Series 1949, No. 9 Issued March 1959

SOIL SURVEY

Richland County Wisconsin

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
WISCONSIN GEOLOGICAL AND NATURAL HISTORY SURVEY
Soil Survey Division
WISCONSIN AGRICULTURAL EXPERIMENT STATION
University of Wisconsin

HOW TO USE THE SOIL SURVEY REPORT

THIS SURVEY of Richland County will help you plan the kind of farming that will protect your soils and provide good yields. It describes the soils; shows their location on a map; and tells what they will do under different kinds of management.

Find Your Farm on the Map

In using this report, start with the maps bound in the back of the report. The first map is an index map that represents the entire county. It is divided into rectangles. Each rectangle has an index number. Determine the quadrangle that covers that part of the county in which your farm is located. Now, find the detailed map that has the same index number as the quadrangle. The map shows towns and villages, roads, streams, and other landmarks. They will help you locate your farm. Each soil is shown by a symbol, such as Ad, and the extent of each area is shown by a boundary line. All areas marked with the same symbol are the same kind of soil wherever they appear on the map. Color patterns also help you pick out the areas of different soils, although each color pattern is used for several soils that resemble each other in some way.

Suppose you have found on your farm an area marked with the symbol Ad. You learn the name of the soil this symbol represents by looking at the map legend. The symbol Ad identifies Arenzville silt loam.

Learn About the Soils on Your Farm

Arenzville silt loam and all the other soils mapped are described in the section, Soil Descriptions. Soil scientists, as they walked over the fields and through the woodlands, described and mapped the soils. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noted differences in growth of crops, weeds, brush, or trees; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming.

After they mapped and studied the soils, the scientists talked with farmers and others about the use and management each soil should have. Then they placed it in a capability class and in a management group. The capability classification is a means of showing the comparative suitability of the soils for agricultural use. A management group is a group of similar soils that need and respond to about the same kind of management.

Arenzville silt loam is in management group 1A. Turn to the section, Use and Management of Soils, and read what is said about soils of group 1A. You will want to study the table which tells you how much you can expect to harvest from Arenzville silt loam under two levels of management.

Make a Farm Plan

For the soils on your farm, compare your yields and farm practices with those given in this report. Look at your fields for signs of runoff and erosion. Then decide whether or not you need to change your methods. The choice, of course, must be yours. This survey will aid you in planning new methods, but it is not a plan of management for your farm or any other farm in the county.

If you find that you need help in farm planning, consult the local representative of the Soil Conservation Service or the county agricultural agent. Members of the staff of your State agricultural experiment station and others familiar with farming in your county will also be glad to help you.

Fieldwork for this survey was completed in 1949. Unless otherwise specifically indicated, all statements in the publication refer to conditions in Richland County at that time.

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SOIL SURVEY OF RICHLAND COUNTY, WISCONSIN

Report by GLENN H. ROBINSON and A. J. KLINGELHOETS, Soil Conservation Service
Fieldwork by GLENN H. ROBINSON, F. A. HAVERLAND, F. D. HOLE, and others.[1]

Correlation by IVER J. NYGARD and A. H. PASCHALL, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Wisconsin Geological and Natural History Survey, Soil Survey Division, and the Wisconsin Agricultural Experiment Station, University of Wisconsin.

General Nature of the Area

Dairying is the principal industry in Richland County. Corn, oats, hay, and pasture crops are important, as they provide a base for the dairy industry. Forests occupy more than a third of the land area of the county. They provide fuel for the farm homes and some cash income. The principal cash crop is tobacco.

Location and Extent

Richland County is in southwestern Wisconsin (fig. 1). It is bounded on the west by Crawford County, on the north by Vernon County, and on the east by Sauk County. On the south it is bounded by the Wisconsin River. The land area of the county is 584 square miles, or 373,760 acres. Richland Center, the county seat, is about 50 miles from Madison, 125 miles from Milwaukee, and 175 miles from Chicago.

Geology

Richland County lies within the unglaciated part of Wisconsin. It is in the Western Upland physiographic region (*5*).[2] In general, it is a deeply dissected plateau that is characterized by complex narrow ridges in the uplands and by valley flats that occur along the major drainageways and streams (fig. 2). The ridges range in elevation from 1,291 feet at West Lima, in the northern part of the county, to between 1,100 and 1,160 feet near Richland Center. The elevation at Lone Rock is 710 feet.

The sides of the valleys are steep. The valley flats, or bottoms, are 300 to 400 feet below the tops of the ridges and are between ¼ and 1¼ miles wide. They are deepest and widest near the Wisconsin River.

Prairie du Chien dolomite and Cambrian sandstones—Trempealeau, Franconia, and Dresbach—make up the larger part of the bedrock that underlies Richland County (fig. 3) (*5*). A few scattered remnants of St. Peter sandstone outcrop through the dolomite. Most of these

Figure 1.—Location of Richland County, Wis.

[1] Glenn H. Robinson, formerly of the Bureau of Plant Industry, Soils, and Agricultural Engineering and Wisconsin Geological and Natural History Survey; S. D. Alfred, W. W. Anderson, W. H. Bender, Nels Benson, F. A. Haverland, A. W. Irvine, R. F. Peterson, R. T. Sasman, Harvey V. Strelow, and E. M. Watson, Soil Conservation Service; and E. T. Barnes, R. B. Corey, Maynard Fosberg, F. D. Hole, A. J. Klingelhoets, Gerhard B. Lee, Gerard Ouellete, F. F. Peterson, and Samuel Rieger, Wisconsin Geological and Natural History Survey. Fieldwork for this survey was done when Soil Survey was part of the former Bureau of Plant Industry, Soils, and Agricultural Engineering. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

[2] Italic numbers in parentheses refer to Literature Cited, p. 38.

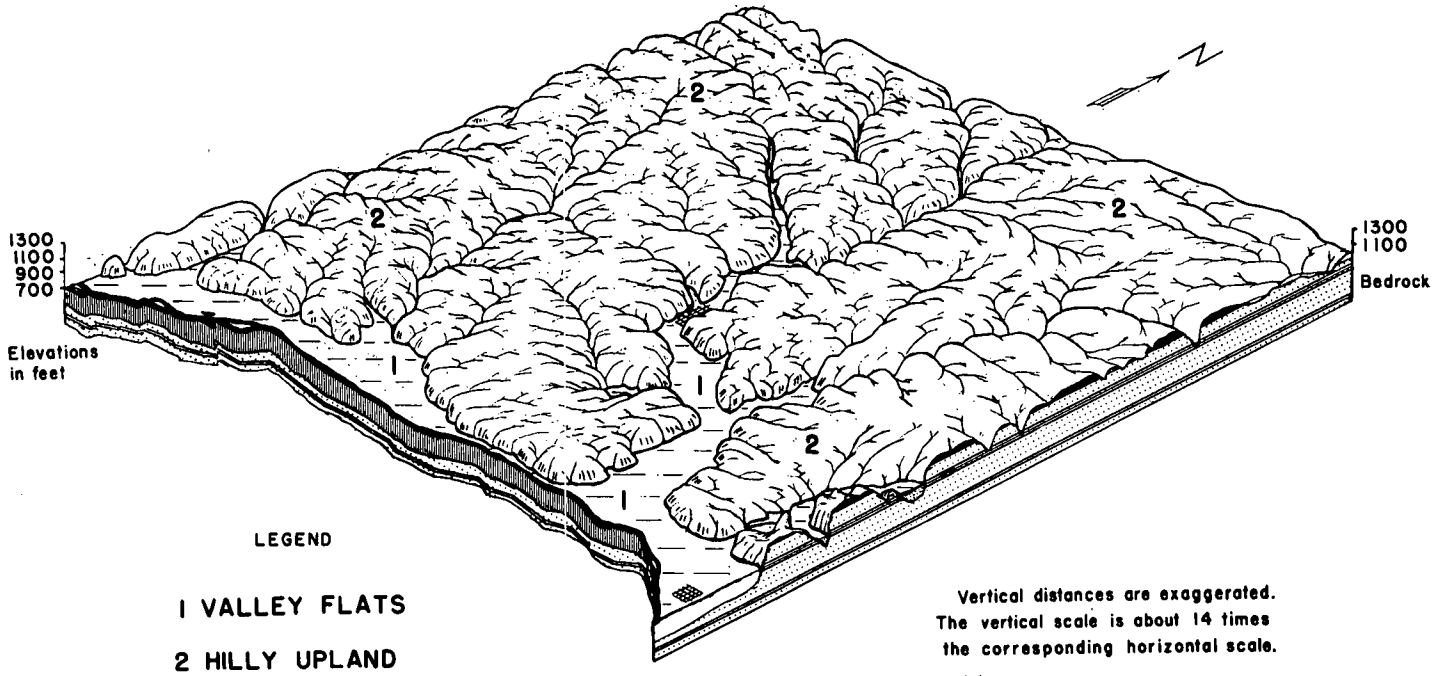

Figure 2.—Landscape types of Richland County (*3*).

remnants are in the northeastern and northwestern corners of the county.

The nearly level bedding of the Prairie du Chien dolomite, which forms a cap over the sandstone, causes the ridges to be level on top. The Prairie du Chien dolomite slopes toward the south with a drop of about 5 or 6 feet per mile. Streams have dissected the areas, causing deep, steep-sided valleys to form.

The upper sandstone formation, or Trempealeau, and the lower formation, or Dresbach, are made up of nearly pure sandstone. Cliffs have formed (fig. 4) where these formations have been dissected by streams. The Dresbach formation is responsible for many of the low rocky benches along Willow Creek on which were deposited the parent materials of the Rockbridge soils.

A thin mantle of loess that ranges from 12 inches to more than 4 feet in thickness has covered all of the uplands and many of the valley slopes and terraces. This silty material was probably blown from the Mississippi River bottoms during, or soon after, the last glacial period. The deepest loessal deposits are in the northwestern corner of the county. The soils of the upland flats have all developed from the loess rather than from the underlying limestone residuum. The loess was probably calcareous at the time it was deposited, but there is no free lime in any of the profiles of the silty soils examined in Richland County.

Above the present flood plains there are 6 levels of river terraces (*4*). Glacial outwash sands are exposed on the first 5 terraces. The exposed areas are the most extensive on terrace number 1, which is the lowest. On terrace number 2, there are a few scattered areas of reddish-brown lacustrine clay. Terrace number 6 is the highest of the terraces. It occurs along the valleys of Willow Creek and Pine River. This terrace has some remnants of old outwash deposits, which are the parent materials of the Rockbridge soils. The lacustrine and outwash materials were laid down before the loess was deposited.

Climate

The climate of Richland County is marked by wide extremes in temperature. The highest temperature recorded during the summer is 110° F. and the lowest is 40°. Temperatures as high as 67° and as low as −46° have been recorded during the winter. Table 1, compiled from records of the United States Weather Bureau at Richland Center, gives monthly, seasonal, and annual temperatures and precipitation.

Rainfall is evenly distributed throughout the county, and most of it falls during the growing season. Snowfall is fairly heavy, averaging about 35 inches annually. The average frost-free season of 138 days extends from May 13 to September 28. Although short, the growing season is usually long enough for corn and other commonly grown crops to mature. Small grains and hay also grow well, as they tolerate fairly low temperatures and even light frosts.

Water Supply

This county has an abundant supply of underground water (*10*). In the uplands in the western part of the county there is enough water if wells are driven to the limestone. Elsewhere in the county it is generally necessary to drive the wells to the underlying sandstone. In the alluvial fans of the valleys, water is ordinarily obtained from shallow wells. Springs are numerous along the lower slopes of the valleys. In most places they occur where the shale strata outcrop along the hillsides. Many of the springs are the sources of permanent streams and supply an abundance of cold clear water for domestic use. The well and spring waters are hard.

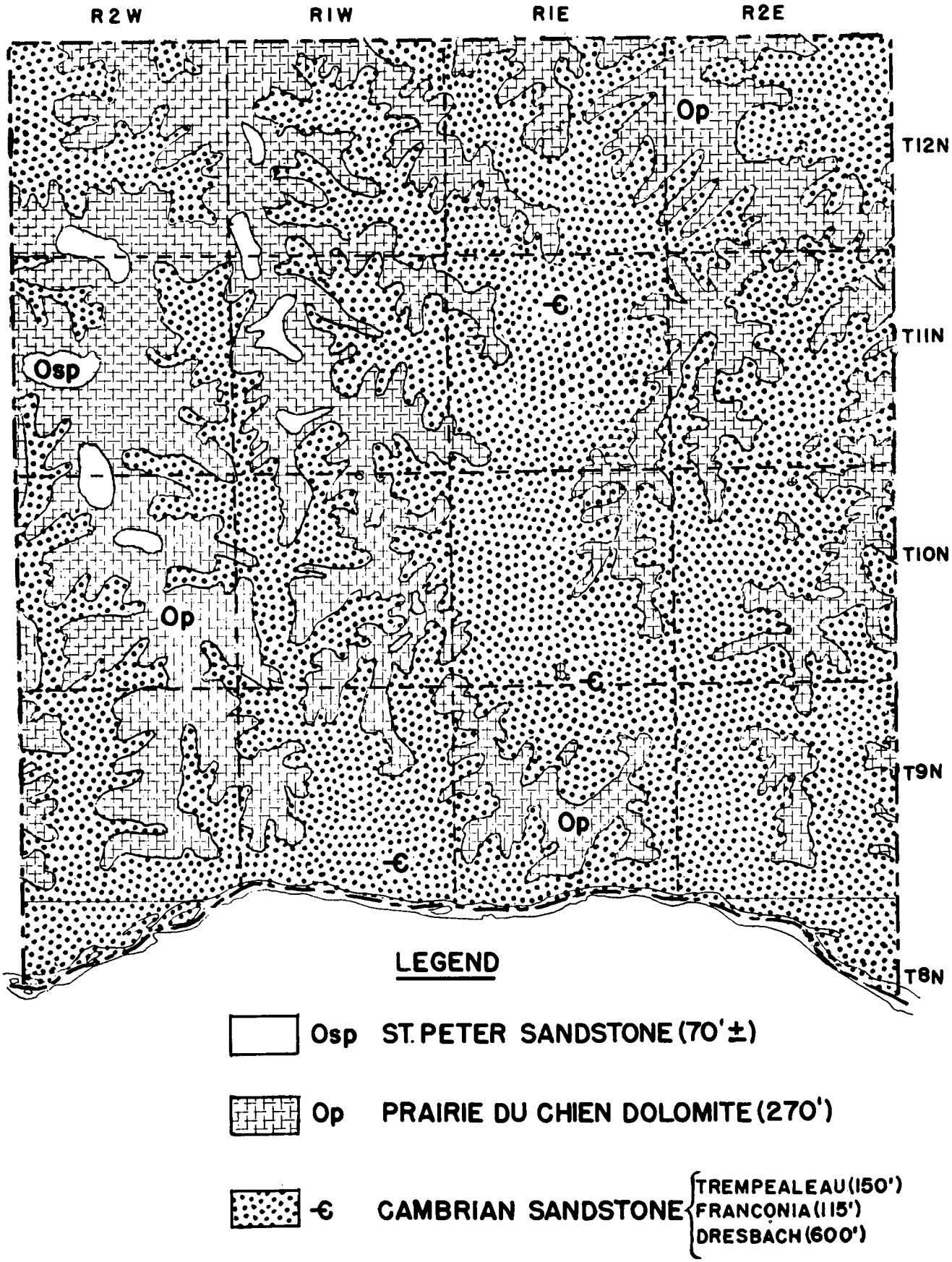

Figure 3.—Diagram showing parent rock of soils in Richland County.

Figure 4.—**Sandstone cliff, Dresbach formation, along Pine River, near Richland Center.**

Supplemental irrigation may be profitable in some parts of the county. A limited amount of water for this purpose is available from the Wisconsin River and other streams. Because of the high cost of pumping water from the deep valleys to the uplands, irrigation would probably be limited to the terraces and bottom lands.

Vegetation

This county is in the Central Hardwood forest region of the United States (*6*), although it is near the prairie areas of Iowa, southern Wisconsin, and Illinois. It lies within an area called a tension zone, in which minor changes in climate may cause changes in the vegetation. If the climate becomes cooler or wetter, for example, the forests will encroach upon the prairie areas. On the other hand, if the climate becomes drier or warmer, the prairie grasses will encroach upon the forests.

Originally, forests covered most of the area that is now Richland County. There were some small marshy and swampy areas, mainly along the Wisconsin River. Today, the most extensive marshy and swampy areas are in Richwood and Buena Vista Townships.

The forests were probably extending when the white man first came to the area. Evidences of this can be seen in the present forests of oak and hickory that still have an understory of prairie plants. It is also apparent in the dark color of many of the soils and in the isolated prairie areas that are surrounded by forests. The rate of extension was slowed by the Indians, who set fires to hold back the forests so they would have open areas for their campsites and fields. Prairie soils and transitional soils that have some characteristics of both prairie soils and timber soils occupy these burned-over areas and indicate their former location and extent. These areas are mainly

TABLE 1.—*Temperature and precipitation at Richland Center, Richland County, Wis.*

[Elevation, 728 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1939)	Wettest year (1892)	Average snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	24.2	63	−31	1.35	0.41	1.48	7.3
January	18.6	56	−46	.99	1.11	.79	9.2
February	22.5	67	−40	1.13	1.59	1.23	6.2
Winter	21.8	67	−46	3.47	3.11	3.50	22.7
March	33.2	80	−16	1.64	.71	2.08	7.9
April	46.5	92	6	2.59	2.01	4.74	1.5
May	58.1	103	21	3.78	2.44	9.81	.2
Spring	45.9	103	−16	8.01	5.16	16.63	9.6
June	67.6	102	31	4.65	3.43	10.20	[3]
July	73.1	110	40	2.80	2.62	3.09	0
August	69.9	102	34	3.63	2.55	4.99	0
Summer	70.2	110	31	11.08	8.60	18.28	[3]
September	63.0	104	22	4.56	2.51	3.25	[3]
October	50.2	88	3	1.86	2.52	1.05	.3
November	35.8	78	−17	2.13	.87	1.85	2.4
Fall	49.7	104	−17	8.55	5.90	6.15	2.7
Year	46.9	110	−46	31.11	22.77	44.56	35.0

[1] Average temperature based on a 39-year record, through 1954; highest and lowest temperatures on a 35-year record, through 1952.

[2] Average precipitation based on a 40-year record, through 1955; wettest and driest years based on a 35-year record, in the period 1892–1952; snowfall based on a 33-year record, through 1952.

[3] Trace.

along the Wisconsin River, but some small tracts are in the northern uplands.

Wooded areas are scattered throughout the county. The trees are mainly hardwoods, but conifers make up about 1 percent of the forests. The conifers grow mainly on the sandy soils along the river.

Organization and Population

An Englishman by the name of Captain John Coumbe was the first settler to come to the area now called Richland County (*8*). In 1840 he made his home near the present site of Port Andrew.

Richland County was organized in 1842, but for judicial and electoral purposes, the county was attached to Iowa County until May 1, 1850. The first county seat was at Richmond, which is now called Orion. Richland Center became the county seat in 1851.

Most of the early settlers chose the valleys for their homes. In the valleys, water was easily available and the land was easier to clear. Lumbering was begun in 1843 along the Pine River near Rockbridge. In 1845, a road was opened that passed from Rockbridge southward to Muscoda, and lumbering was begun in other valleys. The climate was favorable for growing grain and hay crops and for raising livestock, however, so the settlers soon began to change from lumbering to farming.

The population increased rapidly when the Milwaukee and Mississippi Railroad was built. This railroad reached Lone Rock in 1856 and Prairie du Chien in 1857. A cooperatively built narrow-gage railroad that ran on maple rails was put in operation between Lone Rock and Richland in 1876. The county had a population of 15,731 in 1870. By 1950, the population had increased to 19,245. About 52.3 percent of the people lived in rural areas.

Industries

About 50 industrial establishments are located in Richland County. Most of these are food-processing plants. Others include lumber- and wood-processing plants, machinery-manufacturing plants, and printing and publishing concerns. The larger milk-processing plants are in Richland Center, but many small cheese factories are scattered throughout the county. They provide ready markets for milk—the most important source of farm income. The largest lumber- and wood-processing plants are in Richland Center and Boaz.

Industries have had little effect upon the distribution of population or upon the type of agriculture in the county. Rather, the prevalence of dairy farming has influenced the distribution of the industries.

Transportation Facilities

Farm-to-market transportation facilities are good. United States Highway No. 14 enters the county at Lone Rock in the southeastern part of the county. It passes through Richland Center and leaves the county northwest of Bosstown. State highways crisscross the county. In addition, there are county trunk highways and secondary roads. More than 90 percent of the farms are within two-tenths of a mile of an all-weather road.

The Chicago, Milwaukee, St. Paul and Pacific Railroad passes through Lone Rock, and a branch of this road serves Richland Center. Rail transportation is not available for the rest of the county.

Most agricultural products are marketed locally. Some products, especially livestock, are shipped to Madison, Wis., and Dubuque, Iowa. Processed products are sent to various markets such as Chicago, Ill., and St. Louis, Mo.

Schools

Elementary schools are located in each community. Transportation is available for high school and elementary students who live beyond walking distance of the school building. A small college for teacher training is in Richland Center. Recreational and social activities center around the schools and churches.

Agriculture

The agriculture of Richland County is based largely on dairying. On the following pages the more outstanding features of this agriculture are discussed. The statistics used are from reports published by the United States Bureau of the Census.

Land Use

Richland County has a total land area of 373,760 acres, of which 95.9 percent is in farms. The farmland, by use in 1954, and the proportionate extent used for each purpose, are as follows:

	Acres	*Percent*
Cropland, total	154, 894	43
Harvested	127, 302	36
Used only for pasture	21, 886	6
Not harvested or pastured	5, 706	1
Woodland, total	131, 063	37
Pastured	118, 045	33
Not pastured	13, 018	4
Other land pastured	58, 782	16
Land pastured, total	198, 713	55
Other land (house lots, roads, wasteland, and so on)	13, 857	4

This county has a smaller acreage of cropland harvested than most of the counties in the eastern part of southern Wisconsin. This is because many of the soils are not level enough to be suited to tilled crops. More than a third of the land area is wooded. The wooded areas are generally pastured, but it would be better to use them only for trees. The permanent pastures in the county need to be renovated.

Type and Size of Farms

Of the 2,150 farms in Richland County in 1954, 158 were miscellaneous and unclassified. The rest were listed according to the major source of income as follows:

	Number
Dairy farms	1, 747
Livestock farms other than dairy and poultry	100
General farms	45
Primarily livestock	25
Crop and livestock	20
Cash grain	30
Poultry	25

Dairying has always been important in Richland County. Most of the crops are fed to dairy cattle or other livestock.

