U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE IOWA AGRICULTURAL EXPERIMENT STATION,
C. F. CURTISS, DIRECTOR; W. H. STEVENSON, IN CHARGE SOIL SURVEY.

SOIL SURVEY OF SCOTT COUNTY, IOWA.

BY

E. H. STEVENS, IN CHARGE, AND E. H. SMIES, OF THE U. S. DEPARTMENT OF AGRICULTURE, AND KNUTE ESPE, OF THE IOWA AGRICULTURAL EXPERIMENT STATION.

THOMAS D. RICE, INSPECTOR, NORTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1915.]

WASHINGTON:
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1917

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., November 6, 1916.

SIR: I have the honor to transmit herewith the manuscript report and map covering the soil survey of Scott County, Iowa, and to request that they be published as advance sheets of the field operations of the Bureau of Soils, 1915, as authorized by law.

The selection of this area was made after conference with the State officials cooperating with the bureau in the work of surveying and classifying the soils of Iowa.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

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

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MAP.

Soil map, Scott County sheet, Iowa.

SOIL SURVEY OF SCOTT COUNTY, IOWA.

By E. H. STEVENS, In Charge, and E. H. SMIES, of the U. S. Department of Agriculture, and KNUTE ESPE, of the Iowa Agricultural Experiment Station.—Area Inspected by THOMAS D. RICE.

DESCRIPTION OF THE AREA.

Scott County lies in the extreme eastern part of Iowa and is bounded on the east and south by the Mississippi River, which separates Iowa from Illinois, on the west by Muscatine and Cedar Counties, and on the north by Clinton County. The greater part of the northern boundary is formed by the Wapsipinicon River, which enters the Mississippi about 4 miles north of Princeton. Scott County has an area of 455 square miles, or 291,200 acres.

Two principal types of topography have been developed, the more or less rolling uplands and the alluvial lands, the latter comprising the high terraces, and the low, recently formed flood plains along the streams.

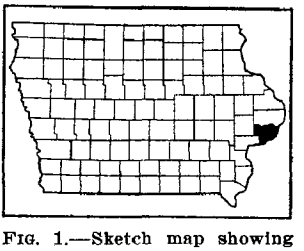

FIG. 1.—Sketch map showing location of the Scott County area, Iowa.

The upland in general consists of a loess-mantled drift plain whose original surface features have been modified by erosion and weathering. These processes have been especially active in the northern, southern, and eastern townships, which have been maturely dissected by the Wapsipinicon and Mississippi Rivers and their tributaries. In the central and western parts of the county, however, erosion has not proceeded to an advanced stage and the surface is fairly level.

In the central part of the county, including the greater part of Sheridan, Hickory Grove, and Cleona Townships and the western and northern parts of Blue Grass Township, the surface is level to gently undulating, while comparatively narrow, irregular ridges of similarly level surface separate the streams which radiate outward from the region. The stream valleys gradually become deeper, the valley slopes become more clearly defined, and the divides considerably narrower, giving rise to a rolling topography that in many places becomes sharply rolling or hilly as the smaller streams emerge

from the upland into the level bottoms of the Wapsipinicon and Mississippi Rivers.

The Iowan drift plain, which is developed in the northern part of Butler and Winfield Townships, represents a surface so recently formed, from the standpoint of geology, that it has been but little modified by erosion and weathering processes.

High terraces or second bottoms are developed in a broad belt along the Wapsipinicon River and in several disconnected areas along the Mississippi. An irregular strip of first-bottom soil follows the Wapsipinicon River throughout its course. The surface is in general level, but in places the land is cut up by the present meandering channel of the stream, or by old, disused channels. The first bottoms rarely exceed a mile in width. The terraces are more irregular in distribution. Along the upper course of the stream they occur as remnants of former, more extensive terraces, and are entirely lacking in places. Farther east, near the junction of the Wapsipinicon with the Mississippi, they broaden, and the first and second bottoms together exceed 3 miles in width. The terraces are distinct and easily traced, as the upland rises sharply from their level surface. Along the Mississippi River the terraces occur as small remnants, except near and southwest of Davenport, where the bottom and terrace together have a width of 1½ miles.

Comparatively narrow strips of alluvial land occur along the small streams in all parts of the county. These bottoms lie only a few feet above stream level, and are subject to frequent overflows. The broadest valley is that of Mud Creek, which has a width in places of more than a mile.

The elevation of Scott County above sea level ranges from about 540 feet along the Mississippi River in the extreme southwest corner to about 820 feet in the vicinity of New Liberty, in the northwestern part. Elevations at various points, as determined on the maps of the United States Geological Survey, are as follows: Davenport, at river level, 550 feet; at corner Locust and Main Streets, 700 feet; Walcott, 730 feet; Maysville, 740 feet; Eldridge, 780 feet; at the mouth of the Wapsipinicon River, 570 feet. The greater part of the county lies between 700 and 800 feet above sea level.

Scott County is drained almost entirely by the Mississippi and Wapsipinicon Rivers and their tributaries. All the principal streams are fed by smaller creeks and intermittent brooks, some of which branch extensively. Drainage is well established in all parts of the county and run-off is rapid, except over a few small areas. On some of the steeper slopes drainage is excessive. The water supply for farm use is everywhere entirely adequate.

The 1915 State census reports the population of Scott County as 65,350. Davenport, the county seat, and the third largest city in

Iowa, has 48,151 inhabitants, or 73.7 per cent of the population of the county. The several smaller towns have a total population of 5,746, or 8.8 per cent, while the purely rural population is 11,453, or 17.5 per cent of the total. The census classes the entire population outside of Davenport as rural, reporting a total rural population in 1910 of 16,972, averaging 37.8 persons to the square mile. The density of rural settlement is very uniform over the county. The purely rural population is apparently decreasing, a comparison of the State census of 1915 with the Federal census of 1910 showing a decrease in population of 880, exclusive of Davenport and the smaller towns. The greatest loss was in Davenport Township, outside the city of Davenport, where the population decreased 29.4 per cent. This falling off may be attributed in part to enlargement of the Davenport city limits to embrace certain outlying districts. Pleasant Valley Township showed a gain in population of 18 per cent, resulting from the rapid growth of an intensive trucking industry—onion growing. Outside Davenport and Pleasant Valley Townships, and exclusive of towns, Scott County shows a decrease in rural population of 2.6 per cent for the five-year period from 1910 to 1915.

The principal small towns of the county are Walcott, with a population of 460; Bettendorf, with 1,421 inhabitants, and Rockingham, with 1,070, both suburbs of Davenport; McCausland, Blue Grass, New Liberty, Dixon, Long Grove, and Eldridge, ranging in population between 100 and 300, and Buffalo, Le Claire, and Princeton, with populations ranging between 400 and 700. There are several smaller towns in the county.

According to the 1910 census, white persons of native birth constitute 80.3 per cent of the total population of the county, and foreign-born white persons 18.8 per cent. The 1905 State census reported 42.6 per cent of the population as native born of foreign parentage and 21 per cent foreign born, making a total of 63.6 per cent of whites of foreign extraction. Of the foreign-born residents and those whose parents are of foreign birth, the great majority are German, especially in the rural districts. Whites of foreign extraction, other than German, are employed principally in nonagricultural pursuits.

Scott County has good railroad service, especially in the southern townships. The main line of the Chicago, Rock Island & Pacific Railway between Chicago and Denver passes through Davenport and Walcott. The Kansas City line of this system runs southwesterly from Davenport along the Mississippi, passing through Buffalo. The tracks of this line are used by the Kansas City division of the Chicago, Milwaukee & St. Paul Railway. Another branch of the Rock Island extends from Davenport westerly through Blue Grass. The Bennett-Clinton branch of the Rock Island crosses the

northern part of the county parallel to the Wapsipinicon River. The central part of Scott County is served by two branch lines of the Chicago, Milwaukee & St. Paul Railway, which diverge at Eldridge. The Davenport, Rock Island & Northwestern Railway, over which are operated trains of the Burlington and the St. Paul systems, extends along the Mississippi River between Davenport and Clinton. Paralleling this line for nearly its entire course is an electric railroad, which furnishes excellent local service between Davenport and Clinton. An interurban line between Davenport and Muscatine serves the western and southwestern parts of the county.

The Mississippi River furnished the earliest means of transportation utilized in the settlement of this region. Some improvements in the channel have already been completed and others are in progress, and the river is now navigable for large boats from St. Paul to the Gulf of Mexico.

Scott County has a system of well-graded public roads. Some of the main roads, largely those near the city of Davenport, have been graveled or macadamized. Over most of the county the roads follow or run parallel to section lines, but some of the main turnpikes leading out from Davenport run diagonally to the land lines.

The rural schools in Scott County are numerous and well situated. All sections of the county are reached by rural mail-delivery service and telephones are in common use. Rural conditions in general indicate prosperity.

Chicago is the chief general market for the products of Scott County, though many other excellent markets are situated within convenient shipping distances. A splendid local market for practically all farm products is afforded by the three cities of Davenport, Rock Island, and Moline, the latter two cities lying across the Mississippi River in Illinois. These three cities and their suburbs have a combined population of 100,000. Small towns within the county consume part of the farm products.

CLIMATE.

The climate of Scott County is characterized by a wide annual range in temperature. An extreme of 106° has been reported in July, while the minimum on record is —27°. The mean annual temperature is 48.8° F. The summer months are generally characterized by high temperatures, while the winters are quite cold.

The normal growing season, or the interval between the average date of the last killing frost in the spring and that of the first in the fall, extends from April 22 to October 13, a period of 174 days. Crops are very seldom greatly damaged by early frost. The latest recorded killing frost in the spring occurred on May 22 and the earliest in the fall on September 18.

The mean annual precipitation is 32.64 inches, over 60 per cent of which falls during the growing season. Severe droughts are rare, though not unknown. Wind and hail cause damage occasionally. The average annual snowfall is 28 inches.

The following table gives the normal monthly, seasonal, and annual temperature and precipitation for Scott County as recorded by the Weather Bureau station at Davenport:

Normal monthly, seasonal, and annual temperature and precipitation at Davenport.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1901).	Total amount for the wettest year (1876).	Snow, average depth.
	° *F.*	° *F.*	° *F.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	27.6	65	− 22	1.53	1.33	0.36	5.0
January	21.4	63	− 27	1.66	1.10	3.47	8.5
February	24.0	67	− 25	1.58	1.59	3.63	7.3
Winter	24.3	67	− 27	4.77	4.02	7.46	20.8
March	35.5	82	− 8	2.24	2.57	4.35	4.8
April	40.1	87	14	2.68	0.88	5.39	0.4
May	61.1	90	29	4.26	1.37	6.70	0
Spring	45.6	90	− 8	9.18	4.82	16.44	5.2
June	70.2	98	39	4.06	3.02	4.25	.0
July	75.1	106	49	3.63	1.48	4.82	.0
August	72.8	98	44	3.73	0.46	4.27	.0
Summer	72.7	106	39	11.42	4.96	13.34	.0
September	65.4	99	28	3.15	2.29	5.50	.0
October	53.4	90	17	2.29	0.45	1.54	0.1
November	38.5	78	− 10	1.83	0.79	2.54	1.9
Fall	52.4	99	− 10	7.27	3.53	9.58	2.0
Year	48.8	106	− 27	32.64	17.33	46.82	28.0

AGRICULTURE.

