclined to be slightly excessive, and the steeper slopes erode somewhat. The subsoil is retentive of moisture.

Practically 60 per cent of this soil is in forest, mostly of white oak, red oak, hickory, and some aspen and elm. Hazel brush and wild plums grow in clumps.

The crop adaptation of this soil is about the same as that of Clinton silt loam, but the yields are slightly lower. The soil warms up a little earlier and corn matures from a week to 10 days earlier than on Clinton silt loam. The chief source of revenue is the sale of livestock and livestock products.

The current value of this land ranges from $100 to $150 an acre, depending on location, condition of improvements, and tenancy.

Clinton very fine sandy loam, like Clinton silt loam, is deficient in organic matter. Legumes should be grown as green-manure crops. The use of lime would prove of great value, especially where red clover or alfalfa is to be grown. More of the land should be kept in clover and alfalfa, and excellent yields are obtained where the seed bed is well prepared. Alfalfa seed should always be inoculated. The steeper slopes are best adapted to the growth of bluegrass for pasture.

TAMA SILT LOAM

Tama silt loam, to an average depth of 10 inches, consists of very dark grayish-brown silt loam, which, when wet, appears almost black. The soil is mellow and friable and the material breaks readily into small granules, usually less than one-sixteenth inch in diameter. Some loose silt which has not entered into the soil grains is present. In the virgin soil, the surface layer, about 2 inches thick, is less perfectly granular and has a slightly grayer color. It is usually filled with grass roots which form a sod, and clusters of the fine granules are attached to the roots. Under this, to an average depth of 22 inches, the material is heavy silt loam or silty clay loam. The color, at a distance, appears dark grayish brown, but when the soil is closely examined it will be seen that the dark color is not uniformly distributed. The original color of the material was brown, but the dark-colored organic matter has penetrated downward from the surface soil along cracks, root holes, and insect and worm burrows until the greater part of the material of this layer has been discolored. The soil material, when powdered, is much browner than is the average broken granule surface because the dark-colored material exists as a coating on the surface of the structure particles. The material of this layer is slightly firmer than the surface soil but is rather friable. It is indistinctly granular in places, but more commonly it breaks into small irregular clods. The next lower layer consists of brown or yellowish-brown heavy silt loam or silty clay loam material which is heavier in texture than the layer above. This material is firm but breaks into irregular, soft clods. A few faint dark streaks extend into the layer, but they decrease rapidly downward. This material continues to a depth varying from 30 to 36 inches. The next lower layer or substratum does not differ greatly from the one above. The color is yellow or grayish yellow and the texture is heavy silt loam. The material is structureless and breaks into irregular clods. This represents the parent material, a silty material or loess little modified by weathering. Iron stains and concretions are common, and gray mottling is present below a depth of 4 feet. No carbonates are present in Tama silt loam at any depth and the surface soil is slightly acid.

Tama silt loam occurs in all parts of the county. The largest areas are south of Wyoming, south and north of Amber, and north of Monticello. This soil was derived from loess which covers a part of the glacial drift to a depth varying from a few inches to 25 or more feet. This soil occurs principally throughout the gently undulating or moderately rolling sections of the county and is found, as a rule, on intermediate positions between Clinton silt loam and Carrington

loam and silt loam. Drainage is well established. Both topsoil and subsoil are retentive of moisture and crops seldom suffer from drought.

In its virgin state, Tama silt loam supports a luxuriant growth of bluegrass which has contributed largely to the accumulation of organic matter. Most of this soil is cultivated or in pasture. The only tree growth consists of a few scattered elms along drainage ways and of shelter elms and evergreens which have been set out to the north and west of dwellings.

Tama silt loam is very fertile and easily tilled. Corn, oats, and hay are the principal crops. Corn ranks first in importance. Excellent yields, averaging 45 bushels to the acre, are obtained, and much higher yields have been reported. Oats yield from 35 to 70 bushels to the acre. All the corn and oats are fed on the farms to the work animals, beef cattle, hogs, and dairy cattle. The supply in some sections is not equal to the demand, and corn is often shipped in. Clover and timothy, grown separately and together, are the chief hay crops. Yields range from 1½ to 2½ tons to the acre. Under normal conditions the clover and timothy are seeded with the oats as a nurse crop. On improved farms the first crop of clover is cut for hay and the second is pastured late and turned under. A small acreage is threshed for seed. Some wheat, barley, rye, buckwheat, and soy beans are grown. Alfalfa makes a very good growth when the land is limed and the seed inoculated. This crop is becoming more popular every year. Small fruits, potatoes, and all kinds of garden truck are grown on most farms to supply, in part, the local needs. A few apple orchards were observed, but as little care is given the trees the fruit is faulty.

Tama silt loam is generally well cultivated. It is plowed to a depth of 6 or 8 inches, and the seed bed is kept in a pulverulent condition. Crop rotation is practiced more or less. The most popular is a four-year rotation of corn, corn, oats, and clover. On rented farms, however, corn usually follows corn for at least three years. Because of the undulating surface which prevails in most areas of this soil, tractors and improved machinery can be successfully used.

Commercial fertilizers are not used except in an experimental way on a few farms. Ground limestone is applied with very good results. Barnyard manure is carefully saved and used on all farms for corn, clover, and pasturage.

The current value of this land varies from $200 to $225 an acre, depending on location and the condition of improvements.

This is naturally a strong agricultural soil. Its fertility can be maintained and improved by the use of proper methods of cultivation. A large percentage, approximately 25 per cent of each farm, should be seeded each year to grasses or clover. Definite crop rotations including legumes should be followed. The seed bed should be kept in a thoroughly pulverulent condition and the depth should gradually be increased.

Tama silt loam, light-colored phase.—Light-colored Tama silt loam consists of light-brown or brown friable silt loam from 12 to 18 inches deep, underlain by yellowish-brown heavy silt loam or silty clay loam mottled with featherings of light gray below a depth of 2 feet. On the whole, the thickness and color of the surface soil are more variable than in typical Tama silt loam.

This light-colored soil occurs exclusively in the northeast quarter of the county where it is found in moderately large connected areas and in small isolated patches. It differs from typical Tama silt loam in that the surface soil is lighter and the land is more rolling. Generally it comprises a transition zone between the undulating or gently rolling Tama silt loam and the strongly rolling Clinton silt loam. In many places it merges with these two soils so gradually that it is difficult to determine the boundary line between them.