In 1954, the average-sized farm consisted of 166.8 acres. The larger farms are mainly in the southern part of the county where the broad terraces that are suited to farming are the most extensive. In 1954, the farms were grouped according to size as follows:

	Farms
Under 10 acres	49
10 to 29 acres	42
30 to 49 acres	67
50 to 69 acres	56
70 to 99 acres	276
100 to 139 acres	450
140 to 179 acres	460
180 to 219 acres	265
220 to 259 acres	172
260 to 499 acres	289
500 to 999 acres	22
1,000 acres and over	2

Crops

Forage crops are grown on a large acreage in Richland County to provide feed for the dairy cattle. Cash crops are grown on some farms. Of these, tobacco and tree fruits are the most important. Table 2 shows the acreage and proportionate extent of the various crops grown in the county in 1939, 1949, and 1954.

Hay was grown on about 43.3 percent of the total cropland in 1954. Most of the hay is used on the farm. It is grown extensively because of the importance of dairy farming. Also, many of the soils have such steep slopes that they are better suited to hay than to cultivated crops.

Alfalfa and alfalfa mixtures account for about 73.4 percent of the total hay acreage. The alfalfa gives high yields of good-quality forage. It needs a fertile, well-drained soil and, to yield well, must have lime, potassium, and phosphorus. The alfalfa is seeded in April in a mixture of alfalfa-bromegrass or alfalfa-clover-timothy. Seeding is done in a nurse crop such as oats. Two cuttings are usually made each season, and the alfalfa can sometimes be pastured in the fall.

Second to alfalfa, the most widely grown hay crop is mixed clover and timothy. The mixture most commonly used for seeding consists of 5 pounds of red clover, 3 pounds of alsike clover, and 2 pounds of timothy. About 10 pounds of seed is used per acre. The clover-timothy mixture is seeded in April with oats or some other small grain that is used as a nurse crop. The seed is drilled in with the small grain that is being used as a cover crop, or it is broadcast after the small grain is seeded.

Corn is an important crop in the county. Practically all of it is used on the farm as grain or silage to provide winter feed for cattle and hogs. Most of it is grown on the more level areas in the county, especially on the soils of the terraces and bottom lands. The soil is usually plowed in the spring and prepared for seeding in May. The corn is harvested for grain in October or November, depending on the weather. It is cut for silage when the grain begins to dent or, if there is an early frost, as soon afterwards as possible.

Oats have always been grown extensively in the county. They are generally used as a nurse crop for hay. The fields to be planted to oats are often plowed in the fall. In the spring, the soil is disked and smoothed, and the oats are seeded in April or before the 15th of May. A grain drill is ordinarily used for seeding, but the oats can be broadcast and covered by harrowing. Fertilizer is sometimes used to increase yields, and it will insure a better stand of the accompanying hay crop.

After the oats mature, they are harvested by using a binder or combine. Most of them are then ground, mixed

TABLE 2.—*Acreage and proportionate extent of principal crops and number of fruit trees and grapevines*

Crop	1939		1949		1954	
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Corn for all purposes:						
Grain	19,770	16.7	25,491	19.6	24,279	19.0
Silage	8,921	7.5	9,946	7.6	10,095	7.9
Hogged, grazed, or cut for fodder	688	.5	1,182	.9	1,319	1.0
Soybeans for all purposes	3,993	3.3	951	.7	839	.6
Small grains threshed or combined:						
Grown together or threshed as a mixture	1,106	.9	1,624	1.2	988	.7
Oats	16,712	14.1	24,915	19.1	22,323	17.5
Wheat	412	.3	733	.5	220	.1
Barley	1,972	1.6	170	.1	117	(1)
Rye	666	.5	238	.1	33	(1)
Hay other than soybeans	62,859		63,625		67,135	
Alfalfa and alfalfa mixtures	16,316	13.8	16,478	12.6	49,307	38.7
Clover, timothy, and mixtures with grasses	34,534	28.8	43,133	33.1	13,747	10.7
Small grains hay	5,366	4.5	927	.7	884	.6
Wild hay	589	.4	380	.2	208	.1
Other hay cut	5,922	5.0	2,547	1.9	585	.4
Silage	132	.1	160	.1	2,404	1.8
Tobacco	262	.2	486	.3	331	.2
Potatoes	615	.5	[2] 179	.1	[3] 75	(1)
	Number [4]		*Number* [4]		*Number*	
Apple trees	12,254		10,647		6,507	
Grapevines	2,309		1,310		568	

[1] Less than 0.1 percent.

[2] Does not include acreage for farms with less than 15 bushels harvested.

[3] Does not include acreage for farms with less than 20 bushels harvested.

[4] Number in the census year, which is 1 year later than the crop year given at the head of the column.

with protein concentrates, and fed on the farm. The straw is baled and used as bedding. To some extent, oats are used as a supplementary hay crop and are cut green.

Although tobacco is the principal cash crop in the county, the acreage has never been large. State records show that tobacco was planted on only 1 acre in 1890, which was the smallest acreage reported for any year. The largest figure reported, 750 acres, was that for 1924. In 1954, tobacco was grown on 338 acres.

Most of the tobacco is grown on bottom lands or on terraces. The soils used for this crop are the most fertile of any on the farm. Most of the fields are heavily manured, and large amounts of commercial fertilizer are added before the crop is planted. Because it is necessary to maintain such a high level of fertility for this crop, the tobacco is not commonly rotated with other crops.

The soils used for tobacco are generally plowed in the fall. The seedbed is prepared carefully in the spring. The tobacco plants are transplanted in June or no later than July 8, and the fields are cultivated to rid them of weeds. When the top leaves of the tobacco begin to turn yellow, the crop is harvested.

Soybeans were introduced in the county around 1930. They have been grown on only a small acreage. When the clover or alfalfa crop fails, soybeans are often used as a catch crop and are fed to livestock. They probably can be grown to best advantage on the sandy terrace areas in the southern part of the county. The soybeans should be planted in May. The seedbed preparation and fertilizer needs are similar to those for corn.

Wheat, rye, and barley were important in the early history of Richland County as feed and cash crops. As the dairy industry has grown, however, they have become less important.

Potatoes were an important crop in the early history of the county, but they are no longer grown extensively, except for use on the farm. Most farms grow some vegetables and fresh fruits for home use, but only small amounts of these crops are sold. Apple orchards are important on a few farms, and in 1954, strawberries and raspberries were sold from 18 farms. Some maple sirup and honey are produced, especially in the hillier parts of the county.

Permanent Pastures

In 1954, about 55.4 percent, or 198,713 acres, of the land in farms was used for pasture. About 59.4 percent of this acreage was pastured woodland. The largest areas of woodland pastures are in Forest, Dayton, Bloom, and Willow Townships. The largest cleared areas used for pasture are in Marshall, Buena Vista, Orion, Richland, and Rockbridge Townships. The most common pasture plants in permanent pastures are Kentucky bluegrass, whiteclover, redtop, and timothy.

A large number of the permanent pastures are on soils not well suited to crops (fig. 5). Many of them are of little value as pasture, but they can be improved by renovating them. Experiments made in Richland County showed that 1 acre of renovated pasture is equal to between 2 and 5½ acres of untreated pasture, or to 11.3 acres of woodland pasture (*2*).

In renovating pastures, lime and a complete fertilizer are broadcast. The sod is then torn with a field cultivator, disk, or harrow. The ground is seeded around the first of May.

***Figure 5.*—Permanent pasture on Boaz and Ettrick silt loams.**

A desirable mixture for seeding pastures contains inoculated legumes. The well-drained loams and silt loams are seeded to mixtures that contain a ratio of from 8 to 10 pounds of alfalfa to from 3 to 6 pounds of bromegrass. The wetter soils are seeded to a mixture of Ladino clover, alsike clover, and reed canarygrass. The native grasses are still present and will replace the legumes as the legumes die out. Legumes will give better yields of high-quality forage than the native grasses, so they need to be encouraged. They should be allowed to reseed and to become well established, as they will help to retard the growth of the less desirable plants.

Livestock and Livestock Products

Livestock and livestock products provide a major source of income in Richland County. Table 3 shows the number of livestock on farms in the county in 1940, 1950, and 1954. Dairy cattle are the most important of the livestock. The most common breed of dairy cattle is Holstein, but there are many Guernsey, Jersey, and Brown Swiss cattle.

TABLE 3.—*Number of livestock on farms*

Livestock	1940	1950	1954
	Number	*Number*	*Number*
Cattle and calves	[1] 52, 879	61, 799	66, 475
Hogs and pigs	[2] 19, 634	37, 870	39, 617
Horses and mules	[1] 8, 023	4, 224	1, 958
Sheep and lambs	[3] 15, 789	9, 568	8, 254
Chickens [2]	120, 337	125, 691	145, 407

[1] More than 3 months old. [3] More than 6 months old.
[2] More than 4 months old.

Of the livestock products, dairy products are the most important. In 1954, more than 205 million pounds of whole milk and nearly 18 thousand pounds of butterfat were sold. In addition, some income was derived from the sale of calves and breeding stock.

Income from the sale of hogs and pigs was reported from 54.6 percent of the farms in 1954. Most of these animals

were raised in the southern half of the county. The number of horses has decreased considerably during the past few years. In 1950, horses and mules were reported on 1,742 farms, but they were reported on only 902 farms in 1954. Sheep were raised on some farms, mainly in the hillier parts of the county. In 1954, sheep and lambs were reported on only 221 farms.

In 1954, 58,352 chickens and 742,991 dozen eggs were sold. In addition, sales of turkeys, ducks, geese, and other miscellaneous poultry and their eggs were reported on 113 farms.

Forests

The woodlands of Richland County occupy 131,063 acres, or more than a third of the land area. They are distributed throughout the county. Most of the wooded areas consist of steep, stony, sandy, or wet soils that are not suited to cultivated crops. The trees help prevent soil erosion, protect wildlife, and provide lumber and fuel. Much of the timber is of commercial value, and all but about 1 percent consists of hardwood trees.

The farm woodlot contributes a substantial amount to the farm income. In 1954 trees were cut for fuel on 1,057 farms, and for posts on 885 farms, and most of this was used on the home farm. Saw logs, including standing timber, were sold from 430 farms, and pulpwood from 1 farm. Maple trees were tapped on 83 farms, and sirup and sugar were made from the sap.

The value of the forests can be increased by (1) preventing forest fires, (2) preventing trampling and grazing by livestock, (3) removing cull trees and weed trees systematically, and (4) thinning the trees so the more desirable ones can grow.

Grazing damages a woodlot as much as overcutting or burning. The grazing animals trample the soil and cause excessive erosion. They also destroy the young trees and other undergrowth. Experiments (*1*) show that 1 acre of renovated pasture yields twice as much forage as untreated pasture and more than 11 times as much as a wooded pasture. This does not mean that all wooded areas should be cleared. It does mean that an area should be used either as a pasture or as a forest but not for both.

Table 4 shows the results of a study made of the trees in Wisconsin (*12*); it indicates there is a good correlation between some of the soil types of Richland County and the yield of lumber per acre. It also shows that certain trees grow more commonly on certain soil types.

Yields of timber are somewhat low on the Fayette and Dubuque soils of the uplands, even though the soils are good for field crops. In contrast, timber yields are high on the Fayette silt loams of the valleys. High yields of timber are also obtained on some of the prairie soils, but the soils must be inoculated with mycorrhizae before the trees will grow well (*11*).

The management of any wooded area depends on its condition and the kind of trees that are to be produced. If the area has been grazed heavily, it may be necessary to replant. In replanting, table 4 may be used as a guide in selecting the species of tree. In areas that have not been grazed or that have been lightly grazed, the cull trees and weed trees should be removed. If it is necessary to remove a large proportion of the trees, it will be well to divide the area into plots or strips. One strip can then be cleared and replanted and the trees allowed to become established before the next strip is cleared. This will reduce the risk of erosion.

Spacing should be close enough to insure well-shaped trees. Trees removed in thinning can be used for posts or fuel, or as pulpwood. Members of the forestry experiment station or of the agricultural experiment station may be consulted for assistance.

TABLE 4.—*Species and average yields of trees that commonly grow on certain soils in the Driftless area of Wisconsin*

Soil	Species	Yield
		M b. m. per acre
Fayette, Dubuque	White, red, and black oaks; shagbark and bitternut hickories; and some hard maple, basswood, and elm.	(1)
Hixton loams	Black and bur oaks; some shagbark hickory.	5
Fayette silt loams, valleys.	White oak, hard maple, basswood, black walnut, and white ash.	14
Curran silt loam	Black and red oaks; white and slippery elms; aspen; paper birch; and boxelder.	4
Plainfield	Jack pine	(2)
Boone sand	White and red pine	7
Boaz, Ettrick	White and slippery elms; swamp white oak; black oak; river birch; silver maple; and black ash.	(1)

[1] No estimate given. [2] Yields about 15 cords per acre.

Farm Tenure

About 58.4 percent of the 2,150 farms in the county were operated by owners in 1954; 29.4 percent by tenants; and about 12 percent by part owners. This shows a slight decrease in tenancy from 1950, when 34.3 percent of the farms were tenant operated. Under the most common rental agreement, the landowner provides the land and farm buildings and half the feed, seed, fertilizer, and livestock; the tenant provides the other half and the labor. Usually, the living quarters are rented to the tenant. There are many variations of this sharecropping agreement, depending upon the value of the farm and the ability of the renter. Some farms are rented on a cash basis.

Farm Power and Mechanical Equipment

Horses are no longer a major source of farm power in this county. Except on the smaller farms, they are used only for lighter work. In 1954, 2,490 tractors were reported on 1,761 farms; 964 trucks were reported on 916 farms; and 2,225 automobiles were reported on 1,867 farms. On 1,587 farms, milking machines were owned, and there were electric pig brooders on 200 farms. Other machinery included 235 grain combines, 406 cornpickers, 380 pick-up hay balers, and 121 field forage harvesters.

A large amount of space is needed to house this equipment, to shelter the livestock, and to store feed for the winter. On most of the farms, there are at least 1 large barn and 1 or 2 silos.

How a Soil Survey is Made

The soil scientist who makes a survey examines the soils in the field, classifies them, and sketches their boundaries on an aerial photograph.

FIELD STUDY.—The soil surveyor bores or digs many holes to see what the soils are like. The holes are not spaced in a regular pattern but are located according to the lay of the land. Usually they are not more than a quarter of a mile apart, and sometimes they are much closer. These observations were supplemented by studies of roadcuts and similar excavations. In most soils each boring, hole, or excavation reveals several distinct layers, called *horizons*, which collectively are known as the soil *profile*. Each horizon is studied to see how it differs from others in the profile and to learn the things about this soil that influence its capacity to support plant growth.

Color is usually related to the amount of organic matter. The darker the surface soil, as a rule, the more organic matter it contains. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration.

Texture, or the content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers, and it is later checked by laboratory analysis. Texture determines how well the soil retains moisture, plant nutrients, and fertilizer and whether it is easy or difficult to cultivate.

Structure, which is the way the individual soil particles are arranged in larger grains and the amount of pore space between grains, gives us clues to the ease or difficulty with which the soil is penetrated by plant roots and by moisture.

Consistence, or the tendency of the soil to crumble or to stick together, indicates whether it is easy or difficult to keep the soil open and porous under cultivation.

Other characteristics observed in the course of the field study and considered in classifying the soil include the following: The depth of the soil over bedrock or compact layers; the presence of gravel or stones in amounts that will interfere with cultivation; the steepness and pattern of slopes; the degree of erosion; the nature of the underlying parent material from which the soil has developed; and the acidity or alkalinity of the soil as measured by chemical tests.

CLASSIFICATION.—On the basis of the characteristics observed by the survey team or determined by laboratory tests, soils are classified into soil series, types, and phases. The soil type is the basic classification unit. A soil type may consist of several phases. Types that resemble each other in important characteristics are grouped into soil series.

As an example of soil classification, consider the Dubuque series of Richland County. This series is made up of 3 soil types and 10 phases. Each phase is a mapping unit that is shown on the map by a symbol and is described in this report. The types and phases in the Dubuque series in Richland County are:

Series	*Type*	*Phase*
Dubuque	Silt loam	Gently sloping, eroded.
		Sloping, eroded.
		Steep, eroded.
		Deep, gently sloping, eroded.
		Deep, sloping, eroded.
		Deep, steep, eroded.
	Silty clay loam	Steep, severely eroded.
	Stony silt loam	Sloping, eroded.
		Steep, eroded.
		Very steep, eroded.

Soil series.—Soils similar in kind, thickness, and arrangement of soil layers are normally designated as a soil series. In a given area, however, it frequently happens that a soil series is represented by only one soil type. Each series is named for the place near which it was first mapped. For example, the Dubuque series is named for Dubuque, Iowa, because the soils of that series were first mapped near Dubuque.

Soil type.—Soils similar in kind, thickness, and arrangement of soil layers are classified as one soil type. The texture of the surface soil determines the number of soil types in a series. Thus, Dubuque silt loam, Dubuque silty clay loam, and Dubuque stony silt loam are all soil types within the Dubuque series.

Soil phase.—Variations within the soil type, generally based on such external characteristics as relief, stoniness, erosion, or depth of surface soil, are designated as soil phases. Judson silt loam, gently sloping, and Judson silt loam, sloping, are examples of phases based on differences in relief.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. Use and management practices therefore can be specified for it more easily than for a soil series or for broader groups that contain more variations.

Miscellaneous land types.—These are areas of land that have little or no true soil, that are too inaccessible to be surveyed, or that for other reasons cannot feasibly be classified and mapped in detail. Riverwash is a miscellaneous land type mapped in Richland County.

Soil Associations

The map of soil associations at the back of this report shows the general patterns of the soils in Richland County. This map is helpful in studying the soils of the county in general or in broad program planning. It is not sufficiently detailed to be useful in studying the soils of a farm. Each association contains several different soils arranged in a characteristic pattern. In most places the pattern is related to the nature of the soil materials and to the shape of the land surface.

The four associations in Richland County are discussed briefly in the following pages.

1. Soils of the Upland Ridges

This soil association is made up of silty soils that occur on the ridgetops. The largest areas are in the northwestern part of the county. The Dubuque, Fayette, and Downs soils are the principal constituents. They have formed primarily from loess that overlies reddish clay.

The clay was derived from weathered limestone, and, in many places, contains numerous fragments of chert.

The Dubuque and Fayette soils have formed under a hardwood forest. The Dubuque soils have formed on silty loess, 18 to 42 inches deep, that overlies residual clay and limestone. The Fayette soils have formed on deep silty loess. The soils of these two series differ mainly in the depth to clay.

The Downs soils have developed under a mixed cover of prairie grasses and forest. As a result they have a darker surface soil than the Fayette soils, although they are similar to the Fayette soils in texture and in parent material.

2. Soils of the Valley Slopes

This soil association consists mainly of Stony land, Norden, and Hixton soils. Other important soils that are included belong to the Boone, Chaseburg, Judson, and Fayette series.

The areas of Stony land are hilly and steep. They are too stony for cultivation, and sandstone or limestone bedrock outcrops in many places. Most of these areas occur on the steeper parts of the valley slopes, particularly along the bluffs near the Wisconsin River.

The Norden, Boone, and Hixton soils have developed from the underlying parent rock. The Norden soils have developed from greenish glauconite. They contain more fine-textured material than the Boone and Hixton soils. In the Norden soils the texture of the surface layer ranges from silt loam to fine sandy loam, and that of the subsoil, from fine sandy loam to light silty clay loam. The sandstone bedrock appears to store more moisture for plants than the highly siliceous sandstone that underlies the Boone and Hixton soils.

The Boone soils consist mainly of loose fine sand that overlies sandstone. The Hixton soils also overlie sandstone, but, in contrast to the Boone soils, they have some loam and fine sandy loam in the profile.

The Fayette soils in this association have formed on valley slopes. They are similar to the Fayette soils of the uplands, but boulders occur in many places within the profile.

The Chaseburg and Judson soils have developed from colluvial materials washed or sloughed from higher lying soils. These soils occur at the bases of steep slopes and along the small valley draws. The Chaseburg soils, developed under forest, are light colored. The Judson have developed under grass and therefore have a dark surface layer.

3. Soils of the Terraces

This soil association is made up largely of Meridian, Sparta, and Plainfield soils. Other important soils belong to the Rockbridge, Medary, Downs, Bertrand, Tell, Jackson, Curran, Dakota, and Gotham series.

The Meridian and Dakota soils have developed from coarser textured materials than the Downs, Tell, and Bertrand soils. In these soils the texture in the upper part of the profile is loam or fine sandy loam and loose fine sand occurs at depths between 24 and 36 inches. The Meridian and Dakota soils have a moderately well developed B horizon. The Meridian soils have developed under forest and therefore are light colored. The Dakota soils have developed under prairie grasses and are dark colored.

The Sparta, Gotham, and Plainfield series are made up of sandy outwash soils that occur near the Wisconsin River and other large streams. The Sparta soils have developed under prairie vegetation. Their surface layer is darker colored than that of the Gotham and Plainfield soils. The Sparta and Plainfield soils consist largely of loose fine sandy material, and they have no structural or textural B horizon. The Gotham soil has a poorly defined B horizon.

The Rockbridge soils have developed on old high rocky terraces in the upper valleys. They have a silty surface layer that overlies weakly stratified cherty gravel.

The Medary soil is the only lacustrine soil in the county. It has developed on old calcareous reddish clay. Its surface layer and subsurface layer are light colored and silty and are similar to the surface layer of the Bertrand and Tell silt loams. In many places lime concretions occur at depths between 26 and 42 inches.

The Downs and Tell soils of this association occur on moderately level terraces. They have developed from silty materials. The Downs soils have a dark surface layer because they have developed under prairie-forest vegetation. In contrast, the Bertrand soils, although similar to the Downs in texture, are light colored because they have developed under forest. The Tell soil is shallower than the Bertrand soils but resembles them in other ways. In the Tell soil, sand occurs at depths between 24 and 36 inches. The Jackson and Curran soils, which lie next to the Bertrand soils, differ from the Bertrand soils in having slower internal drainage.

4. Soils of the Stream Bottoms

This soil association is made up of soils and miscellaneous land types that occur on stream bottoms. Alluvial land is the most important miscellaneous land type in the association, but some Riverwash occurs. Important soils are the Boaz, Ettrick, Lawson, Arenzville, and Orion.