Although the population of Scott County is mainly urban, agriculture has always been an important industry. The first settlement was made in 1833, at the present site of Buffalo. Prior to the building of the Chicago, Rock Island & Pacific Railway from Chicago to Rock Island, in 1854, the growth in population, while steady, was slow. Many of the earliest immigrants came from Ohio.

The early settlers took up homesteads near the larger streams, on account of the lack of timber in the central part of the county. The

principal crops grown were winter wheat and corn, the latter entirely for home use. The first wheat grown was "Michigan White," the seed coming from Ohio. Yields as large as 60 bushels per acre are reported. Owing to the unfavorable marketing conditions, the price of wheat never exceeded 25 cents a bushel prior to the Civil War. Before the advent of railroads, produce was shipped down the Mississippi River to Cairo, Ill., thence up the Ohio River and across the State of Ohio to Lake Erie. Hogs were sold in Davenport for about $1.50 a hundredweight, dressed. In the winter months pork was salted down in barrels and held in Davenport until spring for shipment down the Mississippi.

Only a few farmers improved the land by manuring. Crop rotations were unknown, and wheat was generally grown in the same fields for several years. Yields consequently declined until in the early fifties the average was about 35 bushels per acre, which at that time was considered unprofitable. Spring wheat was introduced and gave good results for some time.

The decade from 1850 to 1860 was characterized by a growth in population from 5,980 to 25,959, this being the period of pronounced German immigration. Farming began on a very extensive scale about 1854. The Germans were mainly grain farmers, and the production of barley, largely for brewing, became important. The soils in many places still show the effect of the continuous cropping to barley. Stock raising was carried on to some extent, cattle and horses being allowed to range on the prairies. Prior to the Civil War the native grasses were used almost exclusively for hay.

The Civil War had a pronounced effect on the development of farming in Scott County. The prevailing high prices of produce made farming profitable, and many of the German immigrants who had previously been farm laborers or tenants came into the possession of land. At the end of the war agriculture was on a firm basis.

The census of 1880 reports 76,164 acres in corn, yielding on an average about 51 bushels per acre; 34,717 acres in barley, yielding about 24 bushels per acre; 32,869 acres in wheat, yielding about 11 bushels per acre; 18,341 acres in oats, yielding about 38 bushels per acre; and 25,185 acres in hay, yielding about 1.6 tons per acre. The production of potatoes reached 542,164 bushels. Some rye and buckwheat were grown. The combined value of orchard and market-garden products was about $115,000. Later censuses show a fairly constant acreage of corn, varying from about 70,000 to 80,000 acres, normally yielding about 46 bushels per acre.

Agriculture in Scott County at the present time consists of the production of the general farm crops for feeding stock, for sale, and for home use; the fattening of beef cattle and hogs for market; dairying, especially near Davenport; market gardening and small-

fruit production, mainly to supply local markets; and orcharding, chiefly to provide for home needs. Near Pleasant Valley the production of onions has become a very important intensive industry within the last few years. Poultry raising is engaged in to some extent on almost every farm, and there are several poultry farms near Davenport.

The principal crops, in the order of acreage, are corn, hay, barley, oats, potatoes, wheat, and rye. In value, according to the 1910 census, cereals are first, followed by animals sold or slaughtered, hay and forage, dairy products, vegetables, and poultry and eggs, respectively.

Corn, the most important crop, is used mainly for fattening steers and hogs and for feeding work stock. Some corn for ensilage is grown. Perhaps 10 per cent of the corn produced is sold.

There were 35,653 acres in tame or cultivated grasses in 1909, producing 57,092 tons of hay, and 3,748 acres in wild or prairie grasses, producing 5,941 tons. The hay crops consist mainly of timothy and clover mixed and timothy alone. Red clover, however, is important. The census reports only 24 acres of alfalfa in 1909, but by 1915 this legume had increased to about 2,000 acres, according to the reports of the Scott County Farm Bureau. Practically all the hay is fed on the farm, only a small proportion being sold locally. Considerable alfalfa hay is shipped into the county annually.

The 1910 census reports 24,401 acres in barley, producing 472,521 bushels. Part of the production is fed on the farm, but the bulk of the crop is sold. The barley produced in Scott County is high in quality and brings good prices. Local brewers consume only a small part of the production.

Oats in 1909 occupied 21,371 acres, which produced 648,738 bushels, or about 30 bushels per acre. The oats grown are mainly fed on the farm, only about 25 per cent of the crop being sold.

Scott County is one of the leading counties of Iowa in the production of potatoes. In 1909 there were 9,340 acres devoted to this crop, with a total production of 862,193 bushels, or about 92 bushels per acre. About half the crop is sold in Davenport, Rock Island, and Moline and the small towns in the county or reserved for home consumption, the remainder being shipped to outside markets.

An intensive onion-growing industry has sprung up about Pleasant Valley, largely within the last few years. In 1915 about 500 acres were devoted to the crop, the acreage having been much increased over that of the preceding year on account of the unusually high prices prevailing in 1914. The yield of onions averages about 400 bushels per acre. The crop is sold, through a cooperative marketing association, to outside markets. Onions are grown to some extent in other parts of the county, mainly to supply local demands.

Grapes and strawberries are the principal small fruits grown, and apples and peaches the leading orchard fruits. The 1910 census reports 54,329 grapevines and 73 acres of strawberries in the county, and over 39,000 apple trees and 32,000 peach trees. Only five counties in the State have a larger acreage devoted to grapes or strawberries.

The feeding of beef cattle is an important industry in Scott County. Liberty Township is an especially important cattle-feeding section. The census reports 5,796 calves and 13,959 other cattle sold or slaughtered on farms in 1909. Many farmers feed herds ranging from 5 to 25 head, while on some farms the number of animals fed annually is much larger. The farmers engaged in feeding on a small scale usually buy stock locally, while the more extensive cattle dealers buy in carload lots from Omaha, Kansas City, and Sioux City. The cattle are sold mainly in Chicago, but to some extent in Peoria and Savanna, Ill.

According to the census 61,825 hogs were sold or slaughtered in 1909. About 16,000 head are bought annually by a packing house in Davenport, while the local consumption aggregates over 1,200 head a year. The remaining hogs, about 72 per cent of the production, are shipped to Chicago.

There were 17,295 dairy cows in the county in 1910. Dairying is well developed within a radius of 15 miles of Davenport, and there are many dairy herds of 5 to 15 cows in other parts of the county. The production of milk constitutes the main dairy business on farms within a radius of 6 miles of Davenport. On farms at greater distances butter is made for sale locally and in Davenport, Rock Island, and Moline. A small cooperative creamery is operated at Long Grove. Some cream is shipped to outside points in warm weather.

The value of poultry and eggs produced in 1909 is reported as $372,576. Poultry raising is an attractive minor interest throughout the county. It is of most importance on farms near Davenport.

The influence of soil differences on the kind of crops grown or the types of farming from place to place is not marked. General farm crops do well on practically all the more extensive soils, and the distance from market and the topography have to a large degree determined the types of farming. It is the common practice to rotate pastures in the level sections of the county, where the Muscatine silt loam is most extensively developed. Much larger permanent pastures are encountered in the more rolling areas typical of the Muscatine silt loam, rolling phase, and other soils of rolling to hilly topography, such as the Memphis and Lindley silt loams. Corn is more important on the Muscatine silt loam and other soils of smooth topography than on the more rolling types, while small grains and the grasses are more commonly grown on slopes and

narrow ridges where clean cultivation is less successful. It is probable that farms on soils of uneven topography, which are less suited to intensive tillage, are somewhat larger than in the smoother areas and that stock raising is more important.

The farmers quite generally recognize the natural adaptation of the different soil types to certain crops. Most of the soils, however, are suited to corn, the principal crop, and the selection of fields is influenced more by topography and markets. Certain crops, nevertheless, are to some extent planted in accordance with their soil requirement. It is commonly recognized that grain crops have a tendency to lodge on the Wabash soils, the Clyde silty clay loam, and some other less important types. It is also realized that the Memphis silt loam is better adapted to the small grains than are certain other soil types. Rye, on account of its ability to thrive on sandy land, is grown largely on the more sandy soils. The Mississippi Valley soils near Pleasant Valley, rich in organic matter, are recognized as being well adapted to the growing of onions.

The farm machinery in use is modern and the implements are in general well housed. Along the electric interurban lines and near Walcott, which is served by an electric-power line, a number of farmsteads are equipped with electricity, which furnishes light as well as power for operating corn shredders, churns, and other machines. Elevators for storing corn and small grain are in quite general use, especially in the better developed farming sections. The generally small size of the farms does not warrant the use of tractors, and very few are employed in general farming. Gasoline engines and windmills are largely used for pumping water. Plowing is done with three to five horse teams. Gang plows are commonly used, four or five horses being required for their operation. The work stock consists of draft horses of rather heavy weight.

In preparing land for corn, manure is commonly applied in the spring. Corn is usually planted in check rows, though part of the crop is drilled. Riding plows and cultivators are in general use, and very little hand labor is employed. Shredders are quite commonly used, as farmers have found it profitable to utilize the stover as roughage and bedding, the bulk of manure being materially increased incidentally. The most successful farmers are adopting such practices as the early gathering of seed corn, the selection of seed by germination tests, and thorough preparation of the seed bed, followed by frequent cultivation. Reid's Yellow Dent is the leading variety grown.

Small grains are grown under good farming methods. Oats and barley seed are quite generally treated for smut. The Hessian fly has caused quite heavy losses in wheat growing, and it also injures barley and rye. Oderbrucher and Wisconsin Pedigree are the principal varieties of barley, while of oats the Kherson and Early Champion

are popular. Grain straw is economically used throughout the county, the farmers recognizing its value in increasing the bulk of stable manure.

Thorough cultural methods are employed in handling the potato crop. Potato diggers are in common use, and farmers are beginning to realize the value of careful seed selection. The Rural New Yorker is the variety most generally grown. Some damage has been done by the scab, but this is being avoided by treating the seed.

Especially intensive methods are employed in the onion-growing district about Pleasant Valley. Heavy applications of manure are made, together with some commercial fertilizer. Onion smut is controlled by the use of formaldehyde. Great care is exercised in controlling weeds, frequent cultivation and hoeing being given even after the crop is harvested. Onions are generally graded, inspected, and sacked in the field. The growers almost universally plant the Red Globe variety.

Market gardening and the production of small fruits are carried on intensively. Orchards, with few exceptions, are not sprayed.

The rotation of crops is quite generally practiced, especially by the more progressive farmers. A common rotation consists of corn for two years, followed by small grain, with which is seeded clover and timothy. The hay land is cut over for two years and then plowed and planted to corn. There are many departures from this general plan. Some farmers pasture the second crop of grass, while others utilize the grassland the second year as pasture. Some farmers include alfalfa in the rotation. On a number of farms a 7-year or 8-year rotation is followed, consisting of corn for one or two years, a small grain, corn for one year, followed by a small grain seeded to clover and timothy, the grass stand remaining for two or three years, when the land is returned to corn.