Areas of this soil are moderately rolling or rolling. Drainage is usually sufficient for all crops, and little damage is caused by erosion. This is considered a valuable agricultural soil, and most of it is cultivated or is in pasture. Corn is the principal crop, and oats and hay follow in importance. Bluegrass makes an excellent growth and is used for pasture. The clover acreage is on the increase. Considerable timothy is grown, usually seeded with the clover. A number of fields of alfalfa were observed during the progress of the work. Where the seed is inoculated and the fields limed, very good stands are obtained. Some wheat and barley are grown for hog feed. Small gardens are maintained on all farms to help supply the home needs.

The yields on this soil compare favorably with those on typical Tama silt loam. Corn yields from 40 to 60 bushels to the acre, averaging 41 bushels; oats from 40 to 60 bushels; and hay from 1½ to 2 tons.

Because of its more rolling surface, this soil should be managed carefully to prevent erosion. The fields should always be plowed at right angles to the slopes. Deeper plowing would enable the soil to absorb more water and thus prevent washing. The steeper slopes should be left in bluegrass for pasture.

The value of this soil is slightly less than that of typical Tama silt loam. Current prices range from $175 to $200 an acre.

MUSCATINE SILT LOAM

Muscatine silt loam, to an average depth of 12 inches, consists of very dark grayish-brown mellow silt loam which appears black when wet. The structure is finely granular. The next lower layer, which continues to a depth of 30 inches, is dark grayish-brown silt loam, slightly more compact than the layer above and very granular. The lower part of this layer is slightly lighter in color and less granular than the upper part. The distribution of the dark color and the processes by which it enters this layer are the same as for Tama silt loam. Below this layer the material is yellowish-brown silty clay loam, faintly mottled with gray. When wet, this material is rather plastic. Here and there iron stains which increase with depth discolor the upper part of the layer. The proportion of gray also increases with depth. This layer continues to a depth of more than 5 feet.

In places in this soil the underlying glacial-drift material comes near enough to the surface to influence slightly the superimposed layer of loess. In such places the determination of the boundaries between this soil and Carrington silt loam was difficult and was arbitrarily made, as the only difference between the two soils is the presence of some small gravelstones and sand in the lower part of Carrington silt loam.

Muscatine silt loam occurs in small areas in the southern parts of Hale and Rome Townships. It lies on the tops of the broader flat divides and in many areas extends well down the slopes. The surface is level, gently sloping, or undulating. Drainage is in general sufficient for crop needs, but in the more level areas the run-off is sluggish and the downward movement of the water is retarded by the heavy, impervious clay subsoil. The tiling of such lands is necessary for best results.

This soil, though it aggregates only a small acreage, is considered valuable agriculturally. It is all under cultivation and the only tree growth on it consists of a few shelter trees which have been set out around farm dwellings. It is particularly well adapted to corn, which is the principal crop. Timothy and clover hay, oats, and some barley, wheat, and rye are grown. All the grain and hay is fed on the farms to the work animals, hogs, and beef cattle.

Muscatine silt loam is farmed in the same manner as the adjoining Carrington silt loam, and yields are practically the same.

The current value of this land varies from $175 to $225 an acre.

Commercial fertilizers are not used on this soil. Barnyard manure is saved and scattered over the corn-stubble land before plowing, and a small quantity is used on the clover land. The use of ground limestone has proved of great benefit, as the soil is rather acid. The methods suggested for the improvement of the associated Carrington silt loam and Tama silt loam can equally well be applied to this soil.

BREMER SILT LOAM

Bremer silt loam, to a depth varying from 16 to 19 inches, consists of very dark brown or black, mellow silt loam which contains a high percentage of organic matter. This is underlain by dark grayish-brown heavy silt loam or silty clay loam material which in turn grades, at a depth of 22 or 24 inches, to grayish-brown heavy silt loam or silty clay loam mottled with rust brown and iron stains. Below a depth of 30 inches, the mottling and iron stains are so abundant that the mass has a mottled yellowish-brown, brownish-gray, and gray appearance. Iron concretions are present in variable quantities throughout both the subsurface layer and the subsoil. North and west of Olin, the lower part of the subsoil is less heavy and is predominantly mottled with yellowish brown, gray, and pale yellowish. Iron concretions are abundant in this material. A few areas having somewhat similar characteristics are in the extreme southeast corner of the county. These differ only in the presence, in the lower part of the subsoil, of varying quantities of fine gritty material. In a few small areas mapped in section 1 of Hale Township and 1 mile east of Oxford Junction the subsoil is predominantly dark grayish-brown silt loam mottled with rust brown and underlain by light-gray silt loam material which is splotched with bright-colored stains. In sections 34 and 35 of Castle Grove Township mapped areas of this soil include patches of loam.

Bremer silt loam occurs on the terraces of all the rivers and creeks in the county. Along the rivers the areas, in the main, are smaller and more or less isolated, whereas those which border the creeks are more extensive and connected. The largest area occurs along the small creek south of Monticello.

Areas of this soil are level or gently sloping toward the streams. They are above the reach of ordinary overflow and lie from 5 to 10 feet above the normal level of the streams. Drainage is inadequate, so that tiling is necessary for the best results.

Bremer silt loam is recognized as a strong agricultural soil and when well drained is highly prized. Corn does particularly well on this soil and occupies the largest acreage. Late spring rains interfere more with planting than they do on the adjoining uplands, and the crops are more apt to be damaged by early frosts. Oats and small grains are seldom planted, as they have a tendency to lodge badly. A large percentage of this soil is left in its natural state and used for pasture. It supports a luxuriant growth of bluegrass, and a large number of cattle are pastured.

The drainage of Bremer silt loam is of first importance. Greater care must be exercised to plow the land when it contains the right amount of moisture. The use of ground limestone improves yields, as the soil is acid.

This land is always sold with the adjoining Carrington silt loam, Carrington loam, and Tama silt loam. Its value, however, is much less.

BREMER SILTY CLAY LOAM

Bremer silty clay loam is very dark grayish-brown or black silty clay loam underlain, at a depth varying from 14 to 18 inches, by dark grayish-brown or very dark brown material which varies in texture from silty clay loam to silty clay, and which grades downward, at a depth varying from 24 to 30 inches, to slate-colored or grayish-brown silty clay mottled with iron and rust-brown stains. In a few places, the lower part of the subsoil is compact silty clay which is mottled with dark grayish brown, yellowish brown, and yellowish gray.

Bremer silty clay loam occurs in small disconnected areas on the terraces of Wapsipinicon River and Walnut Creek, in the southern part of the county. Its total extent is very small. The largest area is in the vicinity of Morley. This soil occupies a position slightly lower than the adjoining Bremer silt loam, and because of the imperviousness of the soil and subsoil, it is naturally poorly drained. The tiling of some of the fields and the construction of open ditches to carry off the excess water has done much to improve yields.