The soils of this association vary considerably. Along the smaller streams, the soils occur in narrow strips and are forming from mixed parent materials. It was not possible to map them separately on the map of the scale used, because the soils were so variable. They were therefore mapped as soil complexes or as miscellaneous land types.

Along the larger streams, the Boaz and Ettrick soils occupy the higher positions and are seldom flooded. The Boaz soil is imperfectly drained, and the Ettrick soil is poorly drained. The Boaz soil is a little lighter colored than the Ettrick.

The Lawson and Arenzville soils are moderately well drained to well drained. The Lawson is a dark-colored soil of the bottom lands. The Orion soil is imperfectly drained. The Arenzville and Orion soils are not quite so dark as the Lawson soil.

A few areas of Carlisle muck occur along the streams. They lie next to areas occupied by the Alluvial lands.

Soil Descriptions

The soils of Richland County are described in detail in the following pages, and their use and suitability for agriculture are discussed. The approximate acreage and

proportionate extent are given in table 5. The location and distribution of the soils are shown on the soil map at the back of this report.

TABLE 5.—*Approximate acreage and proportionate extent of the soils mapped*

Soil	Area	Extent
	Acres	*Percent*
Akan silt loam	832	0. 2
Alluvial land:		
Moderately well drained	9, 152	2. 4
Poorly drained	9, 743	2. 6
Arenzville silt loam	2, 017	. 5
Bertrand silt loam:		
Level to gently sloping	2, 356	. 6
Level to gently sloping, eroded	641	. 2
Sloping, eroded	1, 200	. 3
Boaz silt loam	7, 283	2. 0
Boone loamy fine sand:		
Sloping, eroded	220	. 1
Steep, eroded	168	(1)
Steep, severely eroded	42	(1)
Carlisle muck	1, 292	. 3
Chaseburg silt loam:		
Gently sloping	5, 287	1. 4
Sloping	1, 762	. 5
Chaseburg fine sandy loam:		
Gently sloping	1, 738	. 5
Sloping	712	. 2
Curran silt loam	2, 136	. 6
Dakota loam	377	. 1
Dakota fine sandy loam	895	. 2
Downs silt loam:		
Gently sloping	1, 296	. 3
Gently sloping, eroded	1, 211	. 3
Sloping, eroded	1, 641	. 4
Sloping, severely eroded	350	. 1
Dubuque silt loam:		
Deep, gently sloping, eroded	2, 597	. 7
Deep, sloping, eroded	33, 300	9. 0
Deep, steep, eroded	6, 141	1. 6
Gently sloping, eroded	1, 927	. 5
Sloping, eroded	31, 790	8. 5
Steep, eroded	24, 500	6. 5
Dubuque silty clay loam, steep, severely eroded	6, 147	1. 6
Dubuque stony silt loam:		
Sloping, eroded	835	. 2
Steep, eroded	8, 438	2. 3
Very steep, eroded	1, 500	. 4
Ettrick silt loam	4, 294	1. 1
Fayette silt loam:		
Uplands, gently sloping, eroded	2, 179	. 6
Uplands, sloping, eroded	10, 903	3. 0
Uplands, steep, eroded	1, 364	. 4
Valleys, sloping, eroded	5, 088	1. 4
Valleys, steep, eroded	25, 415	7. 0
Gotham loamy fine sand	1, 287	. 3
Hixton loam:		
Sloping, eroded	104	(1)
Steep, eroded	1, 627	. 4
Hixton fine sandy loam:		
Sloping, eroded	1, 210	. 3
Steep, moderately eroded	5, 776	1. 5
Very steep, eroded	6, 249	1. 7
Jackson silt loam	1, 895	. 5
Judson silt loam:		
Gently sloping	1, 594	. 4
Sloping	409	. 1
Lawson silt loam	1, 557	. 4
Medary silt loam	175	(1)
Meridian fine sandy loam:		
Nearly level	4, 255	1. 1
Sloping, eroded	773	. 2
Steep, eroded	124	(1)
Norden silt loam:		
Sloping, eroded	6, 766	2. 0
Steep, eroded	14, 677	4. 0
Norden loam:		
Sloping, eroded	529	. 1
Steep, eroded	19, 378	5. 2
Very steep, eroded	2, 778	. 7
Norden fine sandy loam:		
Sloping, eroded	993	. 3
Steep, eroded	9, 134	2. 4
Very steep, eroded	2, 386	. 6
Orion silt loam	1, 265	. 3
Plainfield loamy fine sand:		
Nearly level, eroded	823	. 2
Sloping, eroded	1, 250	. 3
Steep, eroded	159	(1)
Riverwash	570	. 2
Rockbridge silt loam:		
Sloping, eroded	172	(1)
Steep, eroded	200	. 1
Sparta loamy fine sand	1, 869	. 5
Sparta fine sand:		
Hummocky	997	. 3
Hummocky, eroded	1, 937	. 5
Stony land:		
Steep	716	. 2
Very steep	59, 000	16. 0
Tell silt loam	2, 357	. 6
Total	373, 760	100. 0

[1] Less than 0.1 percent.

Akan silt loam (Aa).—This bottom-land soil has bluish silty clay in the lower part of the profile. The silty clay appears to have been deposited behind old beaver dams or in shallow ponds. Most of this soil is in the central and northern parts of the county, especially along Fancy Creek and near Loyd. It generally occurs between the higher areas near the streambanks, or natural levees, and the uplands or terraces. Relief is level to gently sloping. The soil is similar in drainage and occupies the same positions as Boaz silt loam, but it is flooded intermittently, whereas the Boaz soil is flooded only occasionally. The soil has developed under a cover of water-tolerant trees.

Profile near the center of section 27 in Willow Township:

- A 0 to 12 inches, dark-gray, friable, granular silt loam; reddish-brown mottles in lower part; somewhat platy structure in places; pH 6.5.
- B_g 12 to 26 inches, gray, firm, silty clay loam, highly mottled with yellowish red; weak blocky structure; somewhat lower content of organic matter than A horizon; pH 5.5 to 6.0.
- C_g 26 inches+, gray, with a bluish cast, massive silty clay that becomes sandier with depth; contains stems of marsh grasses; pH 7.3.

In a few places, where this soil lies next to Ettrick silt loam or Carlisle muck, the surface layer is somewhat darker than that of the typical soil and the internal drainage is somewhat slower. These areas require more intensive practices to improve drainage than the typical soil.

Akan silt loam has slow internal drainage and a high moisture-supplying capacity. A few small areas of dark-

colored, imperfectly drained soils have been mapped with this soil because they were too small to be mapped separately.

Use and suitability (management group 3D).—Areas of Akan silt loam that have been drained are used for pasture, corn, oats, and hay. The crops produce moderate to good yields.

Alluvial land, moderately well drained (Ab).—This miscellaneous land type generally occurs along the smaller drainageways and on higher lying areas that are free of seepage. The areas are level to gently sloping.

The surface layer is dark grayish-brown to dark-brown friable silt loam or loam. The subsoil is grayish-brown friable fine sandy loam or silt loam, mottled with yellowish-brown. In the broader stream valleys, the subsoil is underlain in many places by stratified sands and silts.

Included in this mapping unit are small areas of Akan, Arenzville, Boaz, Ettrick, and Orion soils. These are too small to be shown separately on a map of the scale used.

Use and suitability (management group 3D).—Flooding is a hazard on Alluvial land, moderately well drained. Nevertheless, if areas are large enough to be cropped or pastured, moderately good yields of corn, oats, and hay are obtained, and pasture is moderately good.

Alluvial land, poorly drained (Ac).—This miscellaneous land type generally occurs in the valleys along the Wisconsin River and the smaller streams. It receives seepage from higher lying areas and is also frequently flooded. The areas are nearly level, and slopes do not exceed 2 percent.

The surface layer is dark-gray friable silt loam or loam. The subsoil is gray to dark-gray mottled friable fine sandy loam or silt loam. The underlying material is alluvium derived from various kinds of parent material.

Use and suitability (management group 3F).—If drained, this land type is moderately productive, but artificial drainage is generally not feasible. The areas are best kept in forest or grass to prevent streambank erosion. Under forest or grass, they will provide refuges for wildlife, and the larger areas can be used to pasture cattle.

Arenzville silt loam (Ad).—This moderately well drained to well drained alluvial soil occurs along the larger streams. It is level to gently sloping.

Profile description:

A 0 to 10 inches, dark-gray friable silt loam; moderate granular structure; contains many roots and worm casts; pH 7.0.
10 to 30 inches, dark grayish-brown to brown silt loam; in places contains thin seams of very fine sandy loam; friable when moist, soft when dry; granular structure; pH 7.0.
30 inches+, dark grayish-brown and pale-brown stratified silt and very fine sand; pH 7.0.

The layer that in most places occurs at depths below 30 inches is the dark-colored surface soil of an old buried soil.

The profile varies considerably in thickness and in the amount of fine sand in the lower part. The soil has a high moisture-holding capacity and is high in fertility.

Use and suitability (management group 1A).—This soil is well suited to corn, oats, hay, and pasture. Yields are good if the crops are not damaged by the floods that often cover the area for a short time in the spring. Crops on this soil respond well to complete fertilizer, but even better yields can be obtained if supplemental applications of nitrogen are added. Lime is generally not needed.

Bertrand silt loam, level to gently sloping (Ba).—This well-drained, deep, silty soil occurs on terraces along stream valleys. The terraces are higher than those on which the Meridian and Dakota soils have developed but are at about the same level as the Downs silt loams that occur on terraces. The largest areas are in the southern part of the county along the Wisconsin River near Orion and along the southern part of Pine River. This soil occupies slopes of up to 6 percent, but most of it is on slopes of less than 3 percent. This soil has a lighter colored surface soil than the Downs silt loams. It is similar to Fayette silt loam, uplands, gently sloping, eroded, especially in the A and B horizons.

Profile description:

A 0 to 8 inches, light brownish-gray friable silt loam; moderate coarse granular structure; contains numerous roots and worm casts; pH 6.7.
8 to 13 inches, very pale brown friable silt loam; medium platy structure; contains some roots and numerous worm casts; pH 6.0.
B 13 to 32 inches, yellowish-brown light silty clay loam; moderate medium subangular blocky structure; contains some roots; pH 6.0.
C 32 inches+, dark yellowish-brown friable heavy silt loam; massive to irregular coarse blocky structure; pH 5.S.

This soil is moderately fertile. It has a high moisture-supplying capacity.

Use and suitability (management group 1A).—This soil is well suited to corn, oats, hay, tobacco (fig. 6), and pasture. There is a slight erosion hazard. Nevertheless, under good management the soil can be used intensively and crops will make moderate to high yields. The soil responds well to applications of complete fertilizer. Where the pH is below 6.5, enough lime should be added to raise the pH to 6.5 or 7.0 for best crop yields.

Bertrand silt loam, level to gently sloping, eroded (Bb).—Except that it is more eroded, this soil is similar to Bertrand silt loam, level to gently sloping. It has lost from one-fourth to three-fourths of its original surface soil through erosion.

Use and suitability (management group 2A).—Because of the loss of surface soil through erosion and the corresponding loss of organic matter and plant nutrients, lower crop yields are obtained on this soil than on Bertrand silt loam, level to gently sloping. This soil must be managed

Figure 6.—**Tobacco grown on Bertrand silt loam along Mill Creek south of Boaz.**

carefully. It needs large amounts of commercial fertilizer and manure. If well managed its productivity may be restored.

Bertrand silt loam, sloping, eroded (Bc).—This soil occupies slopes of 7 to 15 percent. Most of it is near drainageways or escarpments where the terraces have been cut by geologic erosion. Except that it has lost part of its surface layer and occupies stronger slopes, the profile of this soil is similar to that of Bertrand silt loam, level to gently sloping. The erosion hazard is higher on this soil than on the less sloping Bertrand soil. Most of the soil has lost between one-fourth and three-fourths of the original surface layer through erosion, but some included areas are only slightly eroded and some are severely eroded.

Use and suitability (management group 3A).—This soil is similar to Bertrand silt loam, level to gently sloping, in need for plant nutrients. Management practices that will help to hold organic matter in the soil and prevent further erosion should be used intensively. The soil occurs in positions that are not well suited to stripcropping and terracing. In places, however, terrace diversions to help control runoff can be used to advantage.

Boaz silt loam (Bd).—This soil occurs on high bottoms. Its parent materials were recent silty sediments from the nearby uplands and material from weathered limestone and sandstone.

Profile observed in the southeastern corner of section 33 in Willow Township:

A 0 to 12 inches, very dark gray friable silt loam slightly mottled in the lower part; granular structure; pH 7.0.

B 12 to 30 inches, dark-gray to gray firm silt loam, mottled with dark yellowish brown and yellowish red; weak subangular blocky structure; contains several roots and worm casts; pH 6.5.

C_g 30 inches +, gray and yellowish-red, firm silty clay that is highly mottled but becomes less mottled with depth; in places gray silty clay extends to depths of 42 to 60 inches; pH 6.5.

The depth to the underlying material varies in this soil. Drainage through the profile is slow, and the soil has a high moisture-supplying capacity. This soil is subject to flooding when the water is extremely high. It is moderately fertile.

Use and suitability (management group 2D).—If drainage is provided and other good management practiced, crops on this soil will produce medium to high yields. Tile can be used satisfactorily to improve drainage. The drained areas are well suited to corn, oats, hay, and pasture. The undrained areas are used mainly for pasture. The crops need complete fertilizer. Crops such as oats and corn respond well to supplemental nitrogen, especially if it is used in spring. Lime is generally not needed on this soil.

Boone loamy fine sand, sloping, eroded (Be).—This soil occupies slopes of 1 to 15 percent, but most of it is on slopes of 6 to 15 percent. The areas in the highest uplands in the northern part of the county have developed from St. Peter sandstone. The areas on valley slopes throughout the county have developed from Cambrian sandstones. This soil generally occupies small isolated areas that are surrounded by better agricultural soils. In many places in the highest uplands, it occurs as sandy spots within fields in which Dubuque or Fayette soils occur and is farmed with those soils. This soil has lost more than one-fourth of the original surface layer through erosion.

Profile description:

A 0 to 6 inches, grayish-brown, loose, loamy fine sand; the uppermost 1 to 1½ inches in wooded areas is dark brown to very dark gray; very weak crumb structure; pH 6.4.

B 6 to 14 inches, reddish-yellow fine sand; single grain; contains some roots; somewhat compact in places; pH 6.8.

C 14 to 30 inches, very pale brown fine sand; single grain; gradual transition to broken sandstone that occurs at depths of 30 inches; pH 6.0.

Surface runoff and internal drainage are both very rapid. Therefore, the moisture-holding capacity is low. The soil has low natural fertility. Wind erosion is a serious hazard.

Use and suitability (management group 6B).—This soil needs good management. It will benefit from such practices as using heavy applications of barnyard manure, applying commercial fertilizer, and plowing under crops for green manure. It can be protected from wind erosion by keeping the areas in forage crops as much of the time as feasible. The larger areas are best suited to pasture or forest.

Boone loamy fine sand, steep, eroded (Bg).—This soil occurs on valley slopes that range from 16 to more than 30 percent. It has developed almost entirely from fine-grained Cambrian sandstone. Except that it has developed from a finer grained parent material, this soil is similar to Boone loamy fine sand, sloping, eroded.

The surface layer is 4 to 6 inches thick. It is underlain by pale-brown loose fine sand that varies greatly in depth to bedrock.

Use and suitability (management group 6B).—This soil is best suited to trees. If carefully managed, the less sloping areas can be used for pasture. Liberal applications of nitrogen and some phosphate and potash are needed to maintain a good sod. Grazing must be controlled to prevent serious damage to the sod and subsequent erosion.

Boone loamy fine sand, steep, severely eroded (Bh).—Except that most of the surface soil has been removed by erosion and sandstone bedrock occurs at correspondingly shallower depths, this soil is similar to Boone loamy fine sand, steep, eroded.

Use and suitability (management group 6B).—This soil is not suited to crops or pasture. Its best use is for growing trees. Conifers, particularly red and white pines, will grow well. Wooded areas must be protected from burning and from grazing by livestock.

Carlisle muck (Ca).—Carlisle muck has developed from mixed woody and grassy or sedgy organic material under very wet or ponded conditions. Most of it occurs in seepage positions or on stream bottoms that have been dammed up at some time. It is fluffy and light.

Profile observed in the center of section 22, Willow Township:

O_1 0 to 12 inches, black, friable well-decomposed organic material; in many areas contains some mineral material; pH 6.0.

O_2 12 to 36 inches, black organic material that is not quite so well decomposed as that in the O_1 horizon, but none of the plant remains can be definitely identified; pH 6.0.

O_3 36 inches +, black to very dark brown muck; in places contains thin strata of very fine sand; some organic material can be identified, especially in the lower part of this horizon.

Use and suitability (management group 3F).—This soil, if drained, is well suited to corn, oats, and forage crops,

but in many of the areas it is difficult to provide adequate drainage. Under good management the soil can be used intensively for cultivated crops. It produces moderate yields. If high yields are to be obtained, supplemental applications of potash and phosphate are needed. The crops also benefit if nitrogen is added, especially if it is applied during the cool weather in spring. Lime generally is not needed for most crops.

Chaseburg silt loam, gently sloping (Cd).—This soil occurs at the heads of narrow draws and along the foot slopes of the steeper hills. It occupies slopes of 1 to 15 percent, but most of it is on slopes of 1 to 6 percent. This soil is widely distributed, but the areas are generally small. It has formed from silt deposited as the result of soil creep and water action. The horizons are not well developed.

Profile description:

A 0 to 12 inches, grayish-brown friable silt loam; granular structure; contains numerous roots and worm casts; pH 6.0.

B 12 to 34 inches, yellowish-brown to light yellowish-brown friable silt loam; contains somewhat more clay than the A horizon; weak blocky structure; some gray and yellowish-brown mottlings in the lower part of this horizon; pH 5.8.

C 34 inches +, brown silt loam, slightly mottled with yellowish brown; massive to weak coarse blocky structure; pH 5.5.

In some places stones are scattered on the surface and throughout the profile. In other areas sandy pockets or sand lenses are common.

This soil has a high moisture-supplying capacity and moderate fertility. The erosion hazard is slight.

Use and suitability (management group 1A).—This soil is easy to manage and cultivate. It is well suited to all the crops commonly grown in this area. Nitrogen is needed for corn, and lime is generally needed for the best growth of legumes.

Chaseburg silt loam, sloping (Ce).—This soil occurs on slopes of 7 to 15 percent, but most of it is on slopes of 7 to 10 percent. Except that it has a thinner surface soil and steeper slopes, it is similar to Chaseburg silt loam, gently sloping. In places, up to a fourth of the surface soil has been removed by erosion.

Use and suitability (management group 3A).—This soil will require more careful management than Chaseburg silt loam, gently sloping, because of the somewhat greater loss of water by runoff and the greater erosion hazard. The longer slopes should be terraced and stripcropped. If the areas are too small for such practices, more fertilizer and manure will be needed to restore productivity. This soil is suited to the same crops as Chaseburg silt loam, gently sloping. It is more erodible, however, so the crop rotation should include more forage crops.

Chaseburg fine sandy loam, gently sloping (Cb).—This soil occupies slopes of 1 to 6 percent. Part of its parent material came from the associated Boone, Hixton, and Norden soils, which were derived from sandstone. The small areas of this soil occur throughout the county.

This soil has a sandier surface layer than Chaseburg silt loam, gently sloping, and the surface layer contains less organic matter. Also, in most places, the B horizon is loam instead of silt loam. In addition this soil contains a greater number of stones, boulders, and sand pockets. The stony and sandy areas are indicated on the soil map by symbols.

Use and suitability (management group 2A).—This soil is well suited to forest and pasture, but it may be used for corn, oats, tobacco, and hay. The areas that are cropped generally lie next to or within larger areas of other soils used for cropping and are managed in the same way as the adjacent soils. For high yields, a good supply of plant nutrients must be kept in the soil.

Chaseburg fine sandy loam, sloping (Cc).—This soil occurs on slopes of 7 or more percent. Except that it occupies steeper slopes and has a thinner profile, it is similar to Chaseburg fine sandy loam, gently sloping. The depth to the underlying material is between 22 and 28 inches. The B horizon is not well developed. Boulders and stones are common on the surface and throughout the profile. In some places on the upper slopes, there is a thin surface layer of fine sand. The stony and sandy areas of this soil are indicated on the soil map by symbols.

Use and suitability (management group 3B).—This soil is best suited to forest and pasture. The areas that have the strongest slopes and the areas that lie next to steeper soils should be kept in forest. It may be feasible to grow forage crops on the less sloping areas or on areas that adjoin other agricultural soils. Pastures on this soil respond well to renovation. Crops benefit from applications of complete fertilizer.

Curran silt loam (Cg).—This soil occurs on terraces in association with the Bertrand and Jackson soils. It is imperfectly drained, whereas the Bertrand soils are well drained and the Jackson soil is moderately well drained.

Profile observed in the southwestern part of section 36 in Ithaca Township:

A 0 to 7 inches, dark-gray, friable silt loam; medium granular structure; contains some fine roots and several worm casts; pH 6.3.

7 to 16 inches, light brownish-gray to pale-brown very friable silt loam with reddish-brown, gray, or light-gray mottles in the lower part; weak thin platy structure; pH 6.0.

B 16 to 34 inches, dark-brown to brown firm silty clay loam, highly mottled with gray and reddish brown; weak medium subangular blocky structure; contains some root channels; pH 5.5.

C_g 34 inches +, yellowish-brown light silty clay loam that becomes more friable with depth; highly mottled with light gray; massive to weak coarse blocky structure; material is underlain by stratified fine sand and silt at various depths below 42 inches; pH 5.8.

Water drains slowly through the profile, and the soil has a high moisture-supplying capacity. It is moderately fertile. The erosion hazard is slight.

Use and suitability (management group 3E).—When drained, this soil produces good yields of corn, oats, and hay. It is not suited to alfalfa unless drainage is improved. Crops such as corn and oats respond well to nitrogen fertilizer, especially if it is applied in early spring. Lime is needed in most areas to get a good growth of legumes.

Dakota loam (Db).—This well-drained soil occurs in the southern part of Richland County. Most of it is on slopes of 2 percent or less, but a few small areas are on slopes of as much as 15 percent. The soil occurs on stream terraces that generally are slightly lower than those occupied by the siltier Bertrand soils. It has developed from medium-textured material that overlies sandy outwash. The surface layer is dark colored because the soil was formed under prairie grasses.