A common method of using manure is to apply it to cornland in the spring. Manure may be later spread over pastures or may be applied to grain stubble before plowing in the fall. The use of commercial fertilizers is almost entirely confined to onion growing. Lime is not in general use, although liming is nearly always necessary in obtaining a stand of alfalfa. Ground limestone of good quality is obtainable at several quarries within the county.

In 1909, 63.4 per cent of the farms of Scott County expended on an average $340.19 each for labor. Farm laborers are generally paid about $35 a month, with board. Harvest hands are paid $2 or $2.50 a day, with board.

Farms vary widely in size, ranging from a few acres each in the market-gardening and onion-trucking sections to several hundred acres in the more remote parts of the county. The greater number range in size from 40 to 240 acres. According to the census, the

average size of farms in 1910 was about 115 acres, 6 acres more than that in 1880. Owners operated 57.8 per cent of the farms in 1909 and tenants 41.7 per cent. These percentages have changed little within the last 30 years. A few farms are operated by managers. A cash rental is generally paid in tenant farming, ranging from $5 to $7.50 an acre, depending upon the location, kind of soil, and improvements.

The 1910 census reports 96 per cent of the area of the county as in farms, and 90.3 per cent of the farm land as improved. The average value of land in 1910 is given as $105.74 an acre. This average is based upon assessed valuations, and therefore is lower than the ordinary sale value. There is a wide range in land values, from a minimum of about $60 an acre for land in the lower bottoms of the Wapsipinicon River to as much as $1,000 an acre for trucking land in the onion-growing district near Pleasant Valley. Throughout the greater part of the county farm land is held at prices ranging from $175 to $275 an acre, depending upon the soil, topography, improvements, and location with respect to markets.

The farm buildings in Scott County as a rule are good. Modern dwellings are numerous and improvements are constantly being made. In 1915 there were about 200 silos in the county. A number of these are built of hollow blocks, and this type of construction seems to be gaining in popularity. The fences are in good condition; many farmers are installing "hog-tight" woven-wire fences. Osage-orange hedges are still common, although they are being displaced by fences that occupy less land. A number of small catalpa groves, for the production of fence posts, have been planted, mostly in waste places or irregular corners of farms. Scott County maintains a farm-improvement league which has been instrumental in introducing many improvements in farm practice. The rapid adoption of alfalfa as a forage crop and the use of serum in controlling hog cholera are in large measure due to the efforts of this organization.

SOILS.

Scott County lies wholly within the Glacial and Loessial Province. The soils of the county may be grouped broadly in three general classes: (1) Soils derived entirely or in part from loess, (2) soils derived from the drift of the Iowan glaciation, and (3) the reworked and redeposited soils of glacial and loessial origin, which occur in the flood plains and on the terraces along the streams. With the exception of a few small areas in the Mississippi bottoms where ledges of limestone are encountered near the surface and scattered areas in the upland where erosion has removed the soil material, the underlying rock formations have had little effect upon the soils. Outcrops of the rocks are, without exception, too small to be outlined on a map of the scale used in this report and have therefore been

indicated with symbols. The report on the geology of Scott County[1] identifies and correlates the rocks of the county with the Silurian, Devonian, and Carboniferous ages, the first two being represented by limestones and the last by Coal Measures shales of the Des Moines stage. Several limestone quarries are located along the Mississippi River. In Buffalo Township, where the Des Moines formation is most extensively developed, coal is mined on a small scale for local use. Tile is manufactured at Buffalo and near Le Claire from the Des Moines shales.

Scott County comprises materials left by three great continental glaciers. The oldest, or Kansan, invaded the region from the northwest or west, and in Liberty Township the Kansan drift immediately underlies the loess mantle. This drift sheet dips gradually to the southeast and in other parts of the county is believed to underlie the Illinoian drift, which is second to the Kansan in age. The glacier during the Illinoian period entered Scott County from the east, and the material of the drift was spread over the greater part of the area. The loess-mantled Illinoian plain occupies the entire upland, with the exception of the Kansan plain, and a relatively small area in Winfield and Butler Townships, in which a more recent ice invasion is recorded.

Thus the Kansan and Illinoian drift plains with their loessial coverings give rise to the most important soils of the county. The Kansan plain is recognized by the maturely dissected upland which occupies most of Liberty Township. Here few flat-topped ridges remain, erosion having materially altered the original surface. Much of the Illinoian plain, however, is not yet dissected by erosion to any marked degree, and even its edges along the Mississippi River are tabular areas or remnants of a former flat surface. Back from the river many of the divides are so wide that the narrow valleys are invisible and the region appears to the observer as a level plain.

Many exposures of the underlying glacial drift may be found in the more maturely carved areas of the Kansan and Illinoian uplands. It is probable that some of the cuts found in the outer edges of the Illinoian plain may reveal portions of the Kansan drift, which there underlies the Illinoian material. Soils occurring on the Kansan and Illinoian plains constitute the first general class of soils enumerated in this discussion.

The third and youngest drift sheet noted in Scott County is the Iowan. This ice invasion is but slightly represented within the county, covering a relatively narrow belt bordering the Wapsipinicon flood plain in Winfield and Butler Townships and extending over small areas in adjacent portions of Allens Grove and Princeton Townships. Here the loess mantle is absent, and the region is

[1] Annual Report of the Iowa Geol. Survey, 1898.

relatively so recent that erosional modifications have played only a small part in its molding. The material of the Iowan drift consists mainly of clay, silt, and sand, the proportions of which vary to such a degree as to give rise to several types of soil. Erratic glacial bowlders are found, though they are not common, while occasional small rock fragments, mainly of chert, granite, and gneiss, are found on the surface and embedded in the soil. Soils arising from the Iowan drift area are included within the second general class mentioned above.

Along the southern margin or frontier of the Iowan ice invasion are found a number of rounded hills or ridges with northwest-southeast trend composed in part of water-laid sand and silt and in part of ice-molded till. These hills, known as paha, have soils that vary widely in character, and it was deemed advisable to classify them according to their properties in common with other soils in the county, some of them being included with loessial soils, while others are predominantly glacial.

Materials of alluvial deposition, comprising the terraces of the Wapsipinicon and Mississippi Rivers and the flood plains of these and other streams, are widely distributed throughout the county. These sediments are composed of wash from glacial and loessial uplands, and the flood plains are constantly receiving additional deposits from the overflow waters of the streams. The materials along the Mississippi and Wapsipinicon Rivers have their sources in glacial and loessial deposits of relatively wide extent, while the alluvial material along the smaller streams is derived from the more local territory which these streams drain. This river and stream laid material forms the soils of the third general group in Scott County.

The soils of Scott County are grouped in 12 series on the basis of differences in color, origin, position, and structural characteristics. The series are divided into types, mainly on the basis of texture. Twenty-two distinct soil types and three phases of types are mapped, in addition to one miscellaneous soil, Muck.

The soils derived directly from loess are included in the Muscatine, Memphis, and Knox series. The Lindley series represents soils partly of loessial origin, in which partial exposure of the underlying till has resulted from erosion. The material of the Iowan drift gives rise to the soils of the Shelby, and mixed with loessial material to the Clyde series. The alluvial material lying above overflow along the various streams forms the soils of the Buckner, Bremer, Plainfield, and Davenport series, and that which is subject to more or less frequent overflows, the Wabash and Sarpy series.

The Muscatine series includes the dark-colored loessial soils of the county. The surface soils of this series are characterized by an abundance of organic matter, which gives them a dark-brown to

black color. The subsoils are yellowish brown to mottled gray and yellow in color, the mottlings being most conspicuous in the more level situations, and are heavier than the surface soils. Neither soils nor subsoils are highly calcareous. The topography is level to rolling. One type, the Muscatine silt loam, with a rolling phase, is mapped in Scott County.

The surface soils of the Memphis series are brown to light brown in color. The subsoils are yellowish brown and heavier in texture than the surface soils. The topography is gently rolling to rolling. These soils have been formed through the weathering of loess under conditions of more thorough drainage than the black upland soils. Both soil and subsoil have a low lime content. In this series the silt loam is the only type mapped.

The surface soils of the Knox series are grayish brown to brown, with light-brown or yellowish-brown subsoils. These soils occur on wind-formed knolls and ridges, and the soil material consists of loess, with the addition, in some places, of more recently deposited fine sand. The Knox series is represented in this county by one type, the fine sandy loam.

The soils of the Lindley series are light colored and are derived in part from the loess and in part from the underlying glacial drift. They occur in association with the Memphis silt loam on steep slopes where erosion has largely removed the loessial covering. Glacial material is usually encountered within the 3-foot section. One type, the Lindley silt loam, is mapped.

The Shelby series includes types with dark-colored surface soils and light-brown to yellowish-brown, sandy and gravelly subsoils. The soils of this series have been formed through the weathering of glacial drift, with little or no modification from admixture of loessial material. The topography is gently undulating to rolling. Four types of this series are mapped in Scott County, the Shelby loamy fine sand, fine sandy loam, loam, and silt loam.

The surface soils of the Clyde series have dark-gray to black soils and a dark-gray to gray and yellow mottled silty clay subsoil. These soils occur in depressed areas and are derived from reworked glacial or loessial material weathered under conditions of poor drainage. One type, the silty clay loam, is mapped in Scott County.

The Buckner series includes types with dark-brown to black surface soils and lighter colored, somewhat heavier textured subsoils. The soils of this series are alluvial in origin, being composed of redeposited material brought down chiefly from the loessial uplands. They lie above overflow. The Buckner loam, with a colluvial phase, is mapped in Scott County.

The surface soils of the Bremer series are dark brown to black, with dark-gray to drab or gray and yellow mottled, heavy subsoils.

The series occupies level to slightly depressed areas on alluvial terraces and natural drainage is poor. In this series two types are mapped, the silt loam and silty clay loam.

The Plainfield series comprises dark-colored, sandy terrace types with soils underlain by a substratum of coarse material, which renders them somewhat droughty. The soils of this series lie above overflow. Two types are mapped in Scott County, the sandy loam and fine sandy loam.

The Davenport series represents terrace soils lying almost entirely above overflow along the Mississippi and Wapsipinicon Rivers. The surface soils are brown to black, while the subsoils are light to reddish brown, pinkish or brick red, and in places mottled with gray and yellow, and are commonly heavier than the surface soils. Gravel is present in places. Sometimes the underlying limestone occurs within the 3-foot section. This series is represented in Scott County by three types, the sandy loam, silt loam, and silty clay loam.

The types in the Wabash series are characterized by dark-brown to black surface soils, rich in organic matter, and drab or gray and yellow mottled subsoils. The members of this series are widely developed in the first bottoms of streams in the Central Prairie States, the material being washed chiefly from the loessial and associated soils of this region, and are subject to overflow. Two types, the silt loam and silty clay loam, and a colluvial phase of the former, are mapped in this county.