Bremer silty clay loam, like Bremer silt loam, is considered a valuable corn soil and the greater part of it is used for this crop. During favorable years excellent yields are obtained. The soil, because of its heavy texture, is rather difficult to plow. Greater care must be exercised to plow it under the proper moisture conditions than is needed on the silt loam type of the Bremer series. Where fields are not well cultivated the ground cracks, injuring the roots of growing plants.

The value of this land, in its natural state, is about equal to that of Bremer silt loam. When it is tiled and well drained, its value is only slightly lower than that of the adjoining Carrington silt loam.

BUCKNER SILT LOAM

The topsoil of Buckner silt loam, to a depth varying from 16 to 20 inches, is dark-brown or very dark brown mellow silt loam that appears almost black when wet. The subsoil is lighter brown silt

loam material. In a few places the soil to a depth of 3 feet shows little change in either color or texture. In section 36 of Jackson Township and in section 1 of Rome Township the brown or dark-brown subsoil in many places grades below a depth of 33 inches to a layer of sticky fine sand. In these areas the surface soil contains a higher percentage of fine or medium sand. The soil in one small area along Buffalo Creek, in the extreme northwest corner of section 19, T. 85 N., R. 4 W., differs from typical in that the surface layer to a depth of 2 or 3 inches is muck.

Buckner silt loam occurs as small isolated areas on the terraces of Maquoketa and Wapsipinicon Rivers and Buffalo Creek. Areas are level or gently sloping and occur in positions from 1 to 2½ feet above the adjoining first-bottom lands. Drainage of the higher-lying areas is fair or good. Where the soil occupies a lower position, crops are in many places injured during wet seasons by an excess of water caused by the overflowing of the adjoining first bottoms and the raising of the water table.

Practically all this soil is cleared and used for the growing of staple crops. The only tree growth consists of a few elm, butternut, and ash, along some of the swales. Bluegrass makes a very good growth.

Corn is the principal crop and is grown for years on the same land. The yields compare favorably with those obtained on Carrington silt loam. Oats and small grain are seldom grown because of the damage caused by lodging. Some clover and timothy are produced, and yields range from 1½ to 2 tons to the acre. All the grain and hay is used on the farms as feed.

Buckner silt loam is managed in practically the same manner as Buckner fine sandy loam and Buckner loam. Commercial fertilizers are not used, and barnyard manure is seldom applied. The methods suggested for the improvement of Buckner loam can equally well be applied to this soil.

BUCKNER LOAM

The topsoil of Buckner loam consists of dark-brown or very dark brown loam from 18 to 20 inches deep. The subsoil has a slightly lighter color and practically the same texture. The percentage of organic matter decreases somewhat with depth and the lower part of the subsoil is not so fluffy and mellow as the surface soil.

Buckner loam, like Buckner fine sandy loam, occurs exclusively on the terraces of Wapsipinicon and Maquoketa Rivers and Buffalo Creek, and is found in areas varying in size from 5 to 15 acres. Areas of this soil are nearly level and lie at about the same elevation as Buckner fine sandy loam. Drainage is well established, but crops seldom suffer from drought as the water table generally comes within 4 or 5 feet of the surface.

This soil is inextensive and is of minor importance. Approximately 80 per cent of it is cultivated. Areas unsuited to agriculture are left in their natural state and are used for pasture. Bluegrass makes an excellent growth.

Buckner loam is easily cultivated because of its mellowness, and where improved cultural methods are in use its fertility can be easily maintained. It responds well to the application of manure and is greatly benefited by the liberal use of ground limestone. Legumes

like red clover should be grown more extensively, and now and then a crop should be turned under.

BUCKNER FINE SANDY LOAM

The topsoil of Buckner fine sandy loam, to a depth of 18 or 20 inches, is dark-brown fine sandy loam that appears very dark brown or black when wet. The dark-brown fine sandy loam may continue to a depth of 3 or more feet without change, but in most cases the subsoil is slightly lighter in color. One mile north of Olin where this soil occurs in a position slightly higher than the first-bottom land, the lower part of the subsoil is brown fine sandy loam, mottled with rust brown. This condition, no doubt, is the result of poor drainage. An area possessing similar characteristics is in the extreme southeast corner of the county in section 35 of Oxford Township. In section 5, T. 86 N., R. 3 W., the surface soil is much lighter in color than typical, but such areas are not extensive enough to justify separation on the soil map. North of the city limits of Monticello, the percentage of medium or coarse sand present is very high, and the soil in many places approaches sandy loam in texture.

Buckner fine sandy loam occurs along Wapsipincon and Maquoketa Rivers. It lies on the terraces above the reach of ordinary overflows. Areas are level or very gently sloping and as a rule the surface is 2 to 3 feet above the level of the first bottoms. The soil as a whole is well drained, and crops seldom suffer during prolonged dry spells, because the water table is near the surface.

This soil is inextensive and usually occurs in small isolated areas. The largest areas are just north of Olin and Monticello. Practically all of the land is under cultivation. Corn is the principal crop and is grown on the same land for years, with only small variations in the yields. Some small grains are grown, and sweet corn is produced to a small extent in the vicinity of Monticello, where it is sold to a canning factory.

Buckner fine sandy loam is managed in practically the same manner as the adjoining Carrington soils. It warms up earlier in the spring, however, and can be plowed under a wider range of moisture conditions. Definite crop rotations are seldom followed, and commercial fertilizers and lime are not used. However, ground limestone would prove beneficial as the soil is acid, and the use of fertilizers would be economical when applied to land for sweet corn. Some barnyard manure is used.

The value of this land varies with that of the upland soils, with which it is always sold.

BUCKNER FINE SAND

Buckner fine sand consists of brown or dark-brown fine sand or loamy fine sand, from 18 to 20 inches deep, underlain by brown or slightly yellowish brown loose fine sand which continues to a depth of 3 or more feet.

Numerous minor variations occur, but these are not of enough importance to justify separation on the map. In section 22, T. 86 N., R. 3 W., the surface soil has a much lighter color that resembles somewhat that of the Plainfield soils Areas possessing similar characteristics are found along both sides of Wapsipinicon River in section 13, T. 83 N., R. 2 W., and section 18, T. 83 N, R. 1 W.

Small, widely scattered areas of this soil occur on the terraces of Wapsipinicon, Maquoketa, and North Fork Maquoketa Rivers. These areas are level and generally have an elevation varying from 2 to 5 feet above that of the first bottoms and 10 or 12 feet above the normal level of the streams. North of Monticello, in sections 15 and 22 of Lovell Township, this soil occurs on a bench that lies from 15 to 18 feet above the first bottoms. Drainage is excessive and crops suffer during dry seasons.