Profile description:

A 0 to 8 inches, very dark brown, friable loam; fine granular structure; contains many plant roots; pH 7.0.
B 8 to 18 inches, dark yellowish-brown, firm sandy clay loam; moderate medium subangular blocky structure; several plant roots; pH 5.5.
18 to 24 inches, dark-brown, friable loam; weak medium subangular blocky structure; several plant roots; pH 5.4.
C 24 inches +, yellowish-brown, loose fine sand, the color grading to yellow with depth; single grain; iron stains and thin layers of slightly coherent sands occur at depths below 3 feet; pH 5.5.

Drainage is moderately rapid through the profile, and the soil has a moderate moisture-supplying capacity. Natural fertility is moderately high. Erosion is generally not a serious hazard.

Use and suitability (management group 2C).—This soil is well suited to all the crops commonly grown in this county (fig. 7). If a good supply of plant nutrients and organic matter is kept in the soil, good to excellent yields are obtained.

Figure 7.—**Corn growing on Dakota loam near the bluffs of the Wisconsin River north of Lone Rock.**

Dakota fine sandy loam (Da).—This soil occurs on terraces of the larger streams between areas of Sparta soils and the nearby uplands. Except that it has a coarser textured surface soil and a B horizon that is not so well developed, this soil is similar to Dakota loam. The two soils occupy similar positions.

Profile description:

A 0 to 8 inches, very dark gray, very friable fine sandy loam; weak fine granular structure; contains numerous roots; pH 6.8.
8 to 14 inches, dark-gray, very friable light fine sandy loam; weak granular structure; numerous roots; pH 5.8.
B 14 to 26 inches, dark grayish-brown, friable fine sandy loam; weak medium subangular blocky structure; contains several roots; pH 5.3.
26 to 32 inches, yellowish-brown, friable loamy fine sand; slightly compact in place; pH 5.5.
C 32 inches +, light yellowish-brown, loose, stratified fine sand; in many places contains thin layers of more coherent material; single grain; pH 6.0.

Drainage is rapid through the profile, and the soil has a moderately low moisture-supplying capacity. Fertility is moderate. The erosion hazard is not high, but some damage is caused by wind.

Use and suitability (management group 3C).—This soil is well suited to corn, oats, hay, and pasture. Corn and hay, however, are often damaged by lack of water during extended dry spells. Good management is needed to maintain the fertility and the content of organic matter. The soil also needs protection from damaging winds.

Downs silt loam, gently sloping (Dc).—This soil has formed from deep silty material. It occupies slopes of 1 to 6 percent, but most of it is on slopes of less than 3 percent. It is transitional between the light-colored timber soils and the dark-colored prairie soils. The Downs soils were formed under prairie vegetation that has since been invaded by trees. The properties typical of soils formed under trees are notably expressed in the Downs soils, but some properties of prairie soils are still evident. Some of this soil lies next to Bertrand soils. In these areas the surface soil is lighter colored and the soil closely resembles the Bertrand soils.

Profile in the northeastern corner of the southwest quarter of section 28, Eagle Township:

A 0 to 10 inches, very dark gray friable silt loam; moderate granular structure; numerous roots and worm channels; pH 6.4.
A_2 10 to 16 inches, grayish-brown friable silt loam; weak platy structure; some roots and worm channels; pH 6.0.
B 16 to 34 inches, dark yellowish-brown friable light silty clay loam; moderate medium angular blocky structure; some roots and worm channels; pH 5.6.
C 34 inches +, brown friable silt loam, slightly mottled below 40 inches with reddish yellow; massive to weak blocky structure; underlain by sandstone or limestone bedrock at depths greater than 42 inches.

This soil has a high moisture-supplying capacity, and its natural fertility is high. The erosion hazard is slight to moderate.

Use and suitability (management group 1B).—Most of this soil is cultivated. It is well suited to tobacco, corn, small grains, and forage crops. If high fertility is maintained, excellent yields are obtained. Yields can be increased by applying lime and fertilizer. Corn yields can be increased still further if nitrogen is added as a side dressing. Erosion control is needed on many areas.

Downs silt loam, gently sloping, eroded (Dd).—This soil occupies slopes of 1 to 6 percent, but most of it is on slopes of 3 to 5 percent. It occurs mainly in the northwestern part of the county. This soil has formed in silt under prairie vegetation that has since been invaded by trees. It occurs on the broader ridges next to or near the Fayette and deep Dubuque soils. In places it grades gradually to the Fayette silt loams and closely resembles those soils. More than one-fourth of the original surface soil has been lost through erosion.

This soil has a high moisture-supplying capacity. Its natural fertility is moderate to high. The erosion hazard is moderate.

A few small areas are included that have lost nearly all of their surface soil.

Use and suitability (management group 2B).—Downs silt loam, gently sloping, eroded, is well suited to corn, small grains, hay, and pasture. Under good management good to excellent yields are obtained. Stripcropping and terracing will help to prevent further erosion.

Downs silt loam, sloping, eroded (De).—This soil occupies slopes of 7 to 30 percent, but most of it is on slopes of 7 to 15 percent. Except that this soil is steeper and shal-

lower over bedrock, it is similar to Downs silt loam, gently sloping.

The very dark gray to grayish brown surface soil and subsurface layer are friable silt loam, 12 to 14 inches thick. The B horizon is dark yellowish-brown friable silty clay loam, 30 inches thick. Depth to the underlying sandstone or limestone varies more than in Downs silt loam, gently sloping, eroded, but in most places it is more than 36 inches. More than one-fourth of the original surface soil has been lost through erosion.

This soil has a high moisture-supplying capacity and high fertility. The erosion hazard is severe.

Included with this soil are a few areas that are severely eroded. In these areas the surface layer is lighter colored than that of the typical soil.

Use and suitability (management group 3A).—Downs silt loam, sloping, eroded, is suited to corn, oats, hay, and pasture. If fertility is maintained and erosion is controlled, yields are good. Care is needed to prevent further damage from erosion. Terraces and stripcropping can be used on the longer slopes. The rotations should include more close-growing crops, or sod should be kept on the soil for longer periods than is necessary for Downs silt loam, gently sloping, eroded. The severely eroded areas need more careful management than the less eroded ones. Larger amounts of commercial fertilizer and manure will be needed than on the less eroded soil.

Downs silt loam, sloping, severely eroded (Dg).—Except that most of the surface soil has been removed by water erosion, this soil is similar to Downs silt loam, sloping, eroded. Shallow gullies have formed, and in places patches of the brownish subsoil are visible.

Use and suitability (management group 4B).—This soil is well suited to corn, oats, hay, and pasture. If fertility is maintained and erosion is controlled, crops yield well. Heavy applications of fertilizer and manure will be needed, however, to restore the productivity of this soil. Special care is also needed to protect the soil from further erosion.

Dubuque silt loam, deep, gently sloping, eroded (Dn).—This is well-drained, silty soil. It occurs on the broader ridgetops in association with the Fayette soils. It has slopes of 1 to 6 percent.

This soil has developed in a blanket of silt, 18 to 42 inches thick, that is believed to have originated in the Mississippi River bottoms. It was blown to the uplands by winds, probably during or just after the last glacial period. The reddish clay in the lower part of the profile weathered from the limestone bedrock. This clay varies considerably in thickness and in most places contains chert fragments. More than one-fourth of the original surface layer has been lost through erosion.

Profile observed in section 34 in Ithaca Township:

A 0 to 7 inches, light yellowish-brown, friable, granular silt loam; platy structure if not disturbed; contains numerous roots and worm casts; in wooded areas the upper 2 to 3 inches is dark gray, but the color grades to light yellowish brown; pH 6.0.

B 7 to 28 inches, yellowish-brown to dark yellowish-brown friable silty clay loam; moderate subangular blocky structure; surface of the blocky peds [3] have a gray coating; pH 5.3.

D 28 inches+, reddish-brown to dark reddish-brown, massive, heavy clay; sticky when wet and hard when dry; contains numerous chert fragments; pH 5.0.

[3] Peds are structural aggregates, or lumps, of soil.

In the northeastern part of the county the substratum in some areas of this soil is red sandy clay that in places contains chert. These areas were once mapped as Viola silt loam but are now mapped with the Dubuque soils. In some of these areas, thin deposits of reddish sandstone overlie the limestone.

In places where the silt deposit is greater than 28 inches, there is a C horizon in the profile that is more friable than either the B or D horizon. In the D horizon, the thickness of the clay over limestone bedrock varies considerably. In some places the clay contains little or no chert.

Internal drainage is medium, and the soil has a high moisture-supplying capacity. The erosion hazard is slight to moderate.

Use and suitability (management group 2A).—Care must be taken to prevent further erosion of this soil. Although normally the soil has a good supply of moisture, during extended dry spells the heavy clay substratum cracks and allows water to percolate through it. This droughty condition is more serious in places where the silt deposits are thinner.

Crops such as corn and forage crops may fail during extended dry spells. Small grains, however, usually make good to excellent yields. Crops will benefit from applications of complete fertilizer and supplemental applications of nitrogen. Lime is needed for legumes.

Dubuque silt loam, deep, sloping, eroded (Do).—Except that this soil occurs on slopes of 7 to 15 percent and has a slightly lower content of organic matter, it is similar to Dubuque silt loam, deep, gently sloping, eroded. The erosion hazard is moderate.

Use and suitability (management group 3A).—This soil needs good management to maintain a good supply of plant nutrients and prevent further erosion. Terraces can be used on the longer slopes, but such areas must be carefully managed to prevent the terraces from breaking and the loss of additional soil. The shorter, steeper slopes are best used for permanent vegetation. If these short and steep areas are used for row crops, alternate strips of sod-forming crops should be grown.

Dubuque silt loam, deep, steep, eroded (Dp).—This soil occupies slopes of 16 to more than 30 percent. Most of it is in the northern part of the county. The 0- to 6-inch surface layer is light yellowish-brown friable silt loam. The subsoil is yellowish-brown friable silty clay loam. Reddish-brown clay is at depths between 18 and 40 inches. Erosion is a hazard on this soil. More than one-fourth of the original surface soil has been lost through erosion.

Use and suitability (management group 4A).—This soil is not suited to cultivation and is best kept in pasture or forest. Pastures must not be overgrazed. They can be improved greatly by renovating them. Applications of complete fertilizer and supplemental applications of nitrogen improve pasture yields. In the wooded areas, the more desirable kinds of trees should be encouraged and protected from fire.

Dubuque silt loam, gently sloping, eroded (Dh).—This soil is shallower over red clay than Dubuque silt loam, deep, gently sloping, eroded, and in many places the B horizon is heavier textured because some clay is mixed with the silty material. Also, this soil is more droughty. Most of it has lost from one-fourth to three-fourths of the original surface soil through erosion.

Profile description:

A 0 to 3 inches, dark-gray friable silt loam; weak fine granular structure; contains many earthworm casts and fine roots; pH 6.5.
3 to 11 inches, light brownish-gray very friable silt loam; weak thin platy structure; some roots and earthworm casts; pH 6.0.
B 11 to 17 inches, brown to yellowish-brown firm silty clay loam; moderate medium subangular blocky structure; peds have some gray coatings; pH 5.5.
D 17 to 72 inches, reddish-brown clay; sticky when wet, and hard when dry; moderate blocky structure in the upper part, but gradual transition to massive clay at a depth of 3 feet.
D_r 72 inches +, nearly white, hard dolomitic limestone bedrock.

Depth to clayey material ranges from 8 to 18 inches in this soil. The soil has a moderate moisture-supplying capacity. Its natural fertility is moderate. The erosion hazard is slight to moderate.

Included with this soil are a few small areas that are severely eroded and some areas that have little or no erosion.

Use and suitability (management group 2A).—It is important to manage this soil so as to prevent further erosion. The soil is too thin for terracing, but stripcropping, where practical, will help to protect the soil. Though droughty, the soil is otherwise well suited to small grains, corn, and forage crops. Corn and oats respond well to supplemental applications of nitrogen.

Dubuque silt loam, sloping, eroded (Dk).—This soil occurs on slopes of 7 to 15 percent. It is more eroded and a little less fertile than Dubuque silt loam, gently sloping, eroded.

The surface soil is light yellowish-brown friable silt loam. The subsoil is brown moderately plastic silty clay loam. Reddish-brown clay occurs at depths between 8 and 18 inches. Internal drainage is moderately rapid. Approximately 217 acres of this soil is severely eroded. In these areas from three-fourths to all of the original surface soil has been lost through erosion.

Use and suitability (management group 3A).—Dubuque silt loam, sloping, eroded, is suited to corn, oats, hay, and pasture. Crops are often damaged by drought. Adding barnyard manure and plowing under green-manure crops will help to increase the water-holding capacity. Crops on this soil respond well to applications of commercial fertilizer. The soil is too shallow for terracing, but stripcropping can be used to help prevent erosion.

Liberal applications of manure and commercial fertilizer will be needed to restore productivity in the severely eroded areas. Careful management will be needed to prevent further loss of soil.

Dubuque silt loam, steep, eroded (Dm).—This soil occurs on slopes of 16 to more than 30 percent. The steep slopes make it less desirable for cultivation than Dubuque silt loam, sloping, eroded.

The surface layer is light yellowish-brown friable silt loam. The subsoil is brown, moderately plastic, sticky silty clay loam. Reddish-brown cherty clay occurs at depths of 8 to 18 inches.

This soil has a low moisture-supplying capacity and is moderately fertile. The erosion hazard is severe.

Use and suitability (management group 4A).—This soil is best kept in permanent pasture or trees. During midsummer, pastured areas are often damaged by drought. If properly renovated, the pastures give good yields during spring and fall.

Dubuque silty clay loam, steep, severely eroded (Dr).—This soil occurs on slopes of 16 to more than 30 percent. More than three-fourths of the original surface soil has been removed by erosion. Tillage has mixed the reddish clayey subsoil with the remaining surface soil so that the present surface soil is finer textured and more reddish than that of the Dubuque silt loams. This soil occurs in small scattered areas on the ridgetops.

Profile description:

A 0 to 6 inches, reddish-brown to dark-brown firm silty clay loam; moderate fine subangular blocky structure; many plant roots and some earthworm casts; pH 6.0.
B 6 to 27 inches, reddish-brown clay; moderate angular blocky structure; hard when dry, and sticky when wet; surface of some of the blocky peds are gray coated; pH 5.5.
C 27 to 60 inches, reddish-brown clay; massive; sticky when wet, and hard when dry; many chert fragments; pH 5.5.
D 60 inches +, nearly white, hard dolomitic limestone bedrock.

This soil has a low moisture-supplying capacity. It is low in fertility. Runoff is very rapid, and the erosion hazard is high.

Use and suitability (management group 5A).—This soil is best used for permanent pasture or trees. The pastures need heavy applications of commercial fertilizer and manure and then should be seeded to a mixture of alfalfa and bromegrass. Overgrazing must be avoided and fertility maintained. The trees in wooded areas will need selective cutting and protection from fires and grazing.

Dubuque stony silt loam, sloping, eroded (Ds).—This soil occurs on slopes of up to 15 percent, but most of it is on slopes of 6 to 15 percent. It generally occurs on narrow ridges where the original silt deposit was thinner than normal or where erosion has been moderate to severe. Many stones are on the surface and throughout the profile.

The surface soil is light yellowish-brown friable stony silt loam. The subsoil is brown cherty silty clay loam. The substratum is reddish-brown clay similar to that of other soils in the Dubuque series.

This soil is moderate to low in fertility. The erosion hazard is moderate.

Use and suitability (management group 5A).—Stones make this soil unsuited to cultivation. It is best used for permanent pasture or trees. Pastures should not be overgrazed, and wooded areas need protection from grazing or fires. Selective cutting is a good practice in the wooded areas.

Dubuque stony silt loam, steep, eroded (Dt).—This soil occurs on slopes of 16 to 30 percent. Except that it is stonier and has a shallower profile, it is similar to Dubuque stony silt loam, sloping, eroded. The soil occupies large areas and is associated with other Dubuque stony silt loams and with Stony land.

This soil has a low moisture-supplying capacity. It is low in fertility. The erosion hazard is high.

Use and suitability (management group 6A).—This soil is best suited to trees, and most of it is under forest. The more desirable trees can be encouraged by practicing selective cutting and by planting desirable species. The wooded areas should not be grazed, and they need protection from fire.

In a few places this soil is used for pasture. The pastures are poor, and it is difficult to renovate them.

Dubuque stony silt loam, very steep, eroded (Du).—This soil occurs on slopes that are greater than 30 percent. The surface layer is yellowish-brown friable stony silt loam about 6 inches thick. The shallow B horizon consists of brown cherty silty clay loam, and in places it is absent. The depth to underlying material is 6 to 18 inches. Erosion has removed more than one-fourth of the original surface layer.

The soil has low moisture-supplying capacity and is low in fertility. The erosion hazard is high.

Use and suitability (management group 6A).—This soil is best suited to trees, and most of it is in forest. Good management practices are needed, such as encouraging the more desirable trees and practicing selective cutting.

Ettrick silt loam (Ea).—This soil occurs on high bottoms on the flood plains, mostly along the smaller streams. It is flooded only when the water is extremely high. Because the soil has developed under wet conditions, its surface layer is dark colored. The soil has formed from limestone, sandstone, and loess materials. The natural plant cover is swampgrass, weeds, and water-tolerant trees.

Profile observed in the northeastern corner of the southeast quarter of section 2, Buena Vista Township:

A 0 to 14 inches, very dark gray to nearly black friable silt loam, mottled with yellowish brown in the lower part; medium granular structure; pH 7.5.

B 14 to 36 inches, dark-gray light silty clay loam, mottled with yellowish brown; very weak blocky structure; contains some roots; pH 7.5.

C 36 inches +, gray and yellowish-brown stratified alluvial silty clay loam; contains some fine sand; pH 7.5.

This soil varies in depth and in the rate of internal drainage. In most of it, internal drainage is very slow. There is an intermittently high water table. This soil has a high moisture-supplying capacity and moderately high fertility.

Use and suitability (management group 2D).—Drainage is necessary for good growth of cultivated crops on this soil. When drainage is adequate, however, corn, oats, hay, and pasture give good yields. Alfalfa cannot be grown successfully, even with improved drainage. Crops respond well to complete fertilizer, but corn and oats need supplemental applications of nitrogen. Lime is not needed.

Fayette silt loam, uplands, gently sloping, eroded (Fa).—This light-colored, deep silty soil occupies the broader ridgetops in the uplands. It has slopes of 1 to 6 percent. The areas are small and scattered. Most of them are in the western and northern parts of the county. This soil has developed under good drainage in a silt deposit that is more than 42 inches thick. The silt was probably blown up on the uplands from the Mississippi River bottoms during the last glacial period. The soil has developed under forest.

Profile description of virgin soil:

A 0 to 4 inches, light brownish-gray very friable silt loam; moderate fine granular structure; contains several roots; pH 6.8.

4 to 10 inches, pale-brown to brown very friable silt loam; moderate thin platy to medium platy structure; pH 5.5.

B 10 to 34 inches, brown to dark-brown heavy silt loam or light silty clay loam; moderate subangular blocky structure; peds coated with gray; pH 5.5.

C 34 to 46 inches, yellowish-brown friable silt loam; structure weak coarse blocky but becomes massive with depth; pH 5.5.

46 inches +, dark yellowish-brown very friable silt loam; massive structure; pH 6.4.

The depth to the underlying limestone or sandstone bedrock ranges from 42 to 80 inches or more.

This soil has a high moisture-supplying capacity. The erosion hazard is slight, but more than one-fourth of the original surface layer has been lost through erosion.

Included in this mapping unit are a few small areas of imperfectly drained soil. These are in the northwestern part of the county. Except for mottling in the B horizon, their profile is similar to that of the typical soil. Most of these included areas have lost more than a fourth of their surface soil through erosion, and some of the areas are seriously eroded.

Use and suitability (management group 2A).—Most of Fayette silt loam, uplands, gently sloping, eroded, is cultivated. It is well suited to corn, small grains, hay, and pasture. Good management is needed to protect the soil from erosion and to maintain the supply of plant nutrients. Cultivated crops respond well to complete fertilizer. The yields of corn and oats will increase even more, however, if supplemental nitrogen is added. The included areas have management needs similar to those of the typical soil. They are not so well suited to alfalfa as the typical soil.

Fayette silt loam, uplands, sloping, eroded (Fb).—Except that it occurs on steeper slopes and contains a little less organic matter, this soil is similar to Fayette silt loam, uplands, gently sloping, eroded. It has slopes of 7 to 15 percent. The erosion hazard is moderate.

Use and suitability (management group 3A).—This soil is well suited to corn, small grains, hay, and pasture. If erosion is controlled and a good supply of plant nutrients and organic matter is kept in the soil, good yields are obtained. The longer slopes can be terraced or strip-cropped. The terraces must be carefully maintained, however, to prevent them from breaking. Crop rotations should have a greater number of years in close-growing crops than is necessary for Fayette silt loam, uplands, gently sloping, eroded.

Fayette silt loam, uplands, steep, eroded (Fc).—This soil occupies slopes of 16 to more than 30 percent. Except that its slopes are steeper and its surface soil somewhat thinner, it is similar to Fayette silt loam, uplands, gently sloping, eroded. The combined surface soil and subsurface layer are brownish-gray friable silt loam, 6 to 8 inches thick. Runoff is rapid, and the erosion hazard is high. Mapped with this soil are some areas that have lost all of their original surface soil.

Use and suitability (management group 4A).—This soil is difficult to cultivate because it has steep slopes. The less sloping areas are best kept in permanent pasture, and the steeper areas are best for forest. The pastures need to be renovated and protected from overgrazing. The severely eroded areas under cultivation need heavy applications of commercial fertilizer and manure and then should be seeded to a grass-legume mixture. After pasture has been established on these severely eroded areas, care is needed to prevent overgrazing and further damage from erosion.

Fayette silt loam, valleys, sloping, eroded (Fd).—This is a deep, silty soil that contains some grit. It occurs on

the valley slopes. The soil occupies slopes of up to 15 percent but is mostly on slopes of 7 to 15 percent. Except that the B horizon is not so well developed, this soil is similar to the Fayette soils on ridges. Most of it has lost more than one-fourth of its original surface soil through erosion.

Profile description:

A 0 to 8 inches, grayish-brown friable silt loam; medium granular structure; contains many roots and earthworm casts; pH 6.5.
8 to 15 inches, pale-brown to brown friable silt loam; platy structure; contains worm channels; pH 6.0.
B 15 to 30 inches, yellowish-brown to brown heavy silt loam to light silty clay loam; weak subangular blocky structure; pH 5.8.
C 30 to 44 inches, dark yellowish-brown friable silt loam; structure weak subangular blocky but becomes massive with depth; underlain in places by either yellowish or greenish glauconitic sandstone at depths greater than 42 inches; pH 5.8.