The soils of the Sarpy series are brown in color. The subsoils are distinctly lighter in texture than the surface soils. These soils occur in the first bottoms of the Mississippi and Missouri Rivers and their large tributaries. Three types, the Sarpy loamy sand, fine sandy loam, and silt loam, are mapped.

The following table gives the names and the actual and relative extent of the various soils mapped in Scott County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Muscatine silt loam	114,944	52.1	Plainfield sandy loam	2,048	0.7
Rolling phase	36,800		Clyde silty clay loam	1,920	.7
Memphis silt loam	44,096	15.1	Knox fine sandy loam	1,664	.6
Wabash silt loam	28,992	14.4	Davenport sandy loam	1,664	.6
Colluvial phase	12,800		Shelby loamy fine sand	1,600	.5
Bremer silt loam	7,552	2.6	Davenport silt loam	1,536	.5
Lindley silt loam	7,424	2.5	Sarpy fine sandy loam	1,344	.5
Sarpy silt loam	6,464	2.2	Sarpy loamy sand	1,280	.4
Shelby fine sandy loam	5,952	2.0	Bremer silty clay loam	1,088	.4
Buckner loam	1,728	1.1	Shelby loam	832	.3
Colluvial phase	1,408		Davenport silty clay loam	576	.2
Plainfield fine sandy loam	2,816	1.0	Muck	256	.1
Wabash silty clay loam	2,304	.8			
Shelby silt loam	2,112	.7	Total	291,200	

MUSCATINE SILT LOAM.

The surface soil of the Muscatine silt loam is a dark-brown silt loam, with an average depth of about 15 inches. This is underlain by a slightly lighter, more compact silt loam, changing at 20 to 24 inches to a yellowish or faintly mottled gray and yellow silty clay loam, which extends to a depth of 36 inches or more. When very dry the surface soil has a grayish-brown hue. As a rule it is mellow and friable and is easily tilled.

The Muscatine silt loam is the most extensive as well as agriculturally the most important soil type in Scott County. It is distributed throughout the county. In the central and western parts, where the topography is nearly level, it occurs as large, continuous areas, interrupted only by stream-bottom soils and by areas of the Muscatine silt loam, rolling phase, which occupy the more rolling uplands along the streams. In general the topography is nearly level to gently rolling. The surface drainage is generally good, although artificial drainage is necessary in many places for the best results. The subsoil is retentive of moisture, and crops seldom suffer from drought. Erosion is rarely active enough to cause severe damage.

The areas of this type in the northwestern part of the county are separated from the remainder of the type by the broad bottoms of Mud Creek. On the west side of this stream the type occupies long, gentle slopes which gradually descend to the level of the bottoms. Large bodies of this terracelike occurrence extend beyond Mud Creek Valley into the southwestern corner of Cleona Township, where over an area of several square miles the topography is predominantly level, the upland being elevated only a few feet above the bottoms. In the southwest quarter of section 29, Cleona Township, the topography is so nearly level that pronounced soil difference is apparent. Here the surface soil is a dark-brown silt loam, 10 inches deep, which passes abruptly into an ashy-gray, almost pure silt, containing numerous small iron concretions. At 24 inches the subsoil becomes a heavy silty clay loam of a gray color, with yellow and brown mottlings, containing many iron concretions. The soil is similar to the Grundy silt loam, and is included with the Muscatine silt loam owing to its small extent.

In the vicinity of New Liberty and over a large part of Liberty Township the surface soil is slightly shallower than usual, averaging about 12 inches in depth. Between 12 and 20 inches the subsoil is a dark-gray to gray silt loam, while in the lower part it consists of a light-gray to gray silty clay loam, mottled with yellow and brown, both strata containing iron concretions in varying quantities. Similar areas occur near Dixon, in the western part of Allens

Grove Township. In this part of the county the chief variations are in the depth of the surface soil and the degree of mottling in the subsoil, as well as in the presence of iron concretions. Apparently the type is somewhat less productive in this part of the county than in other parts.

Between Walcott and Mount Joy there is a broad, central sag in the Illinoian plain, due not to erosion by the present streams but to an initial depression in the surface of the upland. Within this territory the Muscatine silt loam has a more uniformly level topography than in most other sections of the county, and drainage is, on the whole, imperfectly developed, as a result of which the subsoil is somewhat more compact than usual. The restricted aeration gives rise to a pronouncedly mottled color at depths below 20 to 24 inches. Many small, depressed areas of a heavier soil occur which are mapped as the Clyde silty clay loam. Several less extensive developments in which the mottled condition of the subsoil occurs are found in other parts of the county, usually in close association with areas of the Clyde silty clay loam.

Practically all the Muscatine silt loam is under cultivation, and a large proportion of the best farms are located mainly upon this type of soil. None of the type is forested, except with artificial groves, usually about an acre in size and consisting of soft maple, which adjoin many of the farms. Originally the type supported a luxuriant growth of prairie grasses.

Corn, hay, barley, oats, and potatoes are the most important crops, in the order named. Barley and potatoes are the principal money crops. Nearly every farmer produces from 1 acre to 10 acres of potatoes annually, the average size of the areas devoted to them being about 5 acres. Potatoes usually come on the market about October 1.

No important special crops are grown, although market gardening is practiced to some extent near Davenport. Fruits are grown almost entirely for home consumption and as a rule the orchards receive little attention. The main live-stock industries are the feeding of steers, the fattening of hogs, and dairying. Very few sheep are raised. A number of farmers make a practice of raising each year one or two colts, mainly of the heavy draft type. It is a common practice to rotate pastures on this type.

Corn yields from 40 to 80 bushels per acre, with an average of about 50 bushels, hay yields nearly 2 tons per acre, barley from 20 to 35 bushels, oats 25 to 60 bushels, wheat 15 to 35 bushels, and potatoes 100 to 200 bushels, with occasional higher yields.[1]

[1] Statements in this report in regard to crop yields are based upon information obtained from farmers.

Rotations are quite commonly practiced on this type, especially by the better farmers. A rotation often employed consists of corn 2 years and a small grain 1 year, followed by clover and timothy, which is allowed to stand 2 or 3 years, when the land is returned to corn. Often the grass is pastured the second year or the second and third years, while many farmers make a practice of cutting the first crop for hay and pasturing later crops during the same season. Commercial fertilizers are not used. Lime is not commonly used, although the type is not highly calcareous, either in the soil or subsoil. Stable manure is used in large quantities and is highly prized, the better farmers endeavoring to apply it to all of their land in the course of a rotation. The value of straw and shredded cornstalks in increasing the bulk of manure is generally recognized. Many farmers handle the manure with modern devices, and a few have gone so far as to construct barnyards of concrete to prevent loss through leaching. Manure is applied mainly to cornland in the spring, while later applications are often made upon small grain stubble or pastures. As a rule, the most successful farms on the type are those upon which the largest number of animals per acre are kept.

Farm land of the Muscatine silt loam usually sells for $200 to $300 an acre, the price varying with the location and improvements. Near Davenport, where the type is valued for building sites, higher prices prevail.

The Muscatine silt loam is considered a strong soil, producing fair yields even under somewhat careless treatment. With proper rotations and careful methods of cultivation, including deep plowing and thorough preparation of the seed bed, coupled with the application of barnyard manure, its productiveness can easily be maintained. The adoption of rotations that include clover or alfalfa will prove very beneficial. Poorly drained areas can be greatly improved by the use of tile and the application of lime. Where drainage is well established, lime applied, and the soil inoculated, alfalfa does well, yielding four cuttings in a season.

Muscatine silt loam, rolling phase.—The surface soil of the Muscatine silt loam, rolling phase, is a mellow, brown silt loam, about 8 to 12 inches deep. The subsoil consists of a brownish-yellow silt loam, passing at about 16 inches into a grayish-yellow or yellow silty clay loam to clay, which extends to a depth of more than 36 inches. In places the proportion of silt becomes greater below 30 inches. In other places the subsoil is mottled. There are numerous spots in which the yellow subsoil is exposed at the surface. On a few of the lower slopes small areas occur in which the underlying glacial drift is encountered within the 3-foot section and is occasionally ex-

posed at the surface. This material is usually a rather sandy clay, containing a few small, angular rock fragments.

This phase is developed throughout the county, occurring in close association with the main type. It is most extensively developed in Lincoln, Davenport, and Blue Grass Townships, the largest areas occupying the steeper slopes along streams which have carved their valleys through the flat-topped ridges of the Muscatine silt loam. None of the areas of this phase are of great width. They follow closely the contour of the slopes, terminating where the soil becomes light enough in color to be included with the Memphis silt loam.

The topography of the Muscatine silt loam, rolling phase, is rolling to strongly rolling. Drainage is good to excessive. Serious damage from erosion is sometimes experienced when care is not taken to check the spread of small gullies, which often form during heavy rains.

Nearly all this phase is either under cultivation or is utilized for pastures. Corn is the principal crop, though it is relatively of somewhat less importance than on the typical soil. Hay and the small grains have a more important place in the rotations than on the main type, and a large part of the phase is in permanent pasture. Potatoes are not so commonly grown as on the areas of typical soil on account of the danger of erosion where clean cultivation is practiced.

Many small areas which otherwise might lie idle are planted to catalpa trees for fence posts. In a few places excellent stands of alfalfa have been obtained on relatively steep slopes. Crop yields are somewhat lower than on the main type.

On farms composed partly of this phase cattle feeding, hog raising, and dairying are generally important industries. One to two acres of permanent pasture land will support one head of stock.

This phase, on account of its rolling surface, is not so well suited to definite rotations as the Muscatine silt loam. Areas in which the surface soil is particularly shallow do not respond well to ordinary methods of cultivation. Considerable attention is paid to the maintenance of organic matter by applying stable manure.

Land of this phase is valued at $150 to $250 an acre. In the vicinity of Davenport it has been sold for more than $300 an acre. Very few farms are located entirely upon this phase, the main type usually comprising the greater proportion of the area of farms on which it is found.

In general more careful methods are necessary in handling the phase than in handling the typical Muscatine silt loam. Where erosion is most likely to occur the land should be protected as much as possible by cover crops. Clover and alfalfa should occupy an important place in the rotations. In preparing land for alfalfa manure should be liberally used and lime should be applied at the

rate of about 2 tons per acre. Inoculation with about 500 pounds of soil per acre from an old alfalfa field is recommended; 15 to 20 pounds of seed per acre should be sown. Spring seeding with a small grain as a nurse crop is probably advisable, especially where there is danger of washing where the fields are unprotected. If planting on summer fallow is practiced the seed should be sown before August 15. Large quantities of stable manure should be used, especially where the surface soil is unusually shallow. Green-manure crops, preferably legumes, are also recommended. An extension of the live-stock industries would aid materially in building up the soil, owing to the larger quantity of manure which would be available.

MEMPHIS SILT LOAM.

The surface soil of the Memphis silt loam is a light brownish gray to grayish-brown, floury silt loam, from 8 to 12 inches deep. The subsoil consists of a grayish-yellow to yellow silt loam, passing at an average depth of about 16 inches into a yellowish, rather tough, silty clay loam or clay. In places the subsoil contains light-gray spots or gray and brown mottlings. On some of the steeper slopes the surface soil has a brownish-yellow color.