Buckner fine sand is of small agricultural value and the greater part is left in its natural state and used for pasture. Bluegrass and clover make only a fair growth, and throughout the wooded areas the soil has a somewhat bare appearance. The tree growth consists of scrub oak and some hickory.

Where this soil is cultivated, corn is the principal crop. The corn is all used locally as feed. Some sweet corn is grown for the canning factory at Monticello.

The applications of large quantities of barnyard manure would prove beneficial, as this would increase the moisture-holding capacity of the soil. Buckner fine sand is well suited to the growing of truck crops and this industry would be profitable provided markets could be secured.

WAUKESHA SILT LOAM

The topsoil of Waukesha silt loam, to a depth of 16 or 18 inches, consists of dark grayish-brown mellow silt loam which appears dark brown or black when wet. The percentage of organic matter present is high. The subsoil is yellowish-brown or brownish-yellow silty clay loam which in many places contains a small quantity of medium and fine sand below a depth of 2 feet.

Waukesha silt loam, except for several minor variations, is rather uniform in color and texture. In section 8, T. 86 N., R. 3 W., a few patches of loam are included in mapped areas of this soil, and in several places a gray layer or an indication of a gray layer, about 2 or 3 inches thick, was observed. Other small patches of loam occur in section 15 of Lovell Township and in section 13 of Hale Township, but these are too small to indicate on the map. Along the north side of Wapsipinicon River, in the vicinity of Oxford Junction, the lower part of the subsoil contains a considerable quantity of fine grit and varies in texture from heavy fine sandy loam to sandy clay loam. In such areas, a layer of sticky sand is present in many places below a depth of 36 inches.

Waukesha silt loam occurs on second terraces along all the rivers and larger creeks of the county. It lies above ordinary overflow, at a height varying from 8 to 12 feet above the normal level of the water. The largest areas are in the vicinity of Monticello, Olin, and Oxford Junction. The land is level or gently sloping, and drainage is good.

Practically all of this soil is cleared and used for the production of staple crops. The largest acreage is planted to corn, and the yields range from 35 to 48 bushels to the acre. Oats rank second in importance, and under ordinary conditions produce from 35 to 55 bushels to the acre. The hay crop consists mostly of timothy and clover, grown separately or together, which produce an average yield between 1½ and 2 tons to the acre. Some wheat and barley

are grown, mostly for hog feed. All the grain and hay are fed on the farms. A few head of beef cattle and hogs are raised and pastured each year.

Waukesha silt loam is a fertile soil and easily cultivated. Barnyard manure is usually applied on the stubble land and pastures before plowing. Ground limestone has been used to very good advantage and should be more universally applied. This soil is managed in much the same way as Carrington silt loam, and the methods suggested for its improvement may be equally well applied to this soil.

Land of this kind varies in price from $150 to $175 an acre, depending on location and improvements.

CLYDE SILT LOAM

The topsoil of Clyde silt loam, to a depth of 10 or 15 inches, consists of very dark brown or black silt loam rich in organic matter. When wet, the color is much darker, ranging from dark brown to black. The subsoil is dark grayish-brown or dark-brown silty clay loam which grades, at a depth of 20 or 22 inches, to silty clay mottled with yellow, yellowish brown, and gray. Iron concretions and some small fragments of the parent glacial till are present at a depth of nearly 3 feet.

With a few exceptions, Clyde silt loam is uniform in color and texture. The most conspicuous variation occurs in sections 15, 16, 17, and 21 of Rome Township. Here the soil occurs in slightly depressed areas where drainage is restricted. In many places water stands on the ground for long periods during wet seasons. In such areas, the topsoil consists of black muck 2 or 3 inches thick underlain, to a depth of 18 or 20 inches, by dark-brown or black silt loam very rich in organic matter. The subsoil is predominantly heavy silt loam or silty clay loam material mottled with gray, yellowish brown, and rust brown. Iron concretions are very abundant, and gritty material is present below a depth of 34 inches.

Along the smaller drainage ways and around the heads of most of the streams the dark-brown or black topsoil is commonly much deeper than typical and the subsoil is predominantly yellowish-brown silty clay loam which grades, at a depth varying from 24 to 30 inches, to mottled gray and yellow gritty silty clay loam. In such areas, many bowlders are scattered over the surface. Included in mapped areas of this soil are a few patches of loam and silty clay loam too small to indicate on the map.

Clyde silt loam occurs throughout the glaciated sections of the county, mostly along the smaller drainage ways and in depressions, although it is also found along the base of the more gentle slopes, in an intermediate position between the Carrington soils of the upland and the Bremer soils of the terraces.

Areas of this soil are level or gently sloping. Natural drainage is poor. In the more level areas, the ground-water level is rather near the surface, and along the slopes seepage keeps the soils constantly wet. Some tile, which has lowered the water table and improved conditions, has been installed.

Clyde silt loam is not considered so valuable agriculturally as the adjoining Carrington loam and Carrington silt loam. Most of this soil is left in its natural state and used for pasture. It supports a

growth of sedge and marsh grasses. Where thoroughly tiled, the yields of corn, oats, and hay compare favorably with those obtained on Carrington loam.

It is recognized that this soil must be carefully managed if good yields are to be obtained. Tiling is necessary, and the use of ground limestone will prove beneficial. Greater care must be exercised in plowing. Late spring rains often prevent as early planting as is possible on the better-drained soils, and early frosts are apt to injure the crops. It is therefore very important, to obtain best results, to select early-maturing strains of corn.

CLYDE SILTY CLAY LOAM

Clyde silty clay loam, to a depth of 12 or 14 inches, consists of a very dark brown or black silty clay loam. As the moisture content increases the color darkens, and wet fields have an intense black color. The subsoil is dark grayish-brown silty clay underlain, at a depth ranging from 20 to 24 inches, by mottled yellowish-brown, brown, and gray material containing an abundance of iron concretions and some angular fragments of the parent material. A few bowlders are scattered over the surface and embedded in the soil.

This soil occurs only in the western half of the county in comparatively small, isolated areas. Like Clyde silt loam, it is found in depressed areas along drainage ways, as well as along the lower parts of the more gentle slopes. In its natural state, it is poorly drained.

Clyde silty clay loam is naturally fertile, and where it is well tilled it produces excellent yields of corn. The yields average 40 bushels to the acre. All the grain is fed on the farms. Oats give good yields but have a tendency to lodge. Most of this soil is left in pasture. It supports a good growth of bluegrass.