In some areas on the upper slopes just below a sandstone escarpment, there is a thin surface layer of loamy fine sand. In some areas stones and boulders are scattered on the surface and throughout the profile. These sandy and rocky areas are indicated by symbols on the soil map.

The soil has a high moisture-supplying capacity and is moderately high in fertility. The erosion hazard is moderate.

Mapped with this soil are a few small areas in which the surface soil is darker colored than in the typical soil.

Use and suitability (management group 3A).—This soil is well suited to corn, small grains, hay, and pasture. If the fertility is maintained and erosion is controlled, good crop yields are obtained. Yields of corn and oats will improve if supplemental nitrogen is applied. Lime is needed for legumes. The soil needs protection from runoff from the soils on the steeper slopes above. Other good management practices are stripcropping and using crop rotations that include close-growing crops. The included stony and sandy areas need careful management suited to stony or sandy soils.

Fayette silt loam, valleys, steep, eroded (Fe).—This soil occupies slopes of 16 to more than 30 percent. Except that it is on steeper slopes and has a more friable B horizon, it is similar to Fayette silt loam, valleys, sloping, eroded.

This soil has a high moisture-supplying capacity. It is moderately fertile, but the erosion hazard is high.

Included are a few areas of cultivated soil that have lost all or nearly all of the original surface layer. Some small areas mapped with this soil have a darker colored surface layer than the typical soil.

Use and suitability (management group 4A).—This soil is not so well suited to cultivated crops as Fayette silt loam, valleys, sloping, eroded. It is better used for permanent pasture or meadow. The pastures can be renovated easily and will respond well to fertilizer. If the soil is cultivated, it is best to keep it in hay at least 3 years out of 4. Areas that are forested need protection from fire. They should not be grazed, and the trees should be cut selectively.

The included areas in which all or nearly all of the original surface layer has been lost need more careful management than the typical soil. The small included areas in which the surface layer is darker colored than normal should be used and managed the same as the typical soil.

Gotham loamy fine sand (Ga).—This soil is on low terraces near the larger streams. It is associated with the Plainfield soils. It has a darker colored surface layer than the Plainfield soils and a coherent B horizon that is not well defined. Most of this soil occurs on slopes of 1 to 2 percent, but some is on slopes of up to 6 percent.

Profile observed in the northeast quarter of section 31, Buena Vista Township:

A 0 to 8 inches, very dark grayish-brown friable loamy fine sand; weak fine granular structure; pH 7.0.
8 to 15 inches, dark yellowish-brown friable loamy fine sand; weak medium subangular blocky structure; pH 6.8.
B 15 to 41 inches, dark yellowish-brown to yellowish-brown friable light sandy loam; weak coarse blocky structure; pH 6.4.
C 41 inches+, strong-brown to yellowish-brown loose fine sand; single grain; pH 6.0.

This soil is permeable and has a moderately low moisture-holding capacity. It is moderate in fertility. The hazard of wind erosion is moderate.

Use and suitability (management group 4C).—This soil is used for corn, small grains, hay, and pasture, and fair yields are obtained. The crops respond well to applications of manure and commercial fertilizer. They may be damaged by drought during prolonged dry spells. Alfalfa and other legumes grow well if properly fertilized and if the water table is 6 to 12 feet from the surface. Trees planted as windbreaks will help to prevent damage from erosion.

Hixton loam, sloping, eroded (Hd).—This soil has formed from fine-grained sandstone that contains little glauconite. It occurs on valley slopes in association with Norden and Fayette soils. It occupies slopes of 1 to 15 percent, but most of it is on slopes of 7 to 15 percent. In some places it lies in strips between areas of Stony land, steep, and the Norden soils. In other places the areas lie between drainageways. Most of the cultivated soil has lost from one-fourth to three-fourths of the original surface soil. Some included areas are even more severely eroded.

Profile description:

A 0 to 5 inches, grayish-brown friable loam; weak granular structure; contains many fine roots; pH 6.4.
5 to 12 inches, brown friable fine sandy loam; weak thick platy structure; pH 5.8.
B 12 to 24 inches, yellowish-brown friable heavy loam to sandy clay loam; moderate medium blocky structure; contains some large roots and root channels; pH 5.6.
C 24 inches+, pale-yellow loose fine sand; single grain; gradual transition to fine-grained yellowish sandstone that occurs at varying depths; pH 7.0.

The permeability is moderately rapid, and the moisture-supplying capacity is moderate. The soil is moderately fertile.

Use and suitability (management group 3A).—This soil is well suited to corn, small grains, hay, and pasture. During prolonged droughty spells, yields of corn and of the second cutting of hay are lowered. Crops on this soil respond well to complete fertilizer. Corn and oats, however, will make better yields if supplemental nitrogen is added during the growing season. Lime is needed in most areas. Good management will include using suitable crop rotations and practicing erosion control.

Hixton loam, steep, eroded (He).—This soil occupies slopes of 16 to more than 30 percent. Its surface soil is

thinner than that of Hixton loam, sloping, eroded; the B horizon is not so well developed; and the depth to the underlying sandstone is more variable. Most of this soil has lost from one-fourth to three-fourths of the original surface soil through erosion. Some included areas have been even more severely eroded.

This soil has a moderate moisture-supplying capacity. It is low to moderate in fertility. The erosion hazard is high.

Use and suitability (management group 4A).—This soil needs to be kept under a permanent plant cover much of the time. Satisfactory pasture yields can be maintained by renovating the pastures. A complete fertilizer will be needed, and overgrazing must be avoided. The steeper areas are best suited to forest. The forests need to be protected from fire and should not be grazed.

The more severely eroded areas should be planted to trees. If these areas are to be cultivated, they will need careful management to make them suitable for crops.

Hixton fine sandy loam, sloping, eroded (Ha).—This soil occurs on the lower valley slopes. It is associated with soils of the Norden series. It occurs on slopes of 1 to 15 percent, but most of it is on slopes of between 7 and 15 percent. The principal difference between this soil and Hixton loam, sloping, eroded, is in the texture of the surface soil. More than one-fourth of the surface soil in cultivated areas has been lost through erosion. A few more severely eroded areas are included with this soil.

Profile description:

A 0 to 5 inches, grayish-brown friable fine sandy loam; very weak granular structure; pH 5.3.
5 to 14 inches, pale-brown friable fine sandy loam; weak platy structure; pH 5.0.
B 14 to 24 inches, yellowish-brown friable loam; weak subangular blocky structure; in places contains some fragments of sandstone; pH 5.0.
C 24 inches+, pale-yellow loose fine sand that contains some fragments of sandstone; single grain; gradual transition to fine-grained sandstone that occurs at varying depths; pH 5.0.

This soil has moderate moisture-supplying capacity. It is moderately fertile.

Use and suitability (management group 3B).—If the supply of plant nutrients is maintained and erosion is controlled, this soil is well suited to corn, small grains, hay, and pasture. It is somewhat droughty, however, during dry spells. Crops need supplemental nitrogen. Where the soil occurs on long slopes, it can be terraced or strip-cropped. The severely eroded areas need large amounts of commercial fertilizer and manure and then should be seeded to a grass-legume mixture to restore fertility and to prevent further erosion. Erosion causes the underlying sandstone to be near the surface, and the value of the soil is thus reduced for crops.

Hixton fine sandy loam, steep, moderately eroded (Hb).—This soil occupies slopes of 16 to 30 percent. Except that its slopes are steeper and its B horizon thinner and not so well developed, it is similar to Hixton fine sandy loam, sloping, eroded. It has a grayish-brown friable fine sandy loam surface layer, 10 to 12 inches thick, and a yellowish-brown friable loam subsoil, 20 to 22 inches thick. In places sandstone fragments are scattered on the surface and throughout the profile. From one-fourth to three-fourths of the surface soil has been lost through erosion.

This soil has moderate moisture-supplying capacity and moderate fertility. The erosion hazard is high.

Use and suitability (management group 5B).—Most areas of this soil are used for pasture or forest and should be kept in permanent vegetation. If fertility is maintained, moderate to good yields of hay and pasture are produced. Better yields can be obtained, however, if pastures are renovated. Good pasture management will include prevention of overgrazing and the addition of nitrogen to the soil in the spring. Good forest management will include encouraging growth of the more desirable trees, selective cutting, and protecting the areas from grazing and fires.

Hixton fine sandy loam, very steep, eroded (Hc).—This soil occupies slopes of more than 30 percent. Except that runoff is more rapid, the moisture-supplying capacity is lower, and the erosion hazard is higher, this soil is similar to Hixton fine sandy loam, steep, moderately eroded. The soil occurs throughout the county, generally in small scattered areas. It is associated with the Fayette soils on valley slopes, with the steeper soils of the Norden series, and with Stony land, steep.

Use and suitability (management group 6A).—This soil is suited only to trees. The forested areas need protection from grazing and fires. The trees should be selectively cut.

Jackson silt loam (Ja).—This is a moderately well drained nearly level soil that has developed on silty terraces. Normally, it occurs at some distance from streams and is not subject to flooding. Some small areas occur on slopes of 4 or 5 percent. This soil is associated with Bertrand and Curran soils. Unlike Bertrand soils, it has moderately slow internal drainage. It has slightly better drainage than the Curran soil.

Profile description:

A 0 to 7 inches, light brownish-gray friable silt loam; medium granular structure; pH 6.2.
7 to 10 inches, pale-brown friable silt loam; thin platy structure; pH 6.0.
B 10 to 30 inches, yellowish-brown firm silty clay loam, mottled with dark reddish brown in the lower part; well-developed subangular blocky structure; peds coated with gray; pH 5.0.
C 30 inches +, yellowish-brown, friable, massive silt loam, highly mottled with light grayish brown and yellowish red; in places underlain by stratified sand and gravel at depths greater than 42 inches; pH 5.3.

This soil has a high moisture-supplying capacity and is moderately fertile. There is only a slight erosion hazard or none.

Use and suitability (management group 1A).—This soil is well suited to corn, small grains, hay, and pasture. The crops and pastures respond well to complete fertilizer, but for best yields of corn, supplemental applications of nitrogen are needed, and legumes need lime. There are some wet spots in this soil caused by seepage from adjoining uplands. Before alfalfa can be established on these wet areas, they will need to be drained. The use of diversion ditches will improve the drainage.

Judson silt loam, gently sloping (Jb).—This soil occupies slopes of 1 to 6 percent at the bases of steeper slopes or occurs in narrow draws. It has formed from colluvium washed from the higher slopes. Except that it has a darker colored surface layer, it is similar to Chaseburg silt loam, gently sloping. The areas are small. They occur throughout the county. The profile is not well developed.

The original vegetation was prairie grasses or mixed grasses and forest.

Profile observed in the northeastern corner of section 30, Marshall Township:

A 0 to 18 inches, dark-gray friable silt loam that becomes lighter in color with depth; moderate granular structure grading to platy in the lower part; many roots and some stones; pH 7.0.
B 18 to 44 inches, very dark gray to very dark brown silt loam; weak subangular blocky structure; several roots and worm casts; many sandstone fragments; pH 7.0.
C 44 inches +, very dark brown massive silt loam; slightly more friable than the B horizon; some stones and sand, indicating that a mechanical mixture of soil material has occurred; pH 6.5.

This soil has a high moisture-supplying capacity. Its fertility is moderately high.

Included in this mapping unit are a few areas that have a thin deposit of sandy material on the surface. These areas were too small to map separately.

Use and suitability (management group 1B).—This soil is well suited to corn, small grains, hay, and pasture. It can be used intensively for these crops. The response from complete fertilizer is good, but lime is seldom needed. Good management will include (1) controlling the runoff from higher areas so it will not drain onto this soil and (2) maintaining a good supply of plant nutrients in the soil. The included areas require the same kind of management.

Judson silt loam, sloping (Jc).—This soil occupies slopes of 7 to 15 percent. Its surface soil is dark grayish-brown silt loam or loam, 16 inches thick. The 16- to 30-inch subsoil is very dark brown friable heavy silt loam. The parent material was local colluvium similar to that from which Judson silt loam, gently sloping, developed.

The moisture-supplying capacity of this soil is high, and its fertility is moderately high. The erosion hazard is moderate.

Included in this mapping unit are a few areas of a loam soil too small to be mapped separately. Also included are a few small areas in which sandy material has washed over the silt loam and loam and made the texture of the surface layer a fine sandy loam.

Use and suitability (management group 2B).—Judson silt loam, sloping, is well suited to corn, small grains, hay, and pasture. Care must be taken to prevent erosion or the washing of material from higher lying soils onto this soil. Crops on this soil respond well to complete fertilizer. Lime is not needed in most areas. The included areas need the same management.

Lawson silt loam[4] (La).—This dark-colored soil occurs on first bottoms along streams in Richland County. Most of it lies along the smaller streams in the central and northern parts. The parent material was washed from soils such as the Downs. The dark color of the soil indicates that the soils from which the parent material washed were developed, at least in part, under grass.

Profile observed in the south-central part of section 33, Akan Township:

0 to 16 inches, very dark gray to black granular silt loam; very friable; pH 7.0.
16 to 38 inches, very dark gray friable silt loam that becomes grayer with depth; high in organic matter; contains several roots; pH 7.0.
38 inches +, very dark grayish-brown to dark grayish-brown friable silt loam in which there are a few mottles and some black specks and root channels; pH 7.0.

In places sand and gravel occur at varying depths below 42 inches.

This soil has a high moisture-supplying capacity and high natural fertility. Internal drainage is medium. Unless protected, the soil is subject to overflow.

Use and suitability (management group 1B).—This soil is easy to cultivate and manage. Most of the areas are used for pasture or special crops. Ordinarily, the pastures or fields are small. The soil is well suited to corn, oats, tobacco, hay, and pasture.

Crops on this soil need complete fertilizer, but lime is not needed. Better yields of corn are made when supplemental nitrogen is added.

Medary silt loam (Ma).—This soil occupies slopes of 1 to 6 percent. It occurs on high terraces, mainly near the junctions of the Wisconsin River and its tributaries. This soil is mostly in the southern part of the county. It has formed under forest from slack-water deposits of silt and clay.

Profile observed in the southwestern corner of the southeast quarter of section 31, Richwood Township:

A 0 to 10 inches, gray friable silt loam; weak medium granular structure; many fine roots; pH 6.4.
10 to 14 inches, reddish-brown friable heavy silt loam; moderate platy structure that breaks to coarse granules; pH 6.0.
B 14 to 36 inches, reddish-brown silty clay, mottled with black and yellowish red; strong medium subangular blocky structure; moderately plastic and sticky when wet; slightly permeable to water; pH 5.3.
C 36 inches +, highly mottled yellowish-red, reddish-brown, and pinkish-gray massive clay that has some black specks; lower part stratified; some lime concretions; pH 6.0 in upper part.

This soil is moderately well drained. It has a high moisture-supplying capacity and moderate natural fertility. The erosion hazard is slight.

Use and suitability (management group 3E).—This soil is best suited to corn, small grains, hay, and pasture. If well fertilized and properly drained, good yields are obtained. The crops need lime and complete fertilizer. Corn and oats will need supplemental applications of nitrogen.

Meridian fine sandy loam, nearly level (Mb).—This well-drained soil occurs on slopes of 1 to 6 percent, but most of it is on slopes of less than 2 percent. It has developed on stream terraces from sandy parent materials deposited by wind and water.

Profile description:

A 0 to 8 inches, grayish-brown friable fine sandy loam; fine granular structure; many roots and worm casts; pH 6.5.
8 to 11 inches, light brownish-gray friable fine sandy loam; slightly compact; weak platy; many roots and worm casts; pH 6.2.
B 11 to 32 inches, strong-brown friable loam; medium subangular blocky structure; some roots and worm casts; the upper part more grayish than lower and contains darker colored material in the root channels and worm casts; pH 6.0.
C 32 inches +, yellowish-brown, stratified, loose, fine sand; some lenses or streaks of dark yellowish-brown sandy clay loam; single grain; pH 5.5.

This soil has a moderate moisture-supplying capacity. Internal drainage is moderately rapid. The soil has moderate natural fertility, and the erosion hazard is slight.

[4] In later surveys this soil has been mapped as Huntsville silt loam.

Use and suitability (management group 3B).—Much of this soil is in areas that are large enough to cultivate and manage easily. If a good supply of plant nutrients is maintained, good yields of small grains, soybeans, and hay are made. Corn is sometimes damaged by drought. Originally this soil was somewhat acid. Now, in many cultivated areas, it is neutral in reaction because so much lime has been added or dust containing lime has blown onto the soil from roads. The low supply of nitrogen in this soil is the factor that most limits crop yields. Care is needed to keep the supply of nitrogen in balance with the phosphorus and postassium.

Meridian fine sandy loam, sloping, eroded (Mc).—This soil occurs on slopes of 7 to 15 percent. Except that it is on steeper slopes and has a thinner A horizon, it is similar to Meridian fine sandy loam, nearly level.

The erosion hazard is moderate. Most cultivated areas have lost at least one-fourth of their original surface soil through erosion. Included are a few severely eroded areas that have lost all, or nearly all, of their surface soil.

Use and suitability (management group 4C).—Management to protect this soil from further erosion and to maintain a good supply of plant nutrients will be needed to obtain yields as high as those obtained on Meridian fine sandy loam, nearly level.

Meridian fine sandy loam, steep, eroded (Md).—This soil occurs on slopes of 16 to 30 percent. Except that it is on steeper slopes, has thinner A and B horizons, and is shallower to stratified sand, it is similar to Meridian fine sandy loam, nearly level. Most of this soil occurs on terrace escarpments or along drainageways where the terraces are dissected.

The moisture-supplying capacity of this soil is moderately low, and it is moderately low in natural fertility. The erosion hazard is high.

Use and suitability (management group 5B).—This soil is not well suited to row crops. It is best used for forage crops or for trees. Areas that have been cultivated in the past are moderately to severely eroded.

Norden silt loam, sloping, eroded (Nk).—This soil occurs on valley slopes of 1 to 15 percent, but most of it is on slopes of more than 6 percent. It is a well-drained soil that has developed from thin loess that overlies greenish fine-grained glauconitic sandstone. It occurs in a few large areas in association with Hixton soils and with the Fayette silt loams on valley slopes. It has a better developed B horizon, somewhat deeper profile, and finer grained C horizon than the Hixton soils. Many of the cultivated areas have lost between one-fourth and three-fourths of their original surface soil through erosion. A few included areas are more severely eroded.

Profile description:

A 0 to 3 inches, dark-gray friable silt loam; weak granular structure; many fine roots; pH 6.5.
3 to 11 inches, grayish-brown friable silt loam; platy structure; pH 6.0.
B 11 to 32 inches, dark yellowish-brown friable light silty clay loam; moderate subangular blocky structure; pH 5.5.
C 32 inches +, dark yellowish-brown to brownish-yellow partly weathered fine-grained sandstone; some seams or strata of glauconite that weather to finer textured material and increase the moisture-holding capacity; pH 5.5.

The depth to sandstone ranges from 20 to 42 inches. In some places the sandstone is nearly white and is fine grained. In other areas nearby, there is greenish glauconitic sandstone.

This soil has a moderate moisture-supplying capacity and is moderate in fertility. Erosion is a hazard.

A few small areas of Gale silt loam have been included in this mapping unit. They occur above the limestone bedrock and have formed in a silty covering that overlies St. Peter sandstone. Gale soils are not mapped separately in this county.

Use and suitability (management group 3A).—Norden silt loam, sloping, eroded, is suited to corn, small grains, hay, and pasture. If a good supply of plant nutrients is maintained and erosion is controlled, good yields are obtained. Since the glauconitic sandstone contains some potassium, this soil will not need as much potash as some of the other soils. The severely eroded areas can be restored to a high level of productivity by adding commercial fertilizer and manure. Terracing and stripcropping will be needed on the longer slopes to protect the soil from further erosion.

Norden silt loam, steep, eroded (Nm).—This soil occupies slopes of 16 to more than 30 percent. Most of it is in the northern and eastern parts of the county.

The surface soil is grayish-brown friable silt loam, 9 to 10 inches thick. The subsoil is dark yellowish-brown friable silty clay loam. Depth to the C horizon ranges from 24 to 34 inches. The C horizon is thinner, as a rule, than in Norden silt loam, sloping, eroded. This soil has lost more than one-fourth of its original surface soil through erosion. Some small areas that have been used for tilled crops or pasture are more severely eroded.

Use and suitability (management group 4A).—This soil needs to be kept under permanent vegetation as much of the time as feasible. If pastures are renovated and good management practices are followed, good to excellent yields of forage can be obtained. Some of the steeper areas should be kept in trees. Trees grow well on this soil. Good management will consist of encouraging the more desirable species, using selective cutting, and protecting wooded areas from grazing and fire. The severely eroded areas should be planted to trees. Areas to be pastured will need large amounts of commercial fertilizer and manure. A grass-legume mixture is desirable for seeding.

Norden loam, sloping, eroded (Nd).—Except that it has a loam surface soil, is lower in organic matter, and is shallower over glauconitic sandstone, this soil is similar to Norden silt loam, sloping, eroded, and it occupies similar positions. It occurs in small areas throughout the county, but most of it is in the central and southern parts. The cultivated areas have generally lost more than one-fourth of their original surface soil through erosion.

The surface soil is grayish-brown loam that contains many roots. It is friable when moist and soft when dry. The structure is granular. The B horizon is dark yellowish-brown friable heavy loam or sandy clay loam that is underlain by glauconitic sandstone at depths of 22 to 34 inches.

The moisture-supplying capacity is moderate, and the soil is moderate in fertility. The surface soil and subsoil are permeable.

Use and suitability (management group 3A).—This soil is well suited to corn, small grains, hay, and pasture. If a good supply of plant nutrients is maintained and erosion is controlled, moderate to good yields are ob-

tained. If a good supply of organic matter and plant nutrients is kept in the soil, the erosion hazard is not high but care must be taken to prevent erosion. The longer slopes need to be stripcropped or terraced. On the steeper slopes, however, stripcropping is the more desirable practice.

Norden loam, steep, eroded (Ne).—This soil occupies slopes of 16 to 30 percent. Except for having steeper slopes, a less well-developed B horizon, and sandstone at depths of 20 to 30 inches, it is similar to Norden loam, sloping, eroded. The soil is susceptible to damage by erosion, and a few areas are severely eroded. It is difficult to cultivate.