The Memphis silt loam is extensively developed along the Mississippi and Wapsipinicon Rivers and other large streams of the county. It borders the bluffs of the Mississippi River in a practically continuous body, ranging from one-fourth mile to over 3 miles in width, from Princeton to the Muscatine County line. The type is least extensively developed in the central and western parts of the county, where the Muscatine silt loam predominates.

The topography of the Memphis silt loam is prevailingly gently rolling to hilly. The ridges generally are rounded and the slopes smoothly convex in outline. In Buffalo Township, however, several flat-topped ridges are occupied by this type. Here the Illinoian plain dips gently toward the Mississippi River, with a slope barely perceptible to the eye, and the ridges of the upland have a plateau-like or benchlike topography, breaking off toward the stream valleys in rather sharp escarpments.

The rolling character of this type gives excellent surface drainage. The subsoil, however, owing to its high silt content, is retentive of moisture. The type occurs at elevations ranging from 600 to over 800 feet above sea level. Northeast of New Liberty it is found on practically the highest elevations in the county.

Next to the Muscatine silt loam, the Memphis silt loam is the most extensive soil type in Scott County. About 85 per cent of the type is in cultivation or is used as pasture land, the remainder being forested. The original timber growth consisted mainly of oak, black walnut, and hickory.

The type of farming followed is similar to that practiced on the Muscatine silt loam, though less intensive. Pastures are not commonly rotated, owing to the large areas of rolling land, which are best adapted to permanent pasture. Many of the timbered areas are utilized for pastures, as they are open enough to produce considerable forage.

The principal crops are corn, hay, small grains, and potatoes. Corn is the most important crop, though it is of less relative importance than on the Muscatine soils. Barley is the chief money crop. Market gardening and the production of small fruits are industries of local importance. The feeding of steers is an important industry. Dairying is carried on extensively, especially near Davenport.

Corn yields from 35 to 65 bushels per acre on the better portions of the type, averaging about 45 bushels. Hay yields 1 to 2 tons, barley 15 to 35 bushels, oats 20 to 45 bushels, and wheat 15 to 20 bushels per acre. Pastures are not as good as on the Muscatine soils, as the land is not quite so well suited to bluegrass.

Practically the same methods are followed in handling this type as prevail on the soils of the Muscatine series. The somewhat smaller size and the irregular shape of the fields, together with the rolling topography, hinder the use of labor-saving machinery to some extent. Farm buildings and equipment usually are very good, but not equal to those on the Muscatine silt loam. No commercial fertilizers are used. Lime is not commonly applied to the land, although its use is gradually increasing.

Farm land of the Memphis silt loam ranges in price from $150 to more than $200 an acre. Certain portions of the type near the bluffs of the Mississippi River have an enhanced value on account of their desirability as building sites.

While this type deteriorates rapidly under poor management, it responds readily to proper methods of improvement, such as those suggested for the Muscatine silt loam and its rolling phase. It is not so strong a soil as the Muscatine silt loam and therefore requires larger applications of organic matter. If possible, acreage applications of 8 to 10 tons of stable manure should be made, in addition to the growing and plowing under of green manuring crops. Alfalfa will do well on this soil by the use of the methods suggested for the Muscatine silt loam, rolling phase, although summer fallowing is perhaps preferable to seeding with small grains on a large part of the Memphis silt loam. Applications of ground limestone will prove very beneficial in the improvement of this type. On favorably located farms fruit growing could be profitably developed on a commercial scale.

KNOX FINE SANDY LOAM.

The Knox fine sandy loam consists of a light grayish brown to brown fine sandy loam, 10 to 15 inches deep, underlain by a yellow fine sandy loam, extending to a depth of 36 inches or more. In places the subsoil contains enough silt to make it rather heavy. West of Walnut Grove there are included small areas that would have been mapped as Knox very fine sandy loam had they been of sufficient size. A few small, scattered areas of fine sand are also included. These occupy small knolls or mounds which have the characteristic paha [1] contour, though probably formed by wind action.

The Knox fine sandy loam is relatively unimportant in Scott County. The largest areas of this soil are encountered in Princeton Township, near the point where Lost Creek emerges from the upland upon the terraces of the Wapsipinicon River. Other scattered areas occur in Allens Grove, Winfield, and Butler Townships, along the frontier of the Iowan glaciation. Some of these ridges composed of the Knox fine sandy loam are undoubtedly paha.

The topography of this type is rolling to hilly. Drainage is in many places excessive, and damage is sometimes caused by erosion, particularly in the more sandy spots.

On account of the rough topography, which is particularly noticeable in sections 28 and 29, Princeton Township, a large part of the type is pastured or forested. It affords fairly good pasturage. Rye is the principal crop and yields about 15 bushels per acre. Corn gives rather poor yields.

In the improvement of this type the use of stable manures and green cover crops is recommended. The soil is very deficient in organic matter. Measures for the prevention of erosion are essential.

LINDLEY SILT LOAM.

The surface soil of the Lindley silt loam is a light brownish gray to light grayish brown silt loam, from 8 to 12 inches deep. The subsoil varies considerably, but generally consists of a yellowish-brown to slightly reddish brown, stiff, brittle, gritty or sandy clay loam. In a few places the lower subsoil is mottled with gray. As mapped this type includes some small areas of the closely associated Memphis silt loam which it was impracticable to separate. On some of the lower slopes small areas of Rock outcrop occur. In Buffalo Township there are exposures of the carboniferous shales, and in other places of limestone. Rock outcrop is indicated on the map by symbols. Rock fragments common to the glacial till are often encountered in the subsoil.

The Lindley silt loam is developed mainly along the Mississippi River, occupying the river bluffs and extending back along the slopes

[1] See the Report of the Iowa Geological Survey on the Geology of Scott County, 1898.

of some of the deeper valleys. There are several areas of the type in Liberty Township. The topography is strongly rolling to hilly and rough, and drainage is generally excessive.

On account of the generally unfavorable topography, very little of the type is used for cultivated crops. A considerable part of it is cleared and pastured, but the greater part is forested, mainly with oak, black walnut, and hickory.

The value of the Lindley silt loam is somewhat lower than that of the Memphis silt loam.

It is probable that the unfavorable topography will prevent a more extensive cultivation of this type. Certain favorably located areas, however, could be profitably used for the production of orchard fruits, and alfalfa would do well in some localities if proper steps were taken to establish a stand. Much of the type should be left in pasture or forest, and attention should be given to improving the pastures.

SHELBY LOAMY FINE SAND.

The Shelby loamy fine sand consists of a dark grayish brown to brown loamy fine sand, from 20 to 24 inches deep, underlain by a grayish to yellowish-brown fine sand or loamy fine sand which extends to a depth of more than 3 feet. Occasionally cherty fragments are found on the surface, but they are less common to this type than to the other members of the Shelby series.

The Shelby loamy fine sand is not extensively developed in Scott County. The largest area occurs around Cadda. A number of ridges or mounds within the drift region, some of which resemble the paha, are occupied by this type. One ridge, which lies a half mile southeast of St. Ann Church, has been referred to as the "St. Ann Paha."[1]

The topography of this type is generally undulating, but some of the higher ridges are smoothly rolling. The loose, porous nature of both soil and subsoil causes rapid drainage and crops suffer in dry weather.

This type is unimportant, although nearly all of it is in use. It is farmed in the same manner as the Shelby fine sandy loam, except that more rye is grown. Only fair yields are obtained.

The Shelby loamy fine sand should receive the same treatment suggested for the improvement of the Shelby fine sandy loam.

SHELBY FINE SANDY LOAM.

The surface soil of the Shelby fine sandy loam consists of a brown to dark-brown fine sandy loam, 15 to 20 inches deep, containing, in many places, sufficient organic matter to give it a decidedly mellow

[1] Ibid.

or loamy texture. The subsoil, to a depth of more than 36 inches, is a rather light brown to yellowish-brown or brown fine sandy loam. A few small fragments of chert are scattered over the surface of the greater part of the type. There are several very small areas in which a considerable quantity of pebbles occurs, both upon the surface and throughout the 3-foot section. In such areas the subsoil is considerably heavier than the surface soil.

This type is much more extensive than any of the other types encountered within the Iowan drift region. Comparatively large, continuous areas occur north of St. Ann Church, in Winfield Township, extending to the eastern and western limits of the Iowan frontier, while more or less detached areas occur throughout the region of the Iowan glaciation.

The topography is prevailingly gently rolling. Surface drainage is always adequate, and the porous nature of the soil renders it somewhat droughty.

Notwithstanding its large extent in comparison with the other types of the Shelby series, the Shelby fine sandy loam is not an important soil type with reference to the county as a whole. Nearly all the type is cultivated, however, being used for the production of the general farm crops common to the county. Corn is the chief crop, and apparently it is grown about as extensively as on the better corn soils. Rye is grown on some of the more sandy areas. The live-stock industries are similar to those practiced in other parts of the county, although as a rule fewer animals are kept per farm than in many sections.

Good yields of all general farm crops are obtained in favorable seasons. However, yields on this type can not be expected to equal those on the Muscatine silt loam under the same general care, and the crops are more apt to suffer from drought than on types which are retentive of moisture.

The methods of handling the soil are similar to those employed on most of the other soils of the county. The use of manure is general, but no fertilizer and very little lime is used. Land of this type is worth from $125 to $175 an acre.

The Shelby fine sandy loam is well suited to the production of beets, cucumbers, cabbages, potatoes, and many other vegetables, as well as melons and small fruits, particularly strawberries. The question of markets for such crops is one to be studied by the farmer who is contemplating their production. Clover should occupy a more important place in the rotations, while stable manure and green crops, preferably legumes, should be turned under from time to time to increase the organic-matter supply.

SHELBY LOAM.

The surface soil of the Shelby loam is a dark-brown, friable loam about 15 inches deep. The subsoil consists of a brown to yellowish-brown, heavy, gritty loam, passing at about 26 inches into a yellowish-brown sandy clay which contains many small fragments of igneous and cherty material. In places small pebbles are scattered over the surface.

This type is inextensive and is confined to the region of the Iowan drift. The largest two areas lie about a mile southeast of Cadda and immediately south of Martins.

The topography is gently rolling and surface drainage is good. Most of the type is cultivated, the remainder being in pasture. The crops and cultural methods are similar to those followed on the Shelby silt loam. Corn, hay, and small grains give very good yields.

The Shelby loam is not an important type of soil in Scott County, and there probably are no farms located entirely upon it. It is valued at about $200 an acre.

The methods of improvement suggested for the Muscatine silt loam are also applicable to this type.

SHELBY SILT LOAM.

The surface soil of the Shelby silt loam is a dark-brown silt loam, 12 to 18 inches deep, with an average depth of about 16 inches. The subsoil consists of a brown to dull-yellow, heavy silt loam to silty clay loam which passes at any point between 24 and 30 inches into a yellowish-brown sandy loam to sandy or gritty clay loam. A few small rock fragments, mainly chert, are scattered over the surface and through the soil, and an abundance of drift gravel is often present in the lower subsoil.