The tiling of this soil is of major importance, and the use of ground limestone improves its physical condition.

The value of Clyde silty clay loam ranges from $75 to $200 an acre, depending on the location and condition of the improvements.

DODGEVILLE LOAM

Dodgeville loam consists of dark-brown mellow loam, 12 or 14 inches deep, underlain by yellowish-brown or slightly reddish brown gritty clay which in turn is underlain, at a depth varying from 18 to 30 inches, by limerock. In many places the subsoil is missing and the dark-brown topsoil rests directly upon the rock. Along many of the steeper slopes where the limerock crops out, very narrow bands of this soil are present, but these are too small to show on the map in any way other than by outcrop symbols.

This soil occurs in comparatively small disconnected areas in all parts of the county, except in the southwest quarter. The most extensive areas are 2 miles northeast of Monticello. Dodgeville loam has developed on hills and knolls and along slopes. Areas are undulating or rolling. The soil is not retentive of moisture because of the nearness of the limestone, and crops suffer during periods of drought.

Dodgeville loam is of small extent and is not of great agricultural importance. It is practically all cleared; the only tree growth consists of a few scattered plum thickets. Its chief value is for pasture, as bluegrass makes a very good growth during years when the rainfall is well distributed.

This soil is always sold in conjunction with the Carrington, Tama, and Clinton soils and constitutes a very small percentage of the farm area.

LINDLEY SILT LOAM

Lindley silt loam consists of grayish-brown floury silt loam, 6 or 8 inches deep, underlain, to a depth of 15 or 18 inches, by yellowish-brown or pale-yellow silty clay loam which in turn grades, at a depth varying from 27 to 30 inches, to yellowish-brown or brown silty clay containing a considerable quantity of gritty material. In a few areas, the soil differs from typical in that the subsoil, to a depth of 15 or 20 inches, is yellowish-brown or slightly reddish brown silty clay loam. Below this, reddish-brown or dull-red gritty silty clay continues to a depth of 30 or 32 inches, where it rests on mottled yellow, gray, and brown gritty clay.

Lindley silt loam occurs mainly in the eastern half of the county. One small area is in section 10 of Cass Township, and another, containing approximately 200 acres, is just east of Anamosa. This soil is found in close association with Clinton silt loam and most areas are along the steeper slopes where the mantle of loess has been so thinned that the drift comes well within 3 feet of the surface. Areas vary from rolling to strongly rolling. Surface drainage is good and sufficient for crop needs.

Lindley silt loam is not extensive and, from an agricultural viewpoint, is of minor importance. Formerly all of it, no doubt, supported a forest growth but of late years about 40 per cent has been cleared and put under cultivation. The tree growth consists mainly of white oak, scrub oak, hickory, and clumps of hazel, sumac, and plum.

Corn, oats, and hay are the principal crops. Corn has the largest acreage. The hay crop consists mainly of timothy and clover, grown separately or together. All the grain and hay are used on the farms for feed.

The yields on this soil are lower than those obtained on the adjoining Clinton and Carrington soils. The value of the land is also much less.

The surface soil of Lindley silt loam compacts and has a tendency to harden during dry weather, and it is much more difficult to keep the seed bed in a pulverulent condition than on the darker-colored prairie soils. Because of the low percentage of organic matter it contains, the growing of green-manure crops and the liberal use of manure would increase crop yields and make the land more porous. This soil is acid, so that the use of ground limestone is recommended. Red clover makes a good growth, and its acreage should be extended. The steeper slopes erode and gully badly when they are cleared and cultivated. Such areas should either be left in their natural state or seeded to bluegrass and used for pasture.

LINDLEY FINE SANDY LOAM

The topsoil of Lindley fine sandy loam consists of yellowish-brown or grayish-brown fine sandy loam 6 or 8 inches deep. In most places the subsoil is yellowish-brown gritty sandy clay, though in places it grades, at a depth varying from 24 to 30 inches, to mottled yellowish-

brown and reddish-brown sandy clay. Some glacial-till material occurs in variable quantities near a depth of 3 feet.

The surface soil is rather variable. Along the upper part of the slopes, where this soil occurs in close association with Clinton silt loam, an admixture of silt imparts to it a texture which varies from fine sandy loam to fine loam, whereas toward the bottom of the slope it is predominantly sandy loam. In the northern parts of sections 5 and 6, T. 86 N., R. 3 W., this soil joins an area of Lindley sandy loam in Delaware County. It was not thought advisable to establish a new soil type for such a small area, since the soils are very similar in texture and value. Southwest of Anamosa, in section 22 of Fairview Township, the lower part of the subsoil is brownish-yellow gravelly clay loam to a depth of 5 or 6 feet. The material becomes more gravelly with depth.

Lindley fine sandy loam occurs mainly in small, disconnected areas throughout the uplands. The largest areas are just east of Hale and south and north of Anamosa. The surface is rolling or hilly, and drainage is excessive.

This soil was originally forested, but at present the only tree growth consists of a few scattered hickory, white oak, and shrubs. Lindley fine sandy loam is not considered so valuable as the adjoining Clinton silt loam and Carrington loam.

Approximately 90 per cent of the Lindley fine sandy loam is under cultivation or in pasture. Cultivated areas are devoted to the growing of cereals and hay. Corn is the principal crop, and oats are second in importance. The hay crop consists mostly of timothy and clover mixed. These are nearly always seeded with oats as a nurse crop. A very small acreage of rape is sown with the oats and corn and is utilized for hog pasture. A few gardens are maintained for home use. Practically all the corn, oats, and hay are fed on the farms. A number of hogs are raised, and some cattle are fed each year. A few milk cows are kept, and the surplus cream is sold to the creameries in the county.

The yields on this soil are much lower than on the adjoining Carrington and Clinton soils. However, where plenty of manure is worked into the seed bed, very good yields are obtained. The soil warms up early in the spring and crops mature one or two weeks earlier than on the heavier Carrington soils. The corn crop is seldom injured by early frosts.

Lindley fine sandy loam is deficient in organic matter. Barnyard manure should be used wherever possible and more attention should be paid to the growing of green-manure crops, preferably legumes. Generous applications of ground limestone would also prove of great benefit as limestone corrects the acidity and improves the physical condition of the soil. Melons and truck crops do well and can be profitably grown if suitable markets are available.

This land is never sold alone but is included in farms with Carrington loam and Clinton silt loam.