Use and suitability (management group 4A).—This soil needs to be kept under permanent vegetation. The pastured areas should be renovated. If grazing is controlled, the pastures on milder slopes will respond well to renovation. The severely eroded areas can be reclaimed by using heavy applications of manure and other fertilizer. In most places, however, it would be better to plant such areas to trees and manage them along with adjoining wooded areas.

Norden loam, very steep, eroded (Ng).—This soil occurs on slopes of more than 30 percent. It is associated with the steeper soils of the Fayette and Hixton series. Most of this soil has lost at least one-fourth of the surface soil through erosion.

The surface layer is 10 inches of grayish-brown, friable loam. The subsoil is dark yellowish-brown, friable, heavy loam, 8 to 30 inches thick. Depth to the underlying glaucontitic sandstone varies. Some stone fragments are on the surface, and they occur throughout the profile.

This soil has a moderately low moisture-supplying capacity and moderate fertility. The erosion hazard is high.

Use and suitability (management group 6A).—Most of this soil is under forest and should not be cleared. The soil is not suited to crops or pasture. Cleared areas are best planted to trees. All wooded areas need protection from fire and grazing.

Norden fine sandy loam, sloping, eroded (Na).—This soil occupies slopes of 1 to 15 percent, but most of it is on slopes of more than 7 percent. Except that it has a coarser textured surface soil and its profile is not so well developed, it is similar to the Norden silt loams and loams. It occurs in small areas that are scattered throughout the central and southern parts of the county. Most of it has lost at least one-fourth of its surface soil through erosion.

Profile description:

A 0 to 3 inches, dark-gray very friable fine sandy loam; weak medium granular structure; numerous roots and worm casts; pH 7.0.
3 to 11 inches, grayish-brown to light brownish-gray very friable fine sandy loam; weak platy structure; many roots and worm casts; pH 6.5.
B 11 to 32 inches, yellowish-brown friable fine sandy loam; with depth, gradual transition to dark yellowish-brown loam; weak to moderate fine subangular blocky structure; many roots, root channels, and worm casts; pH 5.5.
C 32 inches +, dark yellowish-brown and brownish-yellow partly weathered fine-grained sandstone; some strata of glauconite; in places strata of shaly sandstone and very fine grained sandstone occur below this soil; pH 5.5.

Internal drainage and moisture-supplying capacity are moderate. The soil is moderate in fertility.

Use and suitability (management group 3B).—This soil has good tilth and is easy to manage. If a good supply of plant nutrients is maintained and erosion is controlled, good yields of corn, small grains, hay, and pasture are made. Crops respond well to applications of complete fertilizer and lime. For best yields of corn, oats, and early spring pasture, supplemental nitrogen is needed. Care must be taken to prevent further erosion.

Norden fine sandy loam, steep, eroded (Nb).—This soil occurs on slopes of 16 to 30 percent. Except that its B horizon is not so well developed, the depth to the underlying parent material is somewhat more variable, and the profile is slightly shallower, it is similar to Norden fine sandy loam, sloping, eroded. Most of this soil has lost at least one-fourth of its original surface layer by erosion. A few small areas have been severely eroded.

Use and suitability (management group 5B).—This soil is not well suited to cultivation and is best kept in permanent pasture or forest. The pastures respond well to renovation. If grazing is controlled, good to excellent pasture yields can be obtained. The steeper areas need to be kept under forest and protected from grazing and fires. The severely eroded areas should be replanted to trees and care taken to prevent further damage by erosion.

Norden fine sandy loam, very steep, eroded (Nc).—This soil occupies slopes of more than 30 percent. Except for having steeper slopes, a thinner and lighter colored surface soil, and less depth to bedrock, it is similar to Norden fine sandy loam, sloping, eroded.

Internal drainage is moderately rapid, and the moisture-supplying capacity is low. The erosion hazard is high.

Use and suitability (management group 6A).—This soil is not suited to cultivated crops or pasture. Most areas are under forest and should not be cleared. It is best to cut the trees selectively to encourage the growth of desirable species. The areas need protection from grazing and fires.

Orion silt loam (Oa).—This imperfectly drained soil has formed from sediments derived from silty or loessal material and material from weathered sandstone and limestone. It occurs in association with the Arenzville soil on the flood plains throughout the county. The areas are small. Most of them lie along the Wisconsin River in Richwood, Orion, and Buena Vista Townships.

Profile description:

A 0 to 8 inches, dark grayish-brown silt loam; weak granular structure; contains numerous roots; pH 7.0.
C 8 to 20 inches, grayish-brown to dark-gray friable silt loam, slightly mottled with gray and yellowish brown; weak granular structure; some thin seams of very fine sand; pH 7.0.
A_b 20 inches +, dark gray to very dark gray stratified silt loam, mottled with yellowish brown and dark reddish brown; some layers or seams of very fine sand; pH 7.0.

Internal drainage is medium, and there is an intermittent high water table. Fertility is moderate, and the content of organic matter is high.

Use and suitability (management group 1A).—Cleared areas of this soil are used for row crops and permanent pasture. The soil is well suited to corn, oats, hay, and pasture. Yields are medium to high, but there is risk of floodwaters ruining the crops. Alfalfa, especially, is often

damaged by floods. The crops respond well to complete fertilizer. Corn and oats need supplemental applications of nitrogen for best yields. In most places lime is not needed.

Plainfield loamy fine sand, nearly level, eroded (Pa).—This sandy soil occurs on slopes of up to 6 percent, but most of it is on slopes of 1 to 2 percent. It occurs on low terraces near the larger streams. Most of it is in the southern part of Buena Vista Township. In most places more than one-fourth of the original surface soil has been lost through erosion.

Profile observed in section 30, Buena Vista Township:

A 0 to 10 inches, dark grayish-brown to brown very friable loamy fine sand; weak fine granular structure; pH 6.0.
B 10 to 26 inches, dark yellowish-brown loose fine sand; single grain; color only, no textural or structural development of a B horizon; pH 5.5.
C 26 inches +, yellowish-brown, loose, stratified fine to medium sand many feet thick; pH 5.0.

This soil has a low water-supplying capacity. It is moderately low in fertility. The hazard of wind erosion is high.

Use and suitability (management group 4C).—This soil is used mainly for mellons, corn, small grains, and pasture. Unless irrigation is supplied, crops make low yields. The crops respond well to manure and commercial fertilizer, especially to applications of nitrogen. Fertilizer must be applied with care to prevent damage to young seedlings. Close-growing forage crops and windbreaks will help to prevent wind erosion. Plantings of jack, Norway, and white pines grow well on this soil, particularly if the water table is within 18 to 20 feet of the surface.

Plainfield loamy fine sand, sloping, eroded (Pb).—This soil occurs on slopes of 7 to 15 percent. Except that it is on steeper slopes and has a somewhat lower content of organic matter, it is similar to Plainfield loamy fine sand, nearly level, eroded. It occurs in small areas, mainly on the sides of stabilized dunes. In most places more than one-fourth of the original surface soil has been lost through wind and water erosion.

The surface soil consists of brown loose loamy fine sand, 8 inches thick. This is underlain by strong-brown loose fine sand, and there is a gradual transition to yellowish-brown loose fine sand that occurs at depths of 18 to 24 inches.

This soil has a low moisture-supplying capacity and low fertility. The erosion hazard is high.

Use and suitability (management group 6B).—This soil should be kept in permanent vegetation, such as pasture or trees. Care must be taken to prevent erosion. In pastured areas a supply of organic matter and plant nutrients must be maintained in the soil. Wooded areas need protection from grazing and fires. Plantings of jack, Norway, and white pines make fair to good growth on this soil.

Plainfield loamy fine sand, steep, eroded (Pc).—This soil occurs on slopes of more than 15 percent. It has a low moisture-supplying capacity. The content of organic matter is low, and the soil is low in fertility. The erosion hazard is high. More than one-fourth of the original surface soil has been lost through erosion.

Use and suitability (management group 6B).—This soil has steep slopes and is droughty, so it should be kept in permanent vegetation. If it is used for pasture, care must be taken to prevent overgrazing and to maintain a good supply of organic matter and plant nutrients. If used for trees, the areas will need protection from grazing and fires. Plantings of jack and Norway pines grow well on this soil.

Riverwash (Ra).—This miscellaneous land type occurs along stream bottoms on slopes of less than 6 percent. The areas are small and occur mainly along the Wisconsin River. They consist of sandy and gravelly materials. In many places they are cut by old stream channels. The areas are sometimes flooded.

Use and suitability (management group 6B).—This land type is not suited to cultivated crops and is best kept in trees or used as refuges for wildlife. Selective planting and cutting of trees should be practiced. This will help to control streambank erosion and will help to protect adjoining agricultural areas from the overwashing of soil materials.

Rockbridge silt loam, sloping, eroded (Rb).—This soil occurs on old high stream terraces on slopes of 1 to 15 percent. These terraces are believed to have originated during the glacial or preglacial ages. They are composed of cherty gravel that is covered by loess (fig. 8). The areas of this soil are small. They are mainly near Rockbridge and Woodstock. The A and B horizons are similar to those of the Norden silt loams. A large part

Figure 8.—**Profile of Rockbridge silt loam.**

of this soil has lost more than one-fourth of the original surface soil through erosion.

Profile observed in the southeastern corner of section 4, Rockbridge Township:

A 0 to 5 inches, dark grayish-brown friable silt loam; moderate coarse granular structure; pH 7.0.
5 to 11 inches, grayish-brown very friable silt loam; thin platy structure; pH 6.0.
B 11 to 30 inches, strong-brown to yellowish-red firm silty clay loam; some grit; blocky structure; pH 5.5.
C 30 inches +, strong-brown to yellowish-red sandy clay; contains some broken sandstone and chert; grades to stratified cherty gravel with depth; pH 5.5.

There are gravel pits in some areas of this soil. These are mainly near Rockbridge. The gravel is coarsely stratified, contains chert and sand, and in places has a matrix of reddish clay mixed with the gravel.

This soil has a high moisture-supplying capacity and moderate fertility. The erosion hazard is moderate.

Use and suitability (management group 3A).—This soil is well suited to corn, small grains, hay, and pasture. Under good management moderate to high yields are obtained. Care must be taken to prevent erosion and to maintain a good supply of plant nutrients in the soil. Crops respond well to applications of complete fertilizer and lime. Corn and oats make better yields if supplemental applications of nitrogen are added.

Rockbridge silt loam, steep, eroded (Rc).—Except that the profile is somewhat shallower and in most places chert fragments are scattered on the surface and throughout the profile, this soil is similar to the associated Rockbridge silt loam, sloping, eroded. It occurs in small scattered areas. The erosion hazard is high.

Use and suitability (management group 4A).—This soil is not suited to cultivated crops, because of the risk of erosion. It is best used for pasture or forest. The pastures need careful management and respond well to renovation. The steeper areas should be planted to trees.

Sparta loamy fine sand (Sc).—This soil has developed under prairie grasses. It was derived from sandy outwash. It is on slopes of 1 to 2 percent. It occurs in a few fairly large areas on low terraces along the Wisconsin River. The soil is associated with the Dakota and Plainfield soils. It differs from the Dakota soils in having less profile development and from the Plainfield soils in having a darker colored surface layer. Most areas of this soil have lost at least one-fourth of the original surface soil through erosion. Some included areas are severely eroded.

Profile description:

A 0 to 9 inches, very dark gray, very friable loamy fine sand; weak fine granular structure; pH 6.5.
9 to 18 inches, dark-brown very friable loamy fine sand; weak fine granular structure; pH 5.5.
C 18 to 26 inches, yellowish-brown loose fine sand; single grain; pH 5.0.
26 inches +, light yellowish-brown loose fine sand many feet thick; single grain; weakly stratified; pH 5.5.

Internal drainage is very rapid, and the moisture-supplying capacity is low. The soil has moderately low fertility. The erosion hazard from wind is high.

Mapped with this soil are a few small areas in which slopes are steeper than in the typical soils. These lie in narrow strips along the terrace escarpments. Also included are small areas in which the surface soil and subsoil are reddish in color. These areas are just north of Lone Rock and along State Highway 60 just west of Gotham. This reddish soil is also similar to Trempe loamy fine sand, which is not mapped in Richland County. It was included with the Sparta soil because the areas were too small to show separately on a map of the scale used, and the management needs were similar.

Use and suitability (management group 4C).—This soil is best suited to melons, corn, small grains, and soybeans. If the water table is within 12 to 18 feet of the surface, alfalfa will make good yields. The crops are often severely damaged by drought. The high water table and nearness to the Wisconsin River make irrigation feasible. Good management will include keeping the content of organic matter and plant nutrients high. Planting trees in shelterbelts and using other erosion control practices will help to prevent further loss of soil.

Sparta fine sand, hummocky (Sa).—This soil has developed on old stabilized dunes. It occupies small scattered areas in association with Plainfield soils and with Sparta loamy fine sand. Relief ranges from 1 to 30 percent, but most of the soil is on slopes of 2 to 5 percent.

The surface layer is dark-gray loose fine sand that is single grained. It is 0 to 12 inches thick. The layer just below is grayish-brown to light yellowish-brown loose loamy fine sand, 4 to 12 inches thick. It is underlain by yellowish-brown loose sand. In some places darker colored layers, which are remnants of an older surface soil, occur just below the present surface layer.

This soil has a low moisture-supplying capacity. It is low in fertility. The erosion hazard from wind is high.

Use and suitability (management group 6B).—This soil needs careful management to prevent further loss through wind erosion. A plant cover should be kept on it as much of the time as feasible. The use of windbreaks will help to prevent erosion. Some areas are used to grow melons, corn, and small grains, but yields are usually low. The soil is best used for trees. Jack, Norway, and white pines grow well on this soil.

Sparta fine sand, hummocky, eroded (Sb).—This soil occurs on slopes of 1 to 30 percent, but most of it is on slopes of more than 6 percent. Except that it has a thinner and lighter colored surface soil and contains less organic matter, it is similar to Sparta fine sand, hummocky. This soil has lost from one-fourth to nearly all of its original surface soil through wind erosion. In some small areas even the underlying sands are being blown out by winds.

This soil has low moisture-supplying capacity and low fertility. The hazard from wind erosion is high.

Use and suitability (management group 6B).—This soil is not suited to cultivation and is best used for trees. Most of it is either idle or in trees. Jack, Norway, and white pines will grow on this soil. Although forest yields are not high, the trees will help to control wind erosion. They will also prevent damage to the more productive adjoining areas, which otherwise will be covered by sand from the soil.

Stony land, steep (Sd).—This miscellaneous land type occurs on slopes of 6 to 30 percent, but most of it is on slopes of 15 to 30 percent. It is made up of mixed soil materials and contains many large stones. Limestone or sandstone bedrock outcrops in many places.

Use and suitability (management group 6A).—This miscellaneous land type is not suited to cultivation and is best kept in trees. Good management practices consist of cutting selectively to encourage the growth of the

more desirable trees and protecting the areas from grazing and fires. The milder slopes need the same management as the steeper ones, but trees normally grow better on the less sloping areas.

Stony land, very steep (Se).—This miscellaneous land type occurs on slopes of more than 30 percent. Except that it is steeper, has more rock outcrops, and is not so fine textured, this land type is similar to Stony land, steep. The areas are large. They occur throughout the county but mainly in the central and southern parts.

Use and suitability (management group 6A).—Areas of this miscellaneous land type are best kept in trees. Good management consists of selective cutting and protecting the wooded areas from grazing and fires. A few areas have been cleared and used for pasture. Some of these cleared areas are severely eroded and should be planted to trees.

Tell silt loam (Ta).—Most of this soil occurs on slopes of 1 or 2 percent, but some small areas are on slopes of as much as 20 percent. The soil has developed on stream terraces. The steeper areas lie along terrace escarpments or drainageways. Most of the soil is in Buena Vista and Orion Townships and near Ithaca. It is associated with the Bertrand soils but differs in having developed in a thinner deposit of silt.

Profile observed along State Highway 60, west of Eagle Corners:

A 0 to 6 inches, pale-brown to yellowish-brown friable silt loam; weak thin platy structure; many fine roots and worm casts; pH 5.8.

B 6 to 23 inches, brown friable heavy silt loam that grades to strong brown; moderate fine to medium subangular blocky structure; peds in lower part of horizon coated with gray; some small stones and a few roots; pH 5.0.

23 to 27 inches, reddish-yellow slightly sticky sandy clay loam; weak subangular blocky structure; many water-worn pebbles and thin layers of reddish cherty clay; pH 5.5.

C 27 inches +, yellowish-red massive clay and sand; grades to brownish-yellow loose stratified sand; pH 5.5.

This soil has a moderate moisture-supplying capacity and moderate fertility. The erosion hazard is slight.

Use and suitability (management group 2A).—This soil is well suited to corn, small grains, hay, and pasture. Corn and hay are sometimes damaged by drought. If the supply of organic matter and plant nutrients is maintained, moderate to good crop yields are obtained. The crops respond well to fertilizer and lime. Corn and oats, however, make excellent yields when supplemental applications of nitrogen are made. The few areas of this soil that occur on slopes that are steeper than 6 percent need to be kept in permanent vegetation.

Use and Management of Soils

This section has three main parts. The first explains the system of land capability classification and shows how these groupings help in choosing use and management. The second describes the soils in 6 broad capability classes and 19 management groups. A list of soils in each group and suggestions for their use and management are given in this part. The third part gives estimates of yields for each soil under two levels of management.

Capability Grouping of Soils

The capability classification is a means of showing the comparative suitability of different soils for agricultural uses. The classification of a particular soil depends on the variety of uses to which it is suited, its susceptibility to erosion or other damage if it is cultivated, and the kind of management it needs to protect it from erosion and maintain its productivity.

Eight general capability classes are recognized. In classes I, II, and III are soils that are suitable for annual or periodic cultivation. Class I soils are those that have the widest range of use. They are level, productive, at least fairly well drained, and easy to work. They do not erode readily, even if cultivated frequently, and they will remain productive if managed with normal care.

Class II soils do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping and consequently need moderate care to prevent erosion; others may be slightly droughty, slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly but have a narrower range of use and need still more careful management.

In class IV are soils that should be cultivated only occasionally or only under very careful management.

In classes V, VI, and VII are soils that should not be cultivated; they can be used for pasture, for range, or for forest. Class V soils are level but are droughty, wet, low in fertility or otherwise unsuitable for cultivation.

Class VI soils are not suitable for crops because they are steep, droughty, or otherwise limited, but they give fair yields of forage or forest products. Some soils in class VI can, without damage, be cultivated enough to allow planting them to trees or to pasture.

Class VII soils provide only poor to fair yields of forage or forest products.

In class VIII (none in Richland County) are soils that have practically no agricultural use. These soils produce little useful vegetation but are important parts of watersheds; have scenic value; or may provide shelter for wildlife. Some areas have been developed into recreational facilities. Mountains, deserts, and sand dunes are examples of class VIII land.

The brief description that follows gives the general nature of most, but not all, of the soils in each management group in Richland County:

CLASS I.—Nearly level, well-drained, productive soils that have few limitations for cultivation or other uses.
- 1A.—Deep, nearly level to gently sloping, moderately light colored soils.
- 1B.—Deep, dark to moderately dark, nearly level soils.

CLASS II.—Soils subject to moderate limitations when used for crops.
- 2A.—Moderately deep to deep, light-colored, gently sloping soils.
- 2B.—Deep, dark, gently sloping silty soils.
- 2C.—Moderately deep, nearly level, somewhat excessively drained terrace soils.
- 2D.—Deep, nearly level, imperfectly drained to poorly drained bottom-land soils.

CLASS III.—Soils that can be cultivated in a regular cropping system with moderately severe risk of erosion or that have other moderately severe limitations.
- 3A.—Moderately deep or deep, light-colored to moderately dark colored, sloping, eroded soils.
- 3B.—Moderately deep or deep, mostly sloping, eroded sandy soils.
- 3C.—Nearly level, somewhat droughty terrace soils.
- 3D.—Deep, moderately well drained to imperfectly drained, bottom-land soils.
- 3E.—Deep, nearly level to gently sloping, slowly drained terrace soils.
- 3F.—Poorly drained alluvial land and very poorly drained organic soils.

CLASS IV.—Soils severely limited or subject to high risk of damage if used for tilled crops. They can be cultivated with special management.
- 4A.—Moderately deep to deep, light-colored, eroded soils.
- 4B.—Deep, sloping, severely eroded soils.
- 4C.—Nearly level to sloping, droughty terrace soils.

CLASS VI.—Soils not suitable for tilled crops, except for occasional cultivation to reestablish pasture or to plant trees, because of steep slopes, stoniness, shallowness, or droughtiness.
- 5A.—Moderately shallow, eroded, sloping and steep stony soils.
- 5B.—Steep sandy soils.

CLASS VII.—Soils with serious hazards or limitations when used for pasture or as woodland.
- 6A.—Moderately shallow, stony, steep or very steep, eroded soils.
- 6B.—Hummocky, sloping or steep sandy soils.

Management Groups

Soils within one capability class that are similar and have about the same management needs make up a management group. Nineteen management groups are described in the county. Some of the soils, as delineated on the published map, have a range of slope or range in other characteristics wider than would be permitted in the class at the time this report was written. Following is a description of the main features of each management group, a list of the soils in the group, and some suggestions for the use and management.

Management group 1A

The soils of group 1A are deep, silty, moderately light colored, and nearly level to gently sloping. They have a moderately permeable subsoil and a high capacity for supplying moisture to plants. They are moderately low in organic matter but are easy to work. If lime is added and a high level of fertility is maintained by applying manure and fertilizers, these soils can be used intensively for corn, oats, and a mixture of alfalfa and bromegrass. The special crops—tobacco, peas, and potatoes—can also be grown. The soils of this group are in capability class I. They are the following:

Arenzville silt loam.
Bertrand silt loam, level to gently sloping.
Chaseburg silt loam, gently sloping.
Jackson silt loam.
Orion silt loam.

Use and management suggestions.—Suitable cropping systems are corn 2 years, oats 1 year, and a mixture of alfalfa and bromegrass 2 years; or corn 1 year, oats 1 year, and a mixture of alfalfa and bromegrass 2 years; or tobacco every year, followed each time with a winter cover crop of rye. Apply manure ahead of corn and tobacco, and sidedress corn with nitrogen. Apply lime and fertilizer as indicated by soil tests and field trials.