This type is developed throughout the Iowan drift region, the largest area occurring about 2 miles north of Long Grove, near St. Ann Church. The topography is undulating to gently rolling, and surface drainage is generally good.

The Shelby silt loam is not an important type in Scott County, because of its limited extent. It is considered a very good soil, however, and practically all of it is under cultivation or in pasture.

Corn is the main crop, hay and small grains being next in importance. Excellent yields of all general farm crops are obtained. There are no important special crops. The fattening of steers and hogs for market is generally practiced, and dairying is carried on in a small way. The methods of farming this type are similar to those followed on the Muscatine silt loam, although somewhat less intensive. Barnyard manure is used quite extensively. Farm buildings are good and the equipment is modern.

The value of land of this type, owing probably to its more remote location, is somewhat less than that of the Muscatine silt loam, averaging about $200 an acre.

In general the methods of improvement suggested for the Muscatine silt loam are applicable to this type.

CLYDE SILTY CLAY LOAM.

The surface soil of the Clyde silty clay loam is a black silty clay loam, 12 to 16 inches deep. The subsoil consists of a dark-gray to gray, heavy silty clay loam, which changes at a depth of 24 to 30 inches to a gray and yellow mottled, plastic silty clay. Partially decomposed iron concretions are usually present in small quantities in the lower subsoil. In many places the surface soil is mucky.

The Clyde silty clay loam is inextensive, occupying flat or slightly depressed areas in close association with the more level areas of the Muscatine silt loam. The largest areas are encountered in the southwestern part of Cleona Township, where there is an almost imperceptible drainage divide.

Much of this type is too poorly drained to be successfully cultivated, and is used as pasture land. Where well drained it produces excellent yields of corn and good yields of hay. Small grains, however, make too rank a growth of straw and are apt to lodge. The soil is adapted to the production of some of the heavier garden vegetables, such as cabbages, but its location is not favorable for the production of such crops on a commercial scale.

Owing to the heavy nature of this soil care must be taken to plow it when not too wet. If clods are formed they should be broken up before they harden. Wherever possible adequate drainage outlets should be provided. Much of the type is undoubtedly acid, and it is recommended that lime be used where drainage is established.

BUCKNER LOAM.

The Buckner loam consists of a brown to dark-brown, friable loam, underlain at an average depth of about 18 inches by a grayish-brown to yellowish-brown, heavy loam. In a few places the surface soil contains considerable sandy material, though never enough to impart to it a sandy texture.

This type occupies terraces above overflow along the Mississippi and Wapsipinicon Rivers. On the bottoms of the latter stream it frequently occurs as areas of gradual transition from the heavier textured soils to the sandy types which are commonly developed some distance from the upland. The topography is level and surface drainage is usually good. A few tracts of this soil near McCausland, which had inadequate surface drainage in their natural state, have been largely reclaimed by the use of open ditches and tiling.

This type is relatively unimportant, although practically all of it is farmed.

The crops and cultural methods are similar to those on the Bremer silt loam, corn being the principal crop. A few favorably located areas are devoted to market gardening. Yields closely approach those of the Bremer silt loam, and the price of land is about the same.

Buckner loam, colluvial phase.—The surface soil of the Buckner loam, colluvial phase, is a brown to dark-brown, mellow, friable loam to silt loam, about 18 inches deep. The subsoil is a grayish-brown or yellowish-brown silt loam to silty clay loam. Occasional areas are encountered in which the dark surface soil extends to a depth of nearly 3 feet.

This phase is colluvial in origin, occurring as a narrow belt along the lower gentle slopes from the bluffs to the bottoms of the Mississippi and Wapsipinicon Rivers. In a few places small streams emerging from the upland have deposited the material in the form of colluvial fans. The soil is well drained.

The Buckner loam, colluvial phase, is inextensive, and nearly all of it is cultivated. It is a productive soil and is retentive of moisture. General farm crops are grown, and market gardening is practiced to some extent near Davenport. The soil is well suited to the production of such vegetables as potatoes, cabbage, and onions, as well as of corn and small grains. Apples do well, and there are many favorable locations for orchards. Excellent yields of truck and general farm crops are obtained.

Land of the Buckner loam, colluvial phase, is generally sold in connection with adjoining soil types. It has about the same value as the Bremer silt loam. Alfalfa should do well on this phase with inoculation of the soil and the use of lime.

BREMER SILT LOAM.

The Bremer silt loam consists of a dark-brown to nearly black, mellow silt loam, 16 to 22 inches deep, underlain by a grayish to brown or gray and yellow mottled silt loam to silty clay loam, which extends to a depth of more than 36 inches. In places the subsoil contains a few iron concretions. In texture, structure, and color the surface soil of this type is markedly similar to that of the Muscatine silt loam.

The Bremer silt loam is a second-bottom or terrace soil, occurring along the Wapsipinicon and Mississippi Rivers. The largest areas occupy the broad terraces of the Wapsipinicon River between Martins and Princeton, while important, though much less extensive, tracts occupy the Mississippi terraces from Pleasant Valley to the Muscatine County line. A rather large body occurs near Dixon,

in Allens Grove Township. The topography is nearly level to level. Surface drainage is generally adequate, although tiling is necessary in some cases. The structure of both surface soil and subsoil are favorable to the retention of moisture.

The Bremer silt loam is an important soil type, owing not so much to its extent as to its productiveness. Most of it is cultivated and the remainder is used as pasture land. The principal crops are corn, hay, oats, barley, potatoes, wheat, and onions. On the terraces of the Wapsipinicon River the type is utilized as a general farming soil, and the methods of farming are similar to those on the Muscatine silt loam. The level surface, however, makes the Bremer silt loam particularly desirable for the production of corn and small grains, and therefore live-stock industries are, as a rule, somewhat less important than on the upland soils. Corn is by far the most important crop, while potatoes rank high as an income crop. Near Pleasant Valley the production of onions is very profitable, the farmers there having the advantages of a well-organized cooperative marketing association, superior transportation facilities, and nearness and accessibility to city markets.

Corn yields 40 to 80 bushels, potatoes 100 to 200 bushels, and grasses 1½ to 2 tons of hay per acre. Onions yield from 300 to 600 bushels per acre, the average being nearly 400 bushels. All small grains make excellent yields.

The methods of handling this soil are generally similar to those employed on the Muscatine silt loam. In the production of onions, however, heavy applications of manure are usually made, and commercial fertilizers are applied by many of the growers.

The Bremer silt loam ranges widely in value, depending chiefly upon its location. It is improbable that land of this type could be purchased for less than $200 an acre in any part of the county, while in the onion district it is valued at several times that figure. Some of the land in that locality was held at $1,000 an acre in 1915. Continuous cropping to onions should not be practiced on this soil, as the ultimate effect will necessarily be injurious. The use of a short rotation, including clover, is recommended for land on which onions are grown, as well as for the type as a whole. Stable manure is very beneficial. Yields of corn and potatoes can be increased by deep plowing and thorough preparation of the seed bed, followed by frequent cultivations. More attention should be given to live-stock industries, such as the fattening of steers and hogs and dairying.

BREMER SILTY CLAY LOAM.

The surface soil of the Bremer silty clay loam is a black, heavy silty clay loam about 9 inches deep. The subsoil consists of a dark-gray to drab, plastic silty clay, passing at a depth of 18 to 24 inches

into a light yellowish gray to light-gray and yellow mottled, extremely plastic, impervious silty clay. In some places the surface few inches consists of a silt loam. In others considerable fine gravel is intermingled with the subsoil material.

This type is inextensive, its entire area consisting of only about 1,000 acres. It occurs on the terraces of the Wapsipinicon River, mainly south and southwest of McCausland. The topography varies from extremely level to slightly depressed and the natural drainage is poor. All of the type is under cultivation or in pasture, being mainly used for the production of corn, which gives excellent yields under proper drainage conditions.

The surface of this type is so flat that water has a tendency to stand on it, and artificial drainage is necessary for the best results. A part of it has been reclaimed by the construction of a dredged ditch a mile and a half west of McCausland, and it is recommended that another well-located ditch, with frequent laterals of tile, be constructed. The Bremer silty clay loam closely resembles the "gumbo" soils described in Bulletin 119, Iowa Agricultural Experiment Station. This bulletin recommends for such soils the practice of deep fall plowing and the use of clover or some other green-manure crop in a 3-year or 4-year rotation. Stable manure is also beneficial.

PLAINFIELD SANDY LOAM.

The surface soil of the Plainfield sandy loam is a brown to dark-brown sandy loam, 18 inches deep, usually containing a considerable quantity of coarse material. The subsoil is a brown to yellowish-brown or brownish-gray sandy loam to coarse sandy loam. While the subsoil is not markedly lighter in texture than the surface soil, the percentage of coarse material is usually higher. The type is underlain, usually at a depth of several feet below the surface, by stratified layers of coarse sand and fine gravel.

The Plainfield sandy loam occupies level terrace areas along the Wapsipinicon River. A sharp rise in elevation, usually of about 10 feet, marks the boundary between this soil and the first-bottom or overflow land. The village of McCausland is located upon the eastern extension of the largest body of this type. Several inextensive areas lie in the northern part of Allens Grove and Winfield Townships.

The greater part of the Plainfield sandy loam is used for the production of general farm crops and a little of it as pasture land. Corn is the principal crop. In seasons of ample and well-distributed rainfall yields closely approach those obtained on many of the heavier types. The soil is droughty, however, and crops are easily injured by dry weather.

Owing to its sandy texture, this soil can be cultivated under a wide range of moisture conditions, and weeds are easily controlled. The use of stable manure is general.

The Plainfield sandy loam should give good results with early vegetables. It is also well suited to melons and potatoes. Where sufficient stable manure is difficult to obtain rotations should include a green-manure crop, such as clover.

PLAINFIELD FINE SANDY LOAM.

The Plainfield fine sandy loam consists of a brown to dark-brown fine sandy loam, 12 to 18 inches deep, underlain by a brown to yellowish-brown fine sandy loam. In the areas of this type north and northwest of Princeton there is commonly very little change in color within the 3-foot section. In some parts of the area in sections 21 and 22, T. 80 N., R. 5 E., the material approaches a fine sand, and the influence of wind action is plainly visible. This variation is too small to map as a separate type. There are a few other spots in which the soil contains more sand than usual.

The Plainfield fine sandy loam occupies the level terraces of the Wapsipinicon River from the vicinity of Dixon east to the Mississippi bottoms. It also occurs on Suburban Island, near Davenport. The porous nature of the soil insures good surface drainage, but apparently the type is not markedly droughty, except in a few of the more sandy areas. A small part of the type is forested, mainly with oak. Probably 90 per cent of it is under cultivation.

This type is farmed in the same manner as the surrounding terrace soils, being utilized mainly for the production of general farm crops. It is a warm soil, is cultivated easily, and matures crops somewhat earlier than the heavier soils. It is well suited to the production of melons, early vegetables, potatoes, barley, and rye. As a rule, crop yields are good. Farm buildings on this type are fair, and modern equipment is used.

Land of this type commands somewhat lower prices than that of the Bremer and Muscatine silt loams.

The more sandy areas of the Plainfield fine sandy loam are in need of organic matter, which is best supplied by the use of barnyard manure and the occasional plowing under of green crops.