LINDLEY FINE SAND

The topsoil of Lindley fine sand consists of grayish-brown fine sand from 15 to 18 inches deep. When wet, the color is slightly darker and varies from grayish brown to brown. The subsoil may be gray-

ish-yellow or brownish-yellow fine sand which in most places continues to a depth of 3 or more feet.

This soil, where it occurs in close association with Carrington loam and Carrington silt loam, contains a large quantity of organic matter and the color is darker, ranging from grayish brown to brown when dry and from brown to dark brown when wet. Along the base of the loess hills, on the other hand, the color is lighter.

Lindley fine sand occurs along the rivers and a few of the larger creeks of the county. The most extensive areas are northeast of Olin along the north side of Wapsipinicon River and bordering Maquoketa River north and east of Monticello, and west of Clay Mills. Most areas are on low ridges which border the loess hills. The land is rolling or hilly and, in places, the surface has been altered recently by wind action. Drainage is excessive.

Some of this soil is cultivated but approximately 90 per cent of it is in pasture or forest. The natural tree growth consists of scrub oak and a few elm and hickory. Some thickets of plum and sumac were observed.

Lindley fine sand is not considered of great value. The yields of corn, because of the tendency to fire, are small and uncertain. The soil is used principally for pasture. Truck crops do well and are grown to a small extent.

The incorporation of organic matter in the soil would be of the greatest benefit. This would prevent blowing, make it possible to maintain a better seed bed, and increase the moisture-holding capacity.

SHELBY FINE SANDY LOAM

The topsoil of Shelby fine sandy loam consists of dark grayish-brown loose-textured fine sandy loam from 6 to 12 inches deep. The subsoil is light-brown or yellowish-brown heavy sandy loam or sandy clay loam in which the content of fine and coarse gravel increases with depth. The parent glacial till, below a depth of 3 feet, consists of a mixture of sand, gravel, silt, and clay. The percentage of clay present is sufficiently high to make the material coherent, and it is used in a number of places for surfacing roads.

This soil occurs exclusively on a few small ridges and knolls scattered throughout Fairview, Rome, Jackson, Cass, Lovell, Washington, Richland, and Hale Townships. Areas are undulating or rolling. Drainage is excessive and a few of the steeper slopes, that have been in cultivation, show the effects of erosion.

Corn, oats, and hay are grown, but the yields are much lower than those obtained on the adjoining Carrington soils. Corn has a tendency to fire during the dry spells but is seldom injured by early frosts, as it matures, as a rule, a week or two earlier than it does on the heavier soils.

Shelby fine sandy loam, because of its loose porous texture, has a tendency to wash badly and should be left in pasture or seeded to red clover. With careful methods of cultivation, the incorporation of organic matter, and the use of limestone the yields can be increased. This soil is always sold with the adjoining Carrington, Tama, and Clinton soils and commands the same price. However, its actual value is much less.

JACKSON SILT LOAM

The topsoil of Jackson silt loam consists of light-brown or grayish-brown floury silt loam, from 10 to 14 inches deep. The subsoil is yellowish-brown or grayish-yellowish silty clay loam or silty clay.

Jackson silt loam occurs only on the terraces of Wapsipinicon, Maquoketa, and North Fork Maquoketa Rivers, and Farm and Kitty Creeks. Most areas are small and disconnected and border the Clinton upland soils. The land is level or gently sloping, and drainage is good. The subsoil is retentive of moisture.

This soil is inextensive. It is all cleared and devoted to the growing of corn, oats, and hay. A few hogs and beef cattle are pastured. Crop yields compare favorably with those obtained on the adjoining Clinton silt loam.

Jackson silt loam is managed in the same way as Waukesha silt loam. The soil is deficient in organic matter and responds well to applications of manure. Some ground limestone is used to excellent advantage. Commercial fertilizers are not used.

O'NEILL LOAM

O'Neill loam consists of dark grayish-brown friable loam, 10 or 12 inches deep, underlain by brown or slightly yellowish brown fine sandy loam which grades, at a depth varying from 24 to 30 inches, to yellowish loose fine sand.

Minor variations in the color and texture of the topsoil and subsoil were observed in a number of places. Along the north side of Maquoketa River, in sections 2 and 3, T. 85 N., R. 2 W., the surface soil is light-brown or brown loam or silt loam, from 8 to 12 inches deep, and the subsoil is yellowish-brown clay or silty clay loam material, which grades, at a depth varying from 24 to 30 inches, to sticky loamy sand. Southeast of Oxford Junction the surface soil in places approaches fine sandy loam in texture.

O'Neill loam aggregates a small acreage. It occurs in rather small disconnected areas on the second terraces of Maquoketa and Wapsipinicon Rivers. It lies from 12 to 15 feet above the normal level of the streams, beyond the reach of ordinary overflows. Areas are level or gently sloping. Drainage is inclined to be excessive, and crops suffer from lack of moisture during dry seasons.

Practically all this soil is under cultivation. It is farmed in conjunction with the adjoining Waukesha silt loam and Bremer silt loam, but the yields are lower. Corn is the principal crop, and clover and timothy rank next in importance. Crop rotation is practiced to some extent. The raising of a few hogs and the pasturing of a small number of cattle is a general practice.

O'Neill loam should be carefully managed to conserve moisture. The shallow disking of the fields and the maintenance of a good surface mulch will prove of benefit. More barnyard manure should be applied, and green-manure crops should be grown and turned under. The application of ground limestone is recommended and will aid in increasing yields.

WABASH SILT LOAM

Wabash silt loam consists of very dark brown or black silt loam underlain, at a depth of 16 or 18 inches, by very dark grayish-brown

silty clay loam or silty clay mottled with rust-brown and iron stains. This soil is variable in color and texture, as are all first-bottom soils. The content of organic matter is always high and in places the 2-inch or 3-inch surface layer approaches muck in texture. Along the upper reaches of the small creeks the dark-brown or almost black color in many places continues without change to a depth of 3 or more feet. Throughout the larger, more poorly drained areas, the subsoil has, in general, a mottled dark grayish-brown, gray, and yellowish-brown color, and an abundance of iron stains are present below a depth of 2 feet. Where this soil receives some of the wash from Clinton silt loam, the surface 2-inch to 4-inch layer in many places has a much lighter color, ranging from light brown to brownish gray. Included with mapped areas of Wabash silt loam are areas of loam and silty clay loam too small to separate on the map.

Wabash silt loam has developed from material that has been washed from the darker-colored uplands and deposited, during periods of overflow, along the rivers and creeks of the county. Areas are level or very gently sloping toward the streams and occur in a position from 3 to 5 feet above the normal water level. Drainage during normal years is usually sufficient, but in wet seasons, when the high waters overflow the land and prevent the free movement of the soil waters, it is poor.