Management group 1B

Group 1B consists of deep, nearly level, dark to moderately dark silty soils. The soils are well drained. Their moisture-supplying capacity is high, and they are moderately high to high in fertility. They are easy to work and can be used intensively for tobacco, corn, oats, soybeans, and a mixture of alfalfa and bromegrass. The soils of this group are in capability class I. They are the following:

Downs silt loam, gently sloping.
Judson silt loam, gently sloping.
Lawson silt loam.

Use and management suggestions.—Suitable cropping systems are corn 2 years, oats 1 year, and a mixture of alfalfa and bromegrass 2 years; corn 1 year, soybeans 1 year, wheat 1 year, and a mixture of alfalfa and bromegrass 2 years; or tobacco every year, each time followed by a winter cover crop of rye. Apply manure ahead of the second year of corn and ahead of tobacco. Judson and Lawson soils do not need lime for good yields of alfalfa and clover. Phosphate and potash fertilizers bring a good response from the crops commonly grown. Apply lime and fertilizer as indicated by soil tests and field trials.

Management group 2A

The soils of group 2A are light colored, moderately deep to deep, and gently sloping. They have a silty or very fine sandy loam surface layer. The soils are moderately permeable, moderately fertile, and easy to work. Most of them have a high moisture-supplying capacity but are subject to erosion. Dubuque silt loam, gently sloping, eroded, and the Tell soil have a lower moisture-supplying capacity than the others. The Tell soil is not subject to serious erosion. All of these soils are well suited to tobacco, corn, oats, soybeans, wheat, alfalfa, and bromegrass. Most of them have been placed in class II because of erosion. The soils of this group are:

Bertrand silt loam, level to gently sloping, eroded.
Chaseburg fine sandy loam, gently sloping.
Dubuque silt loam, deep, gently sloping, eroded.
Dubuque silt loam, gently sloping, eroded.
Fayette silt loam, uplands, gently sloping, eroded.
Tell silt loam.

Use and management suggestions.—A suitable cropping system is corn 1 year, oats 1 year, and a mixture of alfalfa and bromegrass 3 years. The alfalfa and bromegrass can be used for hay or pasture.

Use terracing or contour stripcropping, as needed, to control erosion. Sidedress corn with nitrogen fertilizer. Apply lime and fertilizer as indicated by soil tests and field trials.

Management group 2B

Group 2B consists of deep, dark, silty soils that are gently sloping. The soils are forming from wind-laid or colluvial materials. They are moderately permeable and have a high moisture-supplying capacity. They are high in fertility and are easy to work. These soils are well suited to corn, oats, wheat, alfalfa, and bromegrass. They have been placed in capability class II because of

the risk of erosion. The following soils are in the management group:

Downs silt loam, gently sloping, eroded.
Judson silt loam, sloping.

Use and management suggestions.—A suitable cropping system is corn 1 year, oats 1 year, and a mixture of alfalfa and bromegrass 3 years. Use terracing or contour stripcropping to control erosion. Apply barnyard manure ahead of corn. Nitrogen is not needed so much on these soils as it is on the soils of group 2A. Nevertheless, nitrogen used as a starter on corn gives a good response. Apply lime and fertilizer as indicated by soil tests and field trials.

Management group 2C

Dakota loam is the only soil in management group 2C. It is dark colored, moderately deep, and nearly level. Its drainage is somewhat excessive. This soil is forming on stream terraces in loamy material underlain by sand. It is moderately permeable and is moderate in moisture-supplying capacity. Fertility is moderate, and the soil is easy to work. This soil is well suited to corn, oats, wheat, soybeans, and alfalfa and bromegrass. Droughtiness causes it to be placed in class II.

Use and management suggestions.—Suitable cropping systems are corn 1 year, oats 1 year, and a mixture of alfalfa and bromegrass 2 years; or corn 1 year, soybeans 1 year, wheat 1 year, and a mixture of alfalfa and bromegrass 2 years. Add barnyard manure and plow under a good stand of legumes ahead of corn. Apply lime and fertilizer as indicated by soil tests and field trials.

Management group 2D

The soils of group 2D are deep, nearly level, and imperfectly to poorly drained. They are forming on flood plains from silty alluvium. Although the soils are moderately high to high in fertility, many of the areas are so small that they are farmed with adjoining soils. The areas that have inadequate supplemental drainage or that are not protected from flooding are best suited to pasture. Areas that are protected from flooding and that have supplemental drainage, provided either by tile or by surface ditches, are well suited to corn, oats, clover, and timothy. These soils have been placed in capability class II because of excess water. The following mapping units are in this management group:

Boaz silt loam.
Ettrick silt loam.

Use and management suggestions.—Suitable cropping systems are corn 1 year, oats 1 year, and a mixture of clover and timothy 2 years; or corn 1 year, oats 1 year, and a mixture of Ladino clover and bromegrass 1 year.

Protect from flooding by constructing dikes or diversion terraces. Use surface or tile drainage. The soils respond well to fertilizer. Nitrogen will benefit corn, bluegrass, or timothy. Apply lime and fertilizer as indicated by soil tests and field trials.

Management group 3A

The soils of group 3A are moderately deep or deep, sloping, and eroded. They are light colored to moderately dark colored and are silty or loamy. These soils have formed over stratified sands, cherty gravel, sandstone, deep silt, or residual clay. They have a moderate to high moisture-supplying capacity. Fertility is moderately high to high. The soils are subject to water erosion if tilled, but tilling on the contour, stripcropping, and terracing will help to control erosion. If a good supply of plant nutrients is maintained, the soils are well suited to small grains, hay, pasture, and trees. Most of these soils have been placed in class III because they are eroded. The following mapping units are in this management group:

Bertrand silt loam, sloping, eroded.
Chaseburg silt loam, sloping.
Downs silt loam, sloping, eroded.
Dubuque silt loam, deep, sloping, eroded.
Dubuque silt loam, sloping, eroded.
Fayette silt loam, uplands, sloping, eroded.
Fayette silt loam, valleys, sloping, eroded.
Hixton loam, sloping, eroded.
Norden silt loam, sloping, eroded.
Norden loam, sloping, eroded.
Rockbridge silt loam, sloping, eroded.

Use and management suggestions.—Suitable cropping systems are wheat or oats 1 year and a mixture of red clover and timothy 1 year; or oats 1 year and a mixture of alfalfa and bromegrass 2 years. If contour stripcropping or terracing is used to control erosion, 1 year of corn can be used in the rotation. Sidedress corn with nitrogen. Apply lime and fertilizer as indicated by soil tests and field trials.

Management group 3B

The soils of group 3B are moderately deep or deep. Most of them are sloping, and they are sandy and eroded. They are forming over sandstone, stratified sand, or silt. The Chaseburg, Hixton, and Norden soils have moderate permeability. The Chaseburg soil is high in moisture-supplying capacity, and the Hixton and Norden soils are moderate in moisture-supplying capacity. All of the soils are moderately fertile. They are subject to serious erosion. Contour stripcropping, terracing, and adding organic matter will help to control erosion.

The Meridian soil of this group is nearly level. It is moderate in moisture-supplying capacity and is subject to wind erosion. Practices are needed to conserve moisture and to control wind erosion.

All of these soils are easy to work. They respond well to barnyard manure, lime, and commercial fertilizers. If adequate measures are used to control erosion, the soils are well suited to corn, oats, and alfalfa and bromegrass. They are in capability class III. The following soils are in this management group:

Chaseburg fine sandy loam, sloping.
Hixton fine sandy loam, sloping, eroded.
Meridian fine sandy loam, nearly level.
Norden fine sandy loam, sloping, eroded.

Use and management suggestions.—Suitable cropping systems are oats 1 year and a mixture of alfalfa and bromegrass 2 or 3 years. If terracing or contour stripcropping is used, add 1 year of corn to the rotation. Sidedress corn with nitrogen. Apply lime and fertilizers as indicated by soil tests and field trials.

Management group 3C

Only one soil, Dakota fine sandy loam, has been placed in management group 3C. This nearly level, somewhat droughty soil is dark colored. It is forming from fine sandy loam that overlies stratified sands. The soil occurs on stream terraces. Water moves through the profile readily. The soil is moderately fertile and is easy to work.

If suitable measures to conserve soil and water are used, it is well suited to corn, soybeans, oats, alfalfa, and bromegrass. It has been placed in class III because it is droughty.

Use and management suggestions.—Suitable cropping systems are corn 1 year, oats 1 year, and a mixture of alfalfa and bromegrass 2 years; or corn 1 year, soybeans 1 year, wheat 1 year, and a mixture of alfalfa and bromegrass 3 years. Use barnyard manure and green manure ahead of corn. Apply lime and fertilizers as indicated by soil tests and field trials.

Management group 3D

Group 3D consists of deep, light-colored, moderately well drained to imperfectly drained soils of the bottom lands. These soils are forming on silty alluvial materials. They are high in fertility and are easy to work. Many areas, however, are so small that they are either farmed with adjoining soils or left in pasture. They are likely to be flooded frequently, and most areas are inadequately drained. If protected from flooding and if adequate drainage is provided, they are well suited to corn, oats, Ladino or red clover, and timothy. Because they have excess water, these soils have been placed in class III. The following soils are in this management group:

Akan silt loam.
Alluvial land, moderately well drained.

Use and management suggestions.—Suitable cropping systems are corn 1 year, oats 1 year, and a mixture of clover and timothy 2 years; or corn 2 years, oats 1 year, and a mixture of clover and timothy 1 year. If these soils are protected by dikes and adequately drained by surface ditches or tile, they can be used regularly for tilled crops.

The crops respond well to mixed fertilizers, and supplemental nitrogen gives good returns on corn, timothy, or bluegrass pasture. Apply lime and fertilizers as indicated by soil tests and field trials.

Management group 3E

Group 3E consists of light-colored, silty, deep, nearly level to gently sloping soils of stream terraces. These soils are moderately fertile and have a high moisture-supplying capacity. Water drains slowly through the profile. Drainage is not feasible on some areas of the Curran soil that are affected by seepage or a high water table. Unless the Curran soil is drained, alfalfa does not grow well, but the Medary soil is well suited to it. Clover, timothy, oats, corn, and bluegrass do well on both of these soils. The two soils of this group have been placed in class III because of excess water. They are:

Curran silt loam.
Medary silt loam.

Use and management suggestions.—Suitable cropping systems are corn 1 year, oats 1 year, and a mixture of clover and timothy 2 years; or corn 1 year, oats 1 year, and a mixture of alfalfa and bromegrass 2 years.

Surface ditches, diversion ditches, or terraces are needed to dispose of excess water. Use barnyard manure ahead of corn. Crops respond well to applications of mixed fertilizer, and corn responds well if sidedressed with nitrogen fertilizer. Apply lime and fertilizer as indicated by soil tests and field trials.

Management group 3F

Group 3F consists of poorly drained alluvial land and a very poorly drained organic soil. These occur mainly on flood plains, but a minor part of the organic soil occurs on the slopes above the flood plains, where it receives seepage water. The texture of the alluvial land on the flood plains varies greatly.

The soils of this group are high in fertility, but it is not practical to drain them or to provide flood protection for most of the areas. If not drained, the soils are best suited to pasture. Except for the places that have very coarse or very fine texture, all the areas that are drained and protected from overflow are well suited to corn, oats, clover, timothy, and bluegrass. The areas of organic soil can be drained successfully, and crops on this soil respond well to phosphate and potash fertilizers. The soils of this group have been placed in class III because of excess water. They are:

Alluvial land, poorly drained.
Carlisle muck.

Use and management suggestions.—A suitable cropping system is corn 1 year, oats 1 year, and a mixture of clover and timothy 1 or 2 years.

Drainage and protection from overflow are necessary to grow cultivated crops. Tile or surface drains, or a combination of tile and surface drains, can be used to drain Carlisle muck. Surface drains can be used on some of the Alluvial land, poorly drained, but this soil is not suitable for tile drainage.

Corn responds well to liberal applications of potash and nitrogen fertilizers, used as a starter. Apply lime and fertilizers as indicated by soil tests and field trials.

Most of the Alluvial land, poorly drained, cannot be protected from floods and must be used as class V land. Soils of class V are nearly level or gently sloping, but because of floods or other limitations, they must be used mostly for pasture or other permanent vegetation.

Management group 4A

The soils of this group are light colored and have a silty or loamy texture. They are eroded but are moderately deep to deep. The soils are forming on wind-laid silts, cherty gravel, sandstone, or residual clay. They have moderate fertility and range from low to high in moisture-supplying capacity. They are well suited to trees, pasture, and hay but are too steep to allow growing of row crops without severe erosion. These soils, placed in class IV because of the risk of erosion, are the following:

Dubuque silt loam, deep, steep, eroded.
Dubuque silt loam, steep, eroded.
Fayette silt loam, uplands, steep, eroded.
Fayette silt loam, valleys, steep, eroded.
Hixton loam, steep, eroded.
Norden silt loam, steep, eroded.
Norden loam, steep, eroded.
Rockbridge silt loam, steep, eroded.

Use and management suggestions.—A suitable cropping system is oats 1 year and a mixture of alfalfa and bromegrass 2 or 3 years; or alfalfa and bromegrass used for pasture until it needs to be renewed. Bluegrass can also be used for pasture.

Renovate the pastures when needed. Occasional hay crops can be harvested from the alfalfa-and-bromegrass pastures. Lime and fertilize bluegrass pasture as needed

for adequate growth. Apply lime and fertilizers to croplands and pasture as indicated by soil tests and field trials.

Management group 4B

Only one soil, Downs silt loam, sloping, severely eroded, is in management group 4B. This soil is deep, sloping, and severely eroded. It has formed on wind-laid silts. The soil is darker and somewhat more fertile than the soils of group 4A but is otherwise similar. It is suited to oats, alfalfa and bromegrass, and trees. This soil has been placed in class VI, mainly because it is erodible.

Use and management suggestions.—A suitable cropping system consists of oats 1 year and a mixture of alfalfa and bromegrass 3 or 4 years. Keep the soil in alfalfa and bromegrass as long as the proportion of the legume is adequate to make a good mixed stand. Apply lime and fertilizers as indicated by soil tests and field trials.

Management group 4C

The soils in this group are nearly level to sloping and are droughty. They are forming on stream terraces from sandy materials. The soils are moderate to low in fertility and are low in moisture-supplying capacity. They are well suited to Norway and white pines and to pasture. If adequately fertilized and protected from erosion, they will grow corn, oats, and alfalfa and bromegrass. The soils are subject to wind erosion. They have been placed in class IV because they are droughty. The following soils are in this management group:

Gotham loamy fine sand.
Meridian fine sandy loam, sloping, eroded.
Plainfield loamy fine sand, nearly level, eroded.
Sparta loamy fine sand.

Use and management suggestions.—Suitable cropping systems are corn 1 year and a mixture of alfalfa and bromegrass 3 years; oats 1 year and a mixture of alfalfa and bromegrass 3 years; or corn 1 year, oats 1 year, and a mixture of alfalfa and bromegrass 3 years.

Plant and maintain windbreaks and use other measures to control wind erosion. Plow under a good sod ahead of corn. Apply lime and fertilizer to crops and pasture as indicated by soil tests and field trials.

Management group 5A

The soils in this group are moderately shallow and are eroded. They are sloping to steep and some areas are stony. They are forming from wind-laid silts that overlie residual clay. These soils are low to moderately low in fertility and in content of organic matter. They are low in moisture-supplying capacity. The soils are well suited to trees and will grow grass-legume or bluegrass pasture. They are too steep or too stony for cultivation. They have been placed in class VI mainly because of stoniness and the risk of erosion. The following soils are in management group 5A:

Dubuque silty clay loam, steep, severely eroded.
Dubuque stony silt loam, sloping, eroded.

Use and management suggestions.—These soils can be used for alfalfa and bromegrass pasture or for bluegrass pasture. Renovate the pastures that are not stony whenever they need it, and broadcast fertilizer on the stony soil. Apply lime and fertilizer as indicated by soil tests and field trials.

Management group 5B

The soils in group 5B are sandy and steep. They are low in organic matter, moderate to moderately low in moisture-supplying capacity, and low to moderate in fertility. The soils are well suited to trees, bluegrass, and alfalfa and bromegrass. They were placed in class VI mainly because they were droughty. The following soils are in this management group:

Hixton fine sandy loam, steep, moderately eroded.
Meridian fine sandy loam, steep, eroded.
Norden fine sandy loam, steep, eroded.

Use and management suggestions.—These soils are suited to alfalfa and bromegrass pasture, bluegrass pasture, and trees. Topdress pasture with manure, renovate, and fertilize. Apply lime and fertilize as indicated by soil tests and field trials.

Management group 6A

The soils in this group are moderately shallow, stony, steep or very steep, and eroded. They have low to moderate water-supplying capacity and are low to moderate in fertility. These soils are not suited to cultivation but are well suited to hardwood trees and as refuges for wildlife. They have been placed in class VII because they are steep, stony, or droughty. The following soils are in this management group:

Dubuque stony silt loam, steep, eroded.
Dubuque stony silt loam, very steep, eroded.
Hixton fine sandy loam, very steep, eroded.
Norden loam, very steep, eroded.
Norden fine sandy loam, very steep, eroded.
Stony land, steep.
Stony land, very steep.

Use and management suggestions.—Maintain in forest. Plant north- and east-facing slopes to conifers and other areas to hardwoods. Improve the stand by selective cutting. Protect from fire and grazing.

Management group 6B

The soils in this group are hummocky, sloping, or steep and sandy. They all have low moisture-supplying capacity and low fertility. The soils are not suited to cultivation but are well suited to coniferous trees and wildlife. They have been placed in class VII because they are droughty or steep. The following soils are in this management group:

Boone loamy fine sand, sloping, eroded.
Boone loamy fine sand, steep, eroded.
Boone loamy fine sand, steep, severely eroded.
Plainfield loamy fine sand, sloping, eroded.
Plainfield loamy fine sand, steep, eroded.
Riverwash.
Sparta fine sand, hummocky.
Sparta fine sand, hummocky, eroded.

Use and management suggestions.—Plant Norway and white pine or maintain in jack pine and oak. Protect from fire and grazing.

Estimated Yields

The estimated average yields of the principal crops on each soil in Richland County are listed in table 6. These estimates are based on interviews with farmers, on the results obtained by the agricultural experiment station on test plots located within the county, and on observations

made by soil surveyors and other agricultural workers who are familiar with the soils.[5]

In columns A are average yields obtained under the management common in the county at the time the soil survey was made. This management includes the use of barnyard manure, starter fertilizer for corn, and little or no fertilizer for oats and hay crops.

Yields in columns B are those expected if the management practices suggested under each management group are used. These include the wise choice and rotation of crops; proper use of fertilizer, lime, and manure; return of organic matter to the soils; and, if needed, methods to control water. The improved management needed to get the yields in columns B for tobacco and other special crops includes fertilizing heavily and controlling insects. Management to improve the productivity of forests is discussed in the section, Forests.

Even higher yields than those given in table 6 are possible. On certain soils it will pay to make heavy applications of nitrogen, and phosphate, potash, and possibly of some minor elements such as boron. Many farmers can produce more corn than 100 bushels per acre. Consult your county agent or experiment station for specific suggestions on kinds and quantities of fertilizer and lime to apply and seed mixtures to use.

[5] KLINGELHOETS, A. J., PRODUCTIVITY RATINGS FOR SOILS OF CRAWFORD, GRANT, AND RICHLAND COUNTIES, WISCONSIN. [Unpublished thesis, Univ. of Wis.] 1948.

TABLE 6.—*Estimated acre yields of principal crops*

[Estimated yields in columns A are under common management practices; yields in columns B are those obtained under good management. Dashed lines indicate the soil is not suitable or the crop is rarely grown]

Soil	Corn (grain)		Corn (ensilage)		Oats		Tobacco		Clover-timothy hay		Alfalfa-brome hay		Rotation pasture		Permanent pasture		Forest [1]
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
	Bu.	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Lb.*	*Lb.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]	
Akan silt loam [3]	----	60	-----	10.0	----	45	------	------	-----	2.3	-----	-----	115	140	95	120	Poor.
Alluvial land:																	
Moderately well drained	35	55	7.5	9.5	30	45	------	------	1.3	1.8	-----	-----	110	150	100	130	Fair.
Poorly drained [3]	----	50	-----	9.0	----	45	------	------	-----	2.0	-----	-----	60	90	55	85	Poor.
Arenzville silt loam	50	65	9.0	10.5	47	55	1,450	1,650	2.0	2.5	3.2	3.8	130	160	125	140	Good.
Bertrand silt loam:																	
Level to gently sloping	50	70	9.0	11.0	52	60	1,600	1,850	2.0	2.5	3.0	3.5	95	130	85	115	Good.
Level to gently sloping, eroded	48	65	8.5	10.5	50	60	1,400	1,700	2.0	2.5	3.0	3.5	95	130	85	115	Good.
Sloping, eroded	45	65	8.5	10.5	48	58	1,200	1,400	1.9	2.4	2.9	3.4	90	125	85	110	Good.
Boaz silt loam [3]	40	60	8.0	10.0	40	50	------	------	2.1	2.5	-----	-----	90	120	80	105	Poor.
Boone loamy fine sand:																	
Sloping, eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	-----	Poor.
Steep, eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	30	50	20	40	Poor.
Steep, severely eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	-----	Poor.
Carlisle muck [3]	40	65	8.0	10.5	35	50	------	------	1.5	2.2	-----	-----	80	120	70	110	
Chaseburg silt loam:																	
Gently sloping	55	70	9.5	11.0	46	60	1,500	1,800	2.1	2.5	3.0	3.4	120	150	105	135	Good.
Sloping	50	65	9.0	10.5	41	55	------	1,600	1.9	2.3	2.8	3.3	110	145	100	130	Good.
Chaseburg fine sandy loam:																	
Gently sloping	50	65	9.0	10.5	45	55	1,450	1,800	2.0	2.3	3.0	3.4	105	145	95	130	Fair.
Sloping	45	60	8.5	10.0	40	52	------	1,500	1.8	2.2	2.6	3.2	100	140	90	125	Fair.
Curran silt loam [3]	40	55	8.0	9.5	45	50	------	------	1.8	2.2	-----	-----	90	115	80	100	Poor.
Dakota loam	50	65	9.0	10.5	46	55	------	------	2.0	2.3	2.5	3.2	80	105	66	95	Good.
Dakota fine sandy loam	45	60	8.5	10.0	42	52	------	------	1.9	2.2	2.3	3.1	75	100	62	90	Good.
Downs silt loam:																	
Gently sloping	55	75	9.5	11.0	55	65	1,600	1,900	2.2	2.6	3.1	3.5	100	125	90	120	Good.
Gently sloping, eroded	55	75	9.5	11.0	52	64	------	------	2.2	2.6	3.0	3.5	90	125	75	98	Good.
Sloping, eroded	50	70	9.0	11.0	50	60	------	------	2.0	2.3	2.8	3.2	85	120	70	90	Good.
Sloping, severely eroded	----	----	-----	-----	40	55	------	------	1.8	2.4	2.5	3.2	75	105	60	90	Good.
Dubuque silt loam:																	
Deep, gently sloping, eroded	45	60	8.5	10.0	45	52	1,400	1,700	2.0	2.5	2.5	3.0	80	105	65	95	Good.
Deep, sloping, eroded	42	58	8.0	10.0	40	50	------	------	1.8	2.3	2.2	2.8	75	100	60	90	Good.
Deep, steep, eroded	----	----	-----	-----	30	40	------	------	1.1	1.5	2.1	2.6	60	90	50	80	Good.
Gently sloping, eroded	40	55	8.0	9.5	35	45	------	------	1.4	2.0	2.0	2.6	65	90	55	80	Fair.
Sloping, eroded	35	50	7.5	9.0	30	38	------	------	1.2	1.5	2.0	2.5	60	85	50	75	Fair.
Steep, eroded	----	----	-----	-----	28	35	------	------	-----	-----	1.8	2.4	55	80	40	75	Fair.
Dubuque silty clay loam:																	
Steep, severely eroded	----	----	-----	-----	----	----	------	------	-----	-----	1.5	2.2	50	75	35	70	Fair.
Dubuque stony silt loam:																	
Sloping, eroded	----	----	-----	-----	----	----	------	------	1.2	1.8	1.8	2.4	60	80	40	75	Fair.
Steep, eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	-----	Fair.
Very steep, eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	-----	Fair.