DAVENPORT SANDY LOAM.

The surface soil of the Davenport sandy loam is a brown to dark-brown sandy loam, becoming slightly reddish brown below 12 inches. The subsoil, which is encountered at a depth of about 18 inches, consists of a reddish-brown, heavy sandy loam, passing gradually into a brick-red, stiff, gritty clay loam or clay. In some places the subsoil

is a reddish-brown sandy loam, which changes to a loamy sand below 30 inches. In others both soil and subsoil contain gravel. Limestone is sometimes found within a few feet of the surface, but it seldom occurs within the 3-foot section. In the western part of section 23, T. 77 N., R. 2 E., the surface soil consists of a dark-brown to black sandy loam, resting upon limestone at a depth of about 18 inches. This area is too small to map as a separate type. There are also included a number of areas of fine sandy loam which were too small to map. In these the soil material consists of a brown fine sandy loam, about 20 inches deep, underlain by a slightly reddish brown fine sandy loam.

The Davenport sandy loam is mapped in several areas on the Mississippi terraces from Davenport southwestward to the county line. It usually occurs as low, smooth knolls which stand somewhat higher than the general terrace level. All areas of the type are above overflow. Surface drainage is generally adequate and sometimes excessive.

The Davenport sandy loam is of small extent. It is devoted to the same uses as the Davenport silt loam. The soil is well suited to the production of alfalfa, melons, and a number of early vegetables. The more sandy areas of this type are in need of organic matter.

DAVENPORT SILT LOAM.

The Davenport silt loam consists of a dark-brown silt loam, with an average depth of about 16 inches, underlain by a brown to reddish-brown or salmon-colored silty clay loam to silty clay. In many places limestone occurs at depths ranging from 3 to 6 feet. A number of areas of the Davenport loam which were too small to separate are included with this type. In these the soil material consists of a dark-brown gritty loam, 10 to 14 inches deep, underlain by a yellowish-brown, heavy, gritty loam, which passes gradually into a reddish-brown to brick-red, brittle clay loam. There is usually a slight content of small, rounded pebbles in both soil and subsoil.

Areas of the Davenport silt loam occur on the terraces of the Mississippi River from Le Claire southwestward nearly to the county line. The most extensive area is mapped southwest of Pleasant Valley, near the mouth of Crow Creek. The topography is comparatively level, and surface drainage is nearly always good. Very little of the type is subject to overflow.

The Davenport silt loam is well developed agriculturally, being used mainly for the production of general farm crops. Market gardening is practiced to some extent. In the vicinity of Pleasant Valley onions are successfully grown. Alfalfa can be successfully grown on well-drained areas. Yields of corn, hay, and other general

crops are comparable to those obtained on the Bremer silt loam, and land values also have about the same range as on the latter type.

DAVENPORT SILTY CLAY LOAM.

The Davenport silty clay loam consists of a black to dark-gray silty clay loam, 15 to 18 inches deep, underlain by a drab or gray and brown mottled silty clay loam, which passes, at varying depths, into a pinkish-brown or gray and pink mottled, plastic silty clay.

This type is developed on the terraces of the Mississippi River east of Davenport, and on those of the Wapsipinicon River in section 21, T. 80 N., R. 5 E. Along the Mississippi River the type is underlain by limestone at a depth of 2 feet or more. Where the bedrock occurs within the 3-foot section there are usually a few gravel particles in the lower subsoil. In the Wapsipinicon bottoms the type is not marked by the appearance of limestone at shallow depths, and yet the soil material is apparently similar in all other respects to that developed along the Mississippi River.

The topography is level to slightly depressed. Very little of the type is subject to overflow. Drainage is fair, except in areas where limestone occurs within 3 feet of the surface.

The Davenport silty clay loam is an unimportant type, although most of it is used for agriculture. Where thoroughly drained it is well suited to the production of corn, hay, onions, and cabbage and other heavy garden crops. Corn is the principal crop. Onions are grown to some extent near Pleasant Valley. Yields are as high as those on any other soil in the county.

Land of this type is valued highly, the prices being governed to some extent by those of the surrounding types.

WABASH SILT LOAM.

The Wabash silt loam consists of a grayish-brown to dark-brown silt loam, 14 to 20 inches deep, underlain by a dark-gray to black heavy silt loam to silty clay loam which extends to a depth of 3 feet or more. The surface soil is usually lighter in color than the middle subsoil. This is attributed to the fact that the former consists of recent alluvium, while the latter is of sufficient age to have accumulated considerable organic matter.

The Wabash silt loam is a first-bottom soil occurring along the streams throughout the county. It is most extensively developed in the bottoms of Mud Creek, where it sometimes attains a width of a mile. Many of the other stream bottoms are from a hundred yards to a half mile in width. The type lies from 3 to 10 feet above the normal level of the streams. The surface is uniformly flat, with a very slight gradient toward the uplands and also in the direction

of flow of the streams. The natural surface drainage is fairly good when the streams are at their normal stage.

The Wabash silt loam is of considerable extent and is one of the most important soils of the county. Very little of the type is forested. The greater part of it is used as pasture land and for the production of wild hay. The type affords excellent pasturage. Bluegrass grows luxuriantly. Corn is the principal cultivated crop, and yields from 45 to 80 bushels per acre. Hay crops also give excellent yields.

Very little of the Wabash silt loam is sold except in conjunction with the adjoining uplands. It is naturally one of the most productive soils of the county, but its value is affected by the occurrence of floods.

This type is best suited to the production of corn and hay. Small grains usually make too rank a growth of straw. For the highest development of this type the establishment of artificial drainage and the adoption of systematic crop rotations are necessary. Many areas could be materially benefited by the straightening and deepening of the stream channels.

Wabash silt loam, colluvial phase.—Many of the small drainage ways of the county, particularly in localities where the Muscatine silt loam, shallow phase, is developed, contain a soil that is both alluvial and colluvial in character. Areas in which the colluvial material seems to predominate have been indicated on the map as the Wabash silt loam, colluvial phase. The material is more recent than the Wabash silt loam, and the dark grayish brown surface soil sometimes extends to a depth of more than 24 inches. The subsoil is a dark grayish brown or dark-brown, heavy silt loam. The soil has been derived from near-by uplands. Many of the areas of the phase are subject to slight seepage at their junction with the upland, giving rise to rather poor drainage conditions. None of the areas are more than a few hundred feet in width.

This phase closely resembles the main type in crop adaptations and productiveness. More thorough drainage of the relatively narrow areas in which it occurs will in many places permit the cultivation of larger fields and increase the efficiency of labor and machines.

WABASH SILTY CLAY LOAM.

The surface soil of the Wabash silty clay loam is a black to dark-gray silty clay loam from 12 to 18 inches deep and rich in organic matter. The subsoil is a dark-gray to gray silty clay, which gradually passes into a light-gray to yellow or gray and brown mottled, plastic silty clay. A number of variations occur in the subsoil, mainly in the color and in the degree of mottling. In the more poorly

drained areas the subsoil is heavily mottled in the lower part. In many places iron concretions are present in the subsoil, sometimes in considerable quantity.

The Wabash silty clay loam occurs in detached areas on the first bottoms of the Wapsipinicon and Mississippi Rivers and Mud Creek. Generally the areas are flat and low lying to depressed, and the type is subject to overflow. The natural drainage is poor, and upon some areas crops are apt to "drown out" in wet seasons. Some of the depressed areas are rather swampy.

The Wabash silty clay loam is of comparatively small extent. About half its area is cultivated, most of the remainder being devoted to pastures and the production of wild hay. Corn is the principal cultivated crop. With adequate drainage, yields of 35 to 70 bushels of corn per acre are obtained.

The price of this type ranges from $60 an acre for poorly drained tracts to $200 an acre for well-improved land.

Where properly drained the Wabash silty clay loam is an excellent corn and grass soil. Some of the areas are very difficult to drain, however, and are probably best left in pasture. Heavy equipment is required on this soil. It is more difficult to cultivate than the silt loam.

SARPY LOAMY SAND.

The Sarpy loamy sand consists of a brown loamy sand, 8 to 12 inches deep, passing abruptly into a yellowish-brown, loose, incoherent sand to coarse sand, which extends to a depth of more than 3 feet. The subsoil usually contains a considerable amount of fine gravel about one-eighth inch in diameter.

The Sarpy loamy sand is developed on the outer first bottoms of the Wapsipinicon River, usually adjacent to the banks of the stream. Owing to the loose structure of the soil, drainage is excessive except during periods of high water. The type is inextensive and has little agricultural value. It is generally forested, mainly with oak, and, with the exception of a few fields devoted to rye, is utilized for pastures. Only fair yields are obtained. Land values are about the same as on the other soils of the Sarpy series.

SARPY FINE SANDY LOAM.

The surface soil of the Sarpy fine sandy loam is a grayish-brown to brown or rusty-brown fine sandy loam, from 12 to 15 inches deep. The subsoil consists of a gray to rusty-brown or gray, yellow, and brown mottled fine sandy loam to fine sand, often becoming considerably coarser with depth. This type, like the Sarpy silt loam, is characterized by many variations in both soil and subsoil. It occurs on the first bottoms of the Wapsipinicon River, in close association

with the Sarpy silt loam, and often the two types merge so gradually into each other that the boundaries between them are arbitrarily drawn. The level areas of the Sarpy fine sandy loam are perhaps slightly higher than those of the Sarpy silt loam, as a result of which drainage is somewhat better. The type is subject to overflow.

Most of this type is pastured. Corn and rye are grown to some extent and fair yields are obtained.

The price of this land is about the same as that of the Sarpy silt loam.

The Sarpy fine sandy loam must be protected from overflows before it can be profitably utilized for farming.

SARPY SILT LOAM.

The surface soil of the Sarpy silt loam consists of a grayish-brown to brown or dark-brown silt loam with an average depth of 12 inches. The subsoil is extremely variable in texture, ranging from a light silty loam containing considerable fine sand to a fine sandy loam which passes into a yellowish-brown, wet coarse sand at about 30 inches. It consists prevailingly of a gray and rusty-brown mottled fine sandy loam to fine sand.

In some of the more poorly drained areas the surface soil is mottled, and in a few of the higher lying areas the subsoil is a yellowish-brown fine sandy loam. Near the mouth of the Wapsipinicon River the subsoil is quite uniformly a gray and brown mottled fine sand, and the division between soil and subsoil is sharp. There are several included spots of silty clay loam, too small to be shown on the map.

This type is developed to a considerable extent throughout the first bottoms of the Wapsipinicon River. It also occurs on several islands in the Mississippi River north of Princeton. The material composing these islands is undoubtedly largely made up of sediments brought down by the smaller streams.

The surface is level and is characterized by slight depressions surrounding the oxbow lakes, ponds, and overflow channels common to the type. The natural drainage is poor, and practically the whole area covered by this soil is subject to overflow in times of flood. The sandy character of the subsoil apparently has little effect on the moisture supply. The water table is near enough to the surface to prevent droughtiness.