Most of this soil is left in its natural state and is used for pasture. In the few forested areas observed, the tree growth consisted chiefly of willow, butternut, walnut, and hackberry. Bluegrass makes a fairly good growth and affords pasturage for the few head of beef cattle that are ordinarily kept. Where this soil is under cultivation, corn is the principal crop. Yields ranging from 40 to 60 bushels to the acre have been reported.

Wabash silt loam is a strong soil when it is well drained and protected from overflow. The straightening of stream channels and the construction of low dikes along many of the streams would tend to eliminate overflow and would greatly increase the value of the land.

The current value of Wabash silt loam depends largely on that of the adjoining soils with which it is always sold. If this soil was sold separately the selling price would probably range from $50 to $75 an acre.

WABASH SILTY CLAY LOAM

The topsoil of Wabash silty clay loam is very dark brown or black silty clay loam, from 12 to 15 inches deep. The subsoil is dark-drab or dark-gray plastic silty clay mottled with brown and rust brown. Iron stains and concretions are present in many places near a depth of 3 feet. Like Wabash silt loam, this soil is variable. The surface soil layer, to a depth of a few inches, often has an intense black color caused by the large percentage of organic material present, and the lower part of the subsoil in a few places has a mottled yellowish-brown, gray, and yellow color.

Wabash silty clay loam is of minor importance and of small extent. It occurs only in small isolated areas on the first bottoms of Wapsipinicon River and its tributaries. Areas are flat and most of them are somewhat lower than areas of the adjoining Wabash silt loam. Drainage is poor.

Most of this soil is devoted to pasture. The areas least subject to overflow are commonly farmed in conjunction with the uplands. Corn is the principal crop.

CASS LOAM

Cass loam consists of dark-brown mellow loam, from 10 to 15 inches deep, underlain by grayish-brown or brown sandy loam which grades, at a depth varying from 17 to 20 inches, to somewhat sticky fine sand ranging in color from yellowish brown to brownish gray. The percentage of fine sand present is variable, and the surface soil in many places approaches fine sandy loam in texture. The substratum, below a depth of 3 feet, is yellowish fine sand.

This soil occurs only along Wapsipinicon River, the largest areas lying just north of Olin. Cass loam occurs on a first-bottom position some 5 or 6 feet above normal water level. Drainage is excessive.

Approximately 90 per cent of this soil is left in its native state and is utilized for pasture. Some small shrubs, mostly gooseberry, were observed. Grass on this land makes a poor growth.

Cass loam is not considered valuable agriculturally, and only one small area was being farmed the year of the survey. Corn is the only crop grown and the yields are always small and uncertain.

GENESEE SILT LOAM

The topsoil of Genesee silt loam consists of grayish-brown or gray even-textured silt loam from 10 to 16 inches deep. The subsoil is pale-yellowish or yellowish-brown heavy silt loam or silty clay loam, faintly mottled with gray below a depth of 2 feet.

Genesee silt loam has a comparatively small total extent. It is alluvial in origin and is derived from material washed largely from Clinton silt loam. The strips of bottom vary in width from 50 to 150 yards, and in many places the areas shown on the map are somewhat exaggerated.

Areas of this soil are level or very gently sloping and lie from 2 to 8 feet above the normal level of the streams. Drainage is usually sufficient for all crop needs.

Genesee silt loam is, in general, left in its natural state and utilized for pasture. Bluegrass makes an excellent growth. The few areas that are in cultivation are devoted to the production of corn. The yields are much lower than on the adjoining uplands and are made somewhat uncertain by periodic overflows.

This soil is lacking in organic matter, and methods of cultivation that will add to the store of humus should be used. Stream channels should be straightened and small dikes constructed to protect the crops from overflow.

GENESEE VERY FINE SANDY LOAM

Genesee very fine sandy loam consists of grayish-brown or light-brown even-textured very fine sandy loam, from 8 to 15 inches deep, underlain by light-brown or yellowish-brown silt loam or silty clay loam slightly mottled with gray. This soil is somewhat variable, as are most first-bottom soils in this county.

Genesee very fine sandy loam occurs exclusively on the first bottoms of North Fork Maquoketa, Maquoketa, and Wapsipinicon Rivers, and aggregates only a small acreage. Most of the areas are small and disconnected.

This soil is subject to overflow, and consequently very little of it is under cultivation. Bluegrass and white clover grow very well and afford fair pasturage for the few head of cattle that are ordinarily kept.

MEADOW

Meadow, as mapped in Jones County, consists of sediments that have been recently laid down and that are so variable in texture, structure, and other characteristics that a separation of this land into types of soil is practically impossible. These sediments include silt, sand, fine sand, and loam. The total extent of meadow is comparatively small, and the land is of no agricultural value, except for pasture. The surface is level or hillocky. Overflows are frequent. and the soil is usually wet.

SUMMARY

Jones County is in the east-central part of Iowa. Its area is 569 square miles, or 364,160 acres.

The county, in general, is undulating or rolling, with strips of strongly rolling or hilly land adjacent to the rivers and larger streams. The elevation above sea level ranges from 1,100 feet in the uplands to 700 feet where Wapsipinicon River leaves the county. The general elevation of the uplands varies from 800 to 1,000 feet.

The drainage of Jones County is largely through Wapsipinicon and Maquoketa Rivers and their tributaries. Creeks and laterals ramify all parts of the county and afford excellent drainage for the greater part of the land.

The climate of Jones County is characterized by long, rather cold winters and short hot summers. The mean annual temperature is 47.7° F. The mean annual precipitation is 32.66 inches. The greatest precipitation is during the spring and summer. Fall weather is usually excellent for harvesting crops. The average frost-free season is 154 days.

Agriculture in Jones County consists of the growing of staple crops, such as corn, oats, and hay, the raising and feeding of cattle and hogs, and dairying. Practically all the grain and hay are fed on the farms and the revenue is derived from the sale of livestock and livestock products. Modern methods are more or less in general use and the farmers, on the whole, are prosperous.

The soils of Jones County are of glacial and loessial origin, are mostly well supplied with the plant-food elements, are moderately retentive of moisture, and compare favorably in fertility with similar soils in other parts of the State. They have proved rather durable.

Silt loam soils predominate, and loams are next in extent. Carrington silt loam, Carrington loam, Clinton silt loam, and Tama silt loam are the most important soils.