Agriculturally the Sarpy silt loam is of little importance. Only a small part of it is cultivated, the main use being for pasture. Much of the type is sparsely timbered, and the low areas surrounding ponds and sloughs support a growth of willow.

Corn is the principal crop. Where conditions are favorable yields of 50 bushels per acre are often obtained. Wild hay is cut to some

extent. Little or no attention is paid to crop rotations. Land of the Sarpy silt loam is worth from $60 to $120 an acre.

For the profitable production of corn and small grains this type should be protected from overflows.

MUCK.

Areas in which the soil material to a depth of 18 inches or more consists mainly of decomposed vegetable matter are mapped as Muck. The soil is black and is usually underlain to a depth of more than 3 feet by a drab or gray and yellow mottled silty clay. When dry, the surface soil has a loose, friable, flaky structure, but when wet it is spongy.

Muck is mapped in several small areas in the northern part of the county. There is also a small tract near Davenport, in the northeast quarter section 8, T. 77 N., R. 3 E. The type occupies depressed areas where conditions have been favorable for the accumulation and partial decomposition of organic matter. The surface drainage is very poor, and the soil is saturated during a large part of the year.

Muck is of little importance in Scott County. None of it has been drained, and over most of it conditions are unfavorable for the establishment of drainage without great expense. It supports a luxuriant growth of water-loving grasses and is utilized for pastures.

With proper drainage and cultural methods Muck is well adapted to the production of corn, onions, and celery.

SUMMARY.

Scott County lies in the extreme eastern part of Iowa, along the Mississippi River. It has an area of 455 square miles, or 291,200 acres. The topography is prevailingly rolling, the central and western parts of the county being comparatively level. The elevation above sea level ranges from 540 to 820 feet.

The county is drained by the Wapsipinicon and Mississippi Rivers and their tributaries, the greater part of it by the former stream. Surface drainage is good throughout the county.

In 1915 the population of Scott County was 65,350, and that of Davenport, the county seat and third largest city in Iowa, was 48,151. Over 60 per cent of the population of the county is of foreign parentage, mainly German. The county has good railroad service, especially in the southern townships. Public highways are good and rural schools are numerous.

Chicago is the chief outside market for staple farm products. Davenport, Rock Island, and Moline are excellent local markets.

The climate is characterized by a wide annual range in temperature. The mean annual temperature recorded at Davenport is

48.8° F. The mean annual precipitation is 32.64 inches, over 60 per cent of which falls during the growing season. There is a normal growing season of nearly six months.

The agriculture of Scott County consists of the production of the general farm crops for feeding stock, for sale, and for home use; the fattening of beef cattle and hogs for market; dairying; market gardening; poultry raising; and fruit growing. Onion growing is an important industry near Pleasant Valley. The principal crops are corn, hay, barley, oats, potatoes, wheat, and rye. The farm equipment is excellent.

Crop rotations are generally followed. Barnyard manure is saved and applied to the land. Lime is not in general use.

Efficient farm labor is in good supply.

There is a wide range in the size of farms, but the average is about 115 acres. Owners operated 57.8 per cent of the farms in 1909 and tenants 41.7 per cent. A cash rent, averaging about $6 an acre, is generally paid for leased farms.

Throughout the greater part of the county the price of farm land ranges from $175 to $275 an acre. Land near Davenport and in the onion districts commands higher prices.

The soils of Scott County fall into three general groups—(1) loessial, (2) glacial, and (3) alluvial. The soils of the Muscatine, Memphis, and Knox series are of loessial origin; the Clyde soils are derived in part from loess and in part from glacial drift; the Shelby and Lindley soils are derived mainly from glacial drift; and the Buckner, Plainfield, Bremer, Davenport, Wabash, and Sarpy soils are of alluvial origin.

The Muscatine series includes the dark-colored loessial soils of the county. The Muscatine silt loam is the most extensive soil type in the county, and is an important soil agriculturally. Corn, hay, barley, oats, and potatoes are the principal crops. Land of this type has an average value of more than $200 an acre. The Muscatine silt loam, rolling phase, is also extensively developed. Corn is the principal crop. Hay and the small grains are more important crops than on the main type. A large part of the phase is in permanent pasture.

The surface soils of the Memphis series are brown to light brown, with grayish-brown to yellowish-brown, heavier textured subsoils. The Memphis silt loam occurs along the larger streams of the county and ranks next to the Muscatine silt loam in extent. The principal crops are corn, hay, small grains, and potatoes. Pasturage on this type is not quite so good as on the Muscatine soils.

The Knox fine sandy loam has a light grayish brown to brown surface soil and a yellow subsoil. It is a relatively unimportant

type and only a small part of it is cultivated. Rye is the principal crop and yields about 15 bushels per acre. Corn gives rather low yields.

The Lindley silt loam is a light-colored soil with a strongly rolling to hilly and rough topography. Very little of this type is used for cultivated crops. The greater part of it is forested, the remainder being used as pasture land.

The Shelby series includes dark-colored surface soils, with light-brown, sandy and gravelly subsoils. The Shelby loamy fine sand is inextensive. It is excessively drained and crops suffer in dry weather. The Shelby fine sandy loam is the most extensive soil type encountered in the Iowan drift region. The Shelby loam is inextensive, but the greater part of it is cultivated. The Shelby silt loam is unimportant because of its small extent. It is considered a very good soil, however, and practically all of it is under cultivation. These soils are used for the production of general farm crops.

The Clyde silty clay loam has a black surface soil, underlain by a dark-gray to gray, heavy, silty clay loam which changes at a depth of 24 to 30 inches to a gray and yellow mottled, plastic silty clay. This type is inextensive, occupying flat or slightly depressed areas in close association with the Muscatine silt loam. Much of it is too poorly drained to be successfully cultivated and is used as pasture land. Where well drained it produces excellent yields of corn and good yields of hay.

The surface soil of the Buckner loam is brown to dark brown and the subsoil is grayish brown to yellowish brown. This is a well-drained terrace soil and is used for the production of general farm crops. Excellent yields are obtained. The Buckner loam, colluvial phase, is well drained and productive and is used for the same crops as the main type. These soils are relatively inextensive.

The types of the Bremer series have dark-brown to black surface soils, and dark-gray to drab or gray and yellow mottled, heavy subsoils. These soils occupy level to slightly depressed areas on alluvial terraces and natural drainage is poor. The principal crops grown on the Bremer silt loam are corn, hay, oats, barley, potatoes, wheat, and onions. Excellent yields are obtained. The Bremer silty clay loam is inextensive and poorly drained. It is used mainly for the production of corn, which gives excellent yields under favorable drainage conditions.

The Plainfield series comprises dark-colored, sandy terrace soils underlain by coarse material which renders them somewhat droughty. The Plainfield sandy loam and fine sandy loam are utilized mainly for the production of general farm crops, and, as a rule, good yields are obtained.

The Davenport series comprises terrace soils lying almost entirely above overflow along the Mississippi and Wapsipinicon Rivers. The surface soils are brown to black, while the subsoils are lighter in color and commonly heavier than the surface soils. Three types are mapped, the sandy loam, silt loam, and silty clay loam. These soils are used mainly for the production of general farm crops and good yields are obtained.

The Wabash series includes first-bottom soils subject to overflow. The Wabash silt loam is of considerable extent and is one of the most important soils of the county. The greater part of it is used as pasture land and for the production of wild hay. Corn is the principal cultivated crop, yielding 45 to 80 bushels per acre. The Wabash silt loam, colluvial phase, resembles the main type in crop adaptation and productiveness. The Wabash silty clay loam is of small extent.

The surface soils of the Sarpy series are brown, with distinctly lighter colored subsoils. Three types are mapped, the loamy sand, fine sandy loam, and silt loam. These soils are unimportant agriculturally, and are used mainly as pasture land.

Several small areas of Muck are mapped, most of them in the northern part of the county. None of the Muck has been drained, and conditions are unfavorable for the establishment of drainage. It supports a luxuriant growth of water-loving grasses and is utilized for pastures.

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[PUBLIC RESOLUTION—No. 9.]

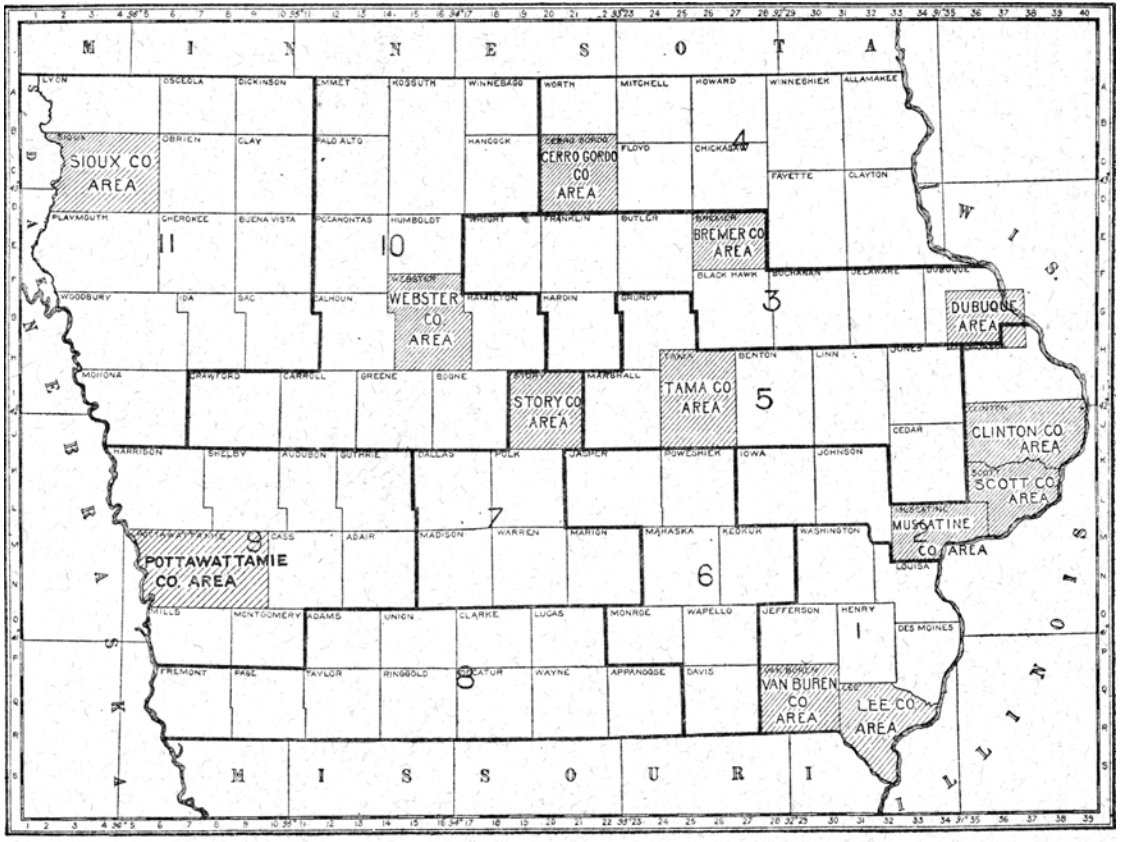
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

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.]



Areas surveyed in Iowa.

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