Carrington silt loam and Carrington loam predominantly have dark grayish-brown topsoils and yellowish-brown subsoils. Both soil and subsoil are retentive of moisture. These soils are used for the

production of staple crops and are very productive. Carrington fine sandy loam has also been mapped, but it aggregates a smaller acreage and is of less agricultural value.

Clinton silt loam is the most extensive soil of the county. Typically, it consists of light-brownish or grayish-brown floury silt loam, from 10 to 14 inches deep, underlain by brownish-yellow or yellowish-brown silty clay loam which grades, at a depth of 20 or 24 inches, to yellowish-brown or pale-yellow silty clay loam or silty clay feathered with gray. This material is tough and granular. Areas vary from rolling to strongly rolling and broken. Surface drainage is in many places excessive, and considerable damage is caused by erosion. The subsoil is retentive of moisture. This soil is of loessial origin.

Tama silt loam is of loessial origin. The topsoil is very dark grayish brown and the subsoil is yellowish brown. This is a very productive and highly prized soil. Areas are undulating or gently rolling, and drainage is well established. Tama silt loam, light-colored phase, differs from the typical soil in that the surface soil is lighter colored and that the areas of its occurrence are more rolling.

Lindley fine sand, Lindley fine sandy loam, and Lindley silt loam are light-colored glacial upland soils. They are not so rich in plant food as are the darker-colored soils of the plains and are of less value.

Shelby fine sandy loam, a dark-colored glacial soil, is of small total extent and of minor agricultural value.

Clyde silt loam and Clyde silty clay loam have very dark brown or black topsils and mottled yellowish-brown, gray, and yellow subsoils. These soils occur in depressed areas throughout the uplands. Natural drainage is poor, but when tiled the soils are very productive, as they contain a large supply of available plant-food elements.

Muscatine silt loam, like Tama silt loam, is of loessial origin but differs from the Tama soil in that the topsoil is darker colored and the subsoil is mottled with rust brown and gray, and with iron stains. This is naturally a strong agricultural soil, but drainage is inadequate for the best results.

Dodgeville loam is dark-brown mellow loam, from 12 to 14 inches deep, underlain by yellowish-brown or slightly reddish brown gritty clay which rests, at a depth varying from 18 to 30 inches, on limerock.

The terrace soils, although of considerable importance, are of comparatively small total extent. They include Bremer silt loam, the most extensive terrace soil, Bremer silty clay loam, Buckner fine sandy loam, Buckner fine sand, Buckner silt loam, Buckner loam, Waukesha silt loam, Jackson silt loam, and O'Neill loam. These soils are utilized for the production of the staple crops.

Wabash silt loam and Wabash silty clay loam, Cass loam, Genesee silt loam, Genesee very fine sandy loam, and meadow comprise the first-bottom lands. These soils are fertile, but periodic overflows and excess moisture make them unsuitable, in general, for any purpose other than for pasture.

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[PUBLIC RESOLUTION—No. 9]

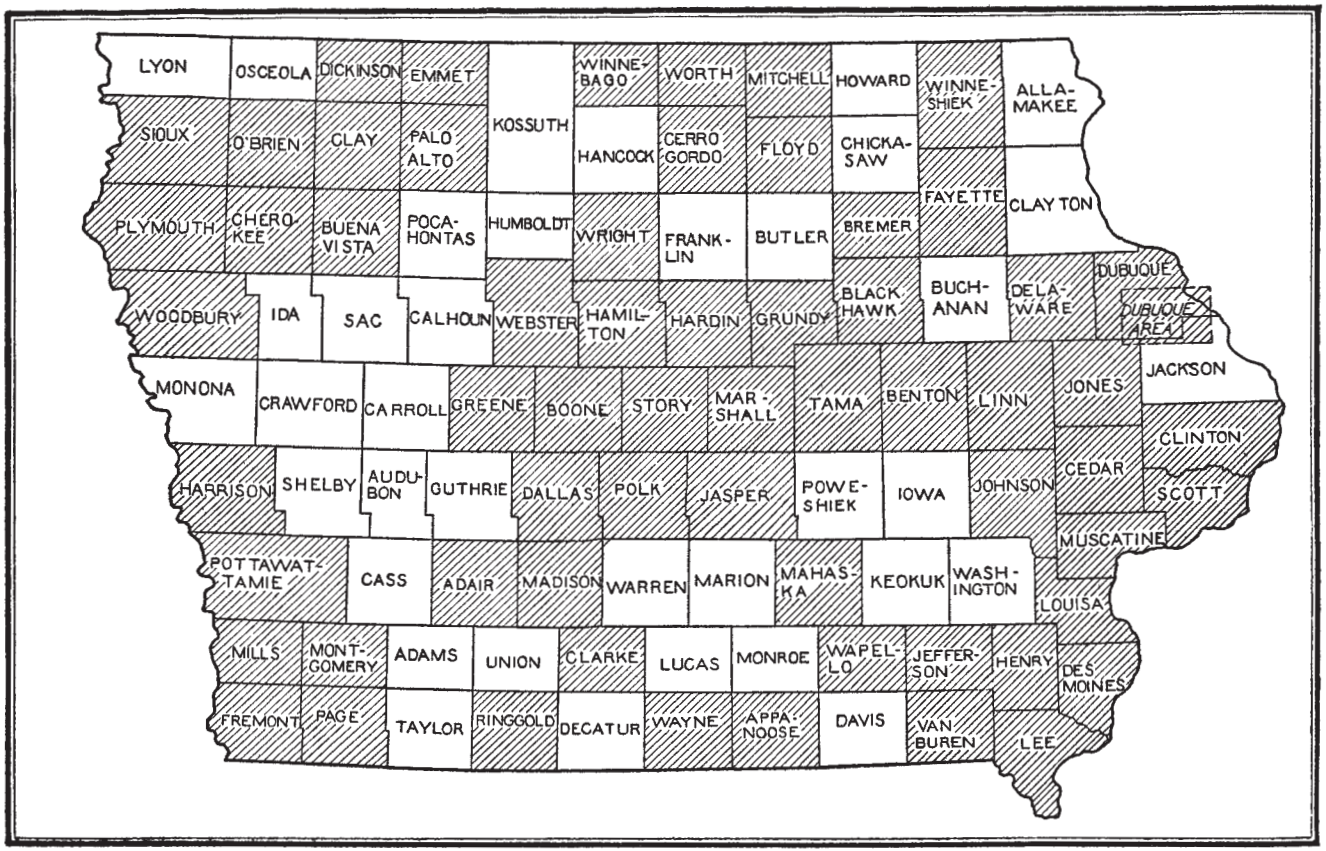
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]



Areas surveyed in Iowa, shown by shading

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