See footnotes at end of table.

TABLE 6.—*Estimated acre yields of principal crops*—Continued

Estimated yields in columns A are under common management practices; yields in columns B are those obtained under good management. Dashed lines indicate the soil is not suitable or the crop is rarely grown]

Soil	Corn (grain)		Corn (ensilage)		Oats		Tobacco		Clover-timothy hay		Alfalfa-brome hay		Rotation pasture		Permanent pasture		Forest [1]
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
	Bu.	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Lb.*	*Lb.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]	
Ettrick silt loam [3]	----	65	-----	10. 5	----	50	------	------	-----	2. 5	-----	-----	60	140	50	125	Poor.
Fayette silt loam, uplands:																	
Gently sloping, eroded	45	65	8. 5	10. 5	45	55	1, 500	1, 800	2. 0	2. 5	2. 8	3. 5	90	120	70	100	Very good.
Sloping, eroded	40	56	8. 0	9. 5	42	51	1, 200	1, 400	1. 8	2. 2	2. 5	3. 0	85	115	65	90	Very good.
Steep, eroded	----	----	-----	-----	35	48	------	------	1. 5	2. 0	2. 1	2. 8	75	110	60	88	Good.
Fayette silt loam, valleys:																	
Sloping, eroded	42	58	8. 0	10. 0	45	55	1, 400	1, 700	2. 0	2. 5	2. 8	3. 5	90	125	70	105	Very good.
Steep, eroded	----	----	-----	-----	35	50	------	------	1. 8	2. 3	2. 5	3. 2	85	120	65	95	Good.
Gotham loamy fine sand	30	45	7. 0	8. 5	25	35	------	------	1. 0	1. 4	1. 5	1. 9	48	75	35	60	Fair. [4]
Hixton loam:																	
Sloping, eroded	35	50	7. 5	9. 0	32	45	1, 200	1, 400	1. 2	1. 6	1. 7	2. 1	60	90	50	80	Good.
Steep, eroded	----	----	-----	-----	30	40	------	------	-----	-----	1. 6	2. 0	55	85	40	70	Good.
Hixton fine sandy loam:																	
Sloping, eroded	30	45	7. 0	8. 5	30	40	1, 100	1, 400	1. 2	1. 5	1. 6	2. 0	55	85	45	75	Fair.
Steep, moderately eroded	----	----	-----	-----	----	----	------	------	1. 0	1. 4	1. 4	1. 9	50	70	30	65	Fair.
Very steep, eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	-----	Fair.
Jackson silt loam	50	70	9. 0	11. 0	46	55	------	------	2. 0	2. 4	2. 6	3. 0	95	140	90	120	Fair.
Judson silt loam:																	
Gently sloping	58	80	10. 0	11. 0	48	58	1, 650	1, 900	2. 3	2. 6	3. 2	3. 5	130	165	120	135	Good.
Sloping	55	70	9. 5	11. 0	42	55	------	------	2. 0	2. 5	2. 9	3. 2	120	160	115	130	Good.
Lawson silt loam	55	75	9. 0	11. 0	48	55	1, 500	1, 700	2. 1	2. 5	3. 0	3. 4	140	170	130	145	Poor.
Medary silt loam	40	55	8. 0	9. 5	35	45	1, 200	1, 400	1. 4	1. 7	1. 7	2. 1	75	95	60	85	Good.
Meridian fine sandy loam:																	
Nearly level	35	50	7. 5	9. 0	32	40	1, 100	1, 300	1. 2	1. 5	1. 7	2. 0	55	80	40	65	Fair.
Sloping, eroded	30	45	7. 0	8. 5	30	38	------	------	1. 0	1. 4	1. 2	1. 9	50	75	35	65	Fair.
Steep, eroded	----	----	-----	-----	----	----	------	------	-----	-----	1. 0	1. 7	45	65	30	60	Poor.
Norden silt loam:																	
Sloping, eroded	40	56	8. 0	10. 0	42	55	1, 200	1, 500	1. 7	2. 0	2. 0	2. 6	70	100	60	85	Good.
Steep, eroded	----	----	-----	-----	35	50	------	------	-----	-----	1. 8	2. 5	60	95	50	80	Good.
Norden loam:																	
Sloping, eroded	38	55	8. 0	9. 5	35	48	1, 200	1, 500	1. 3	1. 7	1. 8	2. 3	65	90	55	85	Good.
Steep, eroded	----	----	-----	-----	32	45	------	------	-----	-----	1. 5	2. 1	58	90	50	80	Good.
Very steep, eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	-----	Fair.
Norden fine sandy loam:																	
Sloping, eroded	32	48	7. 0	9. 0	30	45	1, 100	1, 400	1. 2	1. 6	1. 7	2. 2	60	90	55	80	Fair.
Steep, eroded	----	----	-----	-----	----	----	------	------	-----	-----	1. 4	2. 0	55	85	48	75	Fair.
Very steep, eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	-----	Poor.
Orion silt loam	50	65	9. 0	10. 5	44	54	------	------	2. 2	2. 5	2. 1	2. 7	130	155	120	140	Fair.
Plainfield loamy fine sand:																	
Nearly level, eroded	18	35	4. 0	7. 0	20	27	------	------	-----	-----	-----	1. 6	35	60	26	45	Poor. [4]
Sloping, eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	1. 5	30	55	20	35	Poor. [4]
Steep, eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	-----	Poor. [4]
Riverwash	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	-----	Poor.
Rockbridge silt loam:																	
Sloping, eroded	40	55	8. 0	9. 5	38	50	1, 300	1, 500	1. 5	2. 0	2. 0	2. 7	70	95	57	85	Fair.
Steep, eroded	----	----	-----	-----	30	45	------	------	-----	-----	1. 5	2. 5	60	90	50	80	Fair.
Sparta loamy fine sand	25	40	5. 0	8. 0	22	30	1, 000	1, 200	. 8	1. 4	1. 2	1. 8	38	65	30	50	Poor. [4]
Sparta fine sand, hummocky	----	30	-----	6. 0	18	25	------	------	-----	1. 2	-----	1. 5	30	60	25	45	Poor. [4]
Eroded	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	35	Poor. [4]
Stony land:																	
Steep	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	30	45	Fair.
Very steep	----	----	-----	-----	----	----	------	------	-----	-----	-----	-----	-----	-----	-----	-----	Fair.
Tell silt loam	40	60	8. 0	10. 0	40	48	------	------	1. 5	1. 8	2. 0	2. 4	70	95	50	75	Fair.

[1] General soil ratings for forest growth by C. T. Youngberg, University of Wisconsin. Soil ratings for trees on valley slopes should be raised wherever there is plenty of water available. In order to establish trees on prairie soils, use seedlings from long-established nurseries.

[2] Cow-acre-days is a term used to express the carrying capacity of pasture. The value is obtained by multiplying the number of animal units carried per acre by the number of days the pasture is grazed without injury to the sod during a single grazing season.

[3] Soil must be drained for agricultural use.

[4] Plantings of jack, Norway, and white pines do well on this soil.

Formation and Classification of Soils

In this section are discussed the factors that affect soil formation, the morphology and composition of the soils of Richland County, and classification of the soils in higher categories.

Factors of Soil Formation

Soil is formed by weathering and other processes that act on parent material. The characteristics of the soil at any given point depend upon (1) the climate, (2) the plant and animal life, (3) the physical and mineralogical composition of the parent material, (4) the relief, or lay of the land, and (5) time. Climate, and its effect on soil and plants, is modified by the characteristics of the soil and by relief. Relief, in turn, strongly influences drainage, aeration, runoff, erosion, and exposure to sun and wind.

Climate

Richland County has a climate that is marked by extremes in temperature. The climate is similar to that in most of southern Wisconsin. Precipitation is evenly distributed throughout the county. The annual rainfall averages about 31 inches a year, and a large part of it falls during the growing season. The snowfall averages about 35 inches. The climate is uniform throughout the county, and no major differences exist among the soils because of it.

Living organisms

Plants and animals are active in the soil-forming processes. The nature of the changes they bring about depends, among other things, upon the kind of life processes peculiar to each. The kinds of plants and animals that live on and in the soil are determined by the climate, parent material, relief, and age of the soil, and by other organisms.

Most of the soils of the county have developed under a deciduous forest. The principal kinds of trees were basswood, maple, hickory, and oak, but there were several other less important species. Some areas of prairie soils or of soils that are transitional to prairie soils occur in the county. In these areas the native vegetation was tall prairie grasses or oak and hickory forests that had an understory of prairie plants.

The trees and shrubs that grow in the county have roots that go moderately deep to feed on the plant nutrients in the soil. Most of them shed their leaves each year. The content of plant nutrients in the leaves varies considerably. Generally, however, deciduous trees return larger amounts of bases and phosphorus to the soil in their leaves than coniferous trees. In this way plant nutrients are returned to the upper part of the soil from the lower part of the profile and partly replace nutrients leached out by percolating water.

In soils formed under forest, much organic material is added to the soil by the decay of leaves, twigs, roots, and entire plants. Most of it accumulates on the surface, where it is acted on by micro-organisms, earthworms, and other forms of life and by direct chemical reactions. The plant food released by this decomposition is available for new growth of plants.

As organic material decays, it releases organic acids that make the slowly soluble plant materials more soluble and hasten the leaching and translocation of inorganic materials. The rate of decomposition is strongly influenced by temperature and by the amount of moisture present. In Richland County, the short summers and cold winters slow up decomposition and reduce the amount of leaching.

Parent materials

The parent materials of the soils in the county consist of (1) materials weathered from rock in place and (2) materials transported by wind, water, or gravity and laid down as unconsolidated deposits of silt, sand, and clay and rock fragments. Materials of the first group are related directly to the underlying rocks from which they were derived; materials of the second group are related to the soils or rocks from which they were transported.

The parent materials formed in place consist of weathered products of sedimentary rocks. These rocks differ greatly in chemical and mineralogical composition, and the soils formed from them differ accordingly. The larger part of the bedrock of Richland County is made up of Prairie du Chien dolomite and Upper Cambrian sandstone. A few scattered remnants of St. Peter sandstone occur as rock outcrops above the dolomite in the northwestern part of the county. (See fig. 3, p. 3.) Some outcroppings of St. Peter sandstone occur in the northeastern corner of the county, but they are too small to be shown on a map of the scale used.

Certain soils characteristically form on certain types of geologic material. In Richland County the Norden soils overlie the Franconia formation of the Upper Cambrian sandstone, and the Hixton soils overlie the Trempealeau and Dresbach formations. Soils derived from loess, or wind-deposited silt, occur over all kinds of geologic formations within the county. The kind of soil developed in this loessal material depends on the depth of the deposit. The Dubuque soils have developed in thin silt deposits that overlie red clay, which is residual from the magnesian dolomite. The Fayette soils occur in the deeper silt deposits. There are many small areas of colluvial soils scattered throughout the county.

Soils formed on sands and silts deposited by water occur throughout the bottoms and terraces. The kinds of soils that have formed in these deposits are determined by the depth and texture of the water-deposited materials. The Bertrand and Downs soils are deep silty soils. The Bertrand soils have formed on terraces, and the Downs soils have formed on terraces and uplands. The Tell soil, also formed on terraces, has a somewhat thinner silty profile than the other soils. Some other soils that have formed on terraces are the loamy Meridian and Dakota soils and the sandy Plainfield, Gotham, and Sparta soils.

Topography

Relief ranges from nearly level to very steep in Richland County (fig. 9). On some steep areas, where a large amount of water runs off the surface, erosion is rapid and keeps an almost even pace with rock weathering and soil formation. The soils on steep slopes have shallow profiles, and, in places, there are rock outcrops. The soil materials are being constantly removed by erosion. They do not remain in place long enough to form genetically related horizons. Little water percolates through these soils, and therefore the degree of leaching and the amount of translocated materials are small.

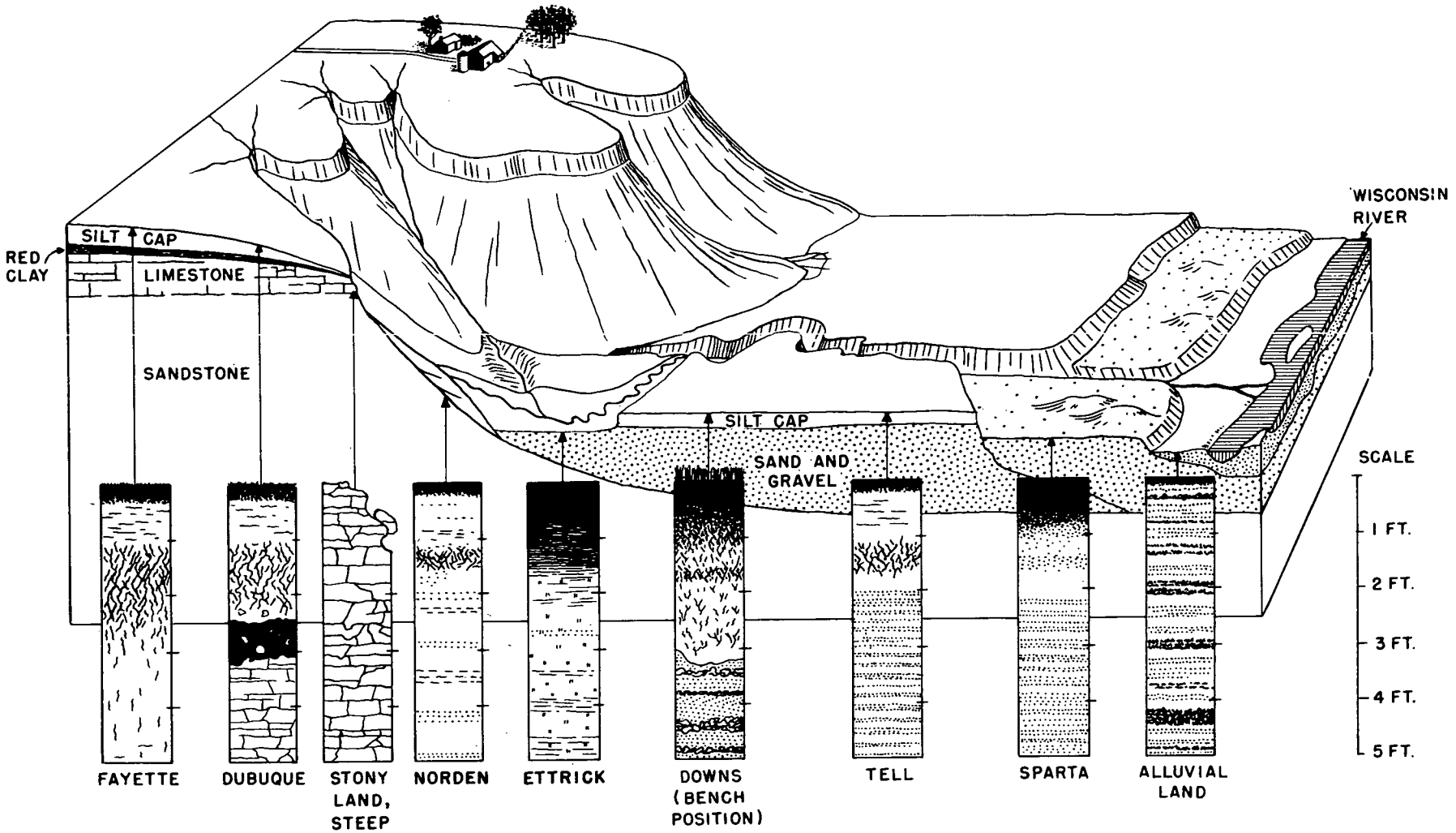

Figure 9.—Soil landscape of Richland County showing relationships among major soil series. (Courtesy Wis. Geol. and Nat. Hist. Survey.)

Most of the soils of this county have developed on slopes that favor the development of a good soil profile. Examples of such soils are those of the Bertrand and Fayette series. A few areas in depressions or on bottom lands have slow surface runoff and internal drainage. The soils in these low-lying areas differ from the well-drained soils in having a mottled yellow and gray, somewhat compact subsoil. The vegetation on the soils of depressions and bottom lands differs from that on well-drained soils, and the micro-organisms in the soils are different. Conditions are less favorable in these soils for organic matter to decompose rapidly than they are in the well-drained soils.

Time

The soils of this county differ little in age. The soils weathered from rocks are very old. They have formed on steep slopes, however, and because of erosion are not so well developed as the soils on milder slopes. The loessal soils of the uplands are developed to about the same degree as the soils on terraces and are probably of about the same age.

Classification of Soils

Soils are placed in narrow classes to organize and apply knowledge about their behavior within farms or counties. For study and comparison of large areas such as continents, they are placed in broad classes. In the comprehensive system of soil classification followed by the United States (*9*), the soils have been placed in six categories. Beginning at the top, the six categories are the order, suborder, great soil group, family, series, and type. In table 7, the soils are classified according to order, great soil group, and soil series.

In the highest category the soils of the whole country are grouped into three orders, whereas thousands of soil types are recognized in the lowest category. The suborder and family categories have never been fully developed and thus have been little used. Attention has largely been given to the classification of soils into soil types and series within counties or comparable areas and to the subsequent grouping of series into great soil groups and orders. The nature of the soil series and soil type is discussed in an earlier section, How a Soil Survey is Made. Subdivisions of soil types into phases, so as to provide finer distinctions significant to soil use and management, are also discussed in the same earlier section.

In the highest category of the classification scheme are the zonal, intrazonal, and azonal orders (*9*). The zonal order is made up of soils that have evident, genetically related horizons that reflect the predominant influence of climate and living organisms in their formation. The intrazonal order is comprised of soils with evident, genetically related horizons that reflect the dominant influence of a local factor of topography, or of parent material, or of time over the effects of climate and living organisms. The azonal order is made up of soils that lack distinct, genetically related horizons, commonly because of youth, resistant parent material, or steep topography.

The great soil groups in the county are (1) Gray-Brown Podzolic soils, (2) Brunizems, (3) Humic Gley soils, (4) Bog (Organic) soils, (5) Alluvial soils, (6) Regosols, and (7) Lithosols. This classification is incomplete and may be revised as knowledge about the soil series and their relations increases. Many of the soil series in the county are not representative of any one great soil group, since they tend to intergrade to other great soil groups.

TABLE 7.—*Classification of the soil series into higher categories*

Great soil group	Series	Remarks
ZONAL		
Gray-Brown Podzolic.	Bertrand.	
	Chaseburg	Intergrades toward Alluvial.
	Curran	Intergrades toward Low-Humic Gley.
	Downs	Intergrades toward Brunizem.
	Dubuque.	
	Fayette.	
	Hixton.	
	Jackson.	
	Medary.	
	Meridian.	
	Norden.	
	Rockbridge.	
	Tell.	
Brunizem	Dakota.	
	Gotham	Intergrades toward Gray-Brown Podzolic.
	Judson	Intergrades toward Alluvial.
	Sparta	Intergrades toward Regosol.
INTRAZONAL		
Humic Gley	Ettrick	Intergrades toward Alluvial.
Bog (Organic)	Carlisle muck.	
AZONAL		
Alluvial	Arenzville.	
	Akan	Intergrade toward Low-Humic Gley.
	Boaz	Intergrade toward Low-Humic Gley.
	Lawson	Washed from areas of Brunizem soils.
	Orion.	
Regosols	Boone.	
	Plainfield.	

The county is in the so-called Driftless area. It is well within the Gray-Brown Podzolic region of the United States and is considered a part of the Fayette-Dubuque soil area of Wisconsin (*7*).

Gray-Brown Podzolic soils

Gray-Brown Podzolic soils belong to the zonal order. These soils have a rather thin organic covering and organic-mineral layers that overlie a grayish-brown leached A horizon. The A horizon rests upon an illuvial B horizon.

These soils have developed under deciduous forest in a temperate moist climate. They have a surface covering of leaf litter, generally from deciduous trees. This consists of a dark, thin, mild (only slightly acid or moderately acid) humus, somewhat mixed with mineral soil. These soils have a grayish-brown loamy A_1 horizon with a crumb structure. The B horizon is yellowish brown, brown, brownish yellow, or reddish brown and becomes lighter colored with depth. Its texture is moderately heavy, and

its structure is blocky. The total depth of the solum varies considerably but seldom exceeds 4 feet (*9*). Podzolization is the chief process in the development of these soils.

In Richland County the soil series in this great soil group are:

Bertrand.	Fayette.	Norden.
Chaseburg.	Hixton.	Rockbridge.
Curran	Jackson.	Tell.
Downs	Medary.	
Dubuque.	Meridian.	

The soils of the Dubuque series are the most extensive of the Gray-Brown Podzolic soils in the county. They have developed from a fairly thin deposit of loess that rests on a layer of red clay. The clay overlies limestone bedrock. The silt deposit varies in thickness. It is thicker on the more level uplands than on the steeper slopes. These well-drained soils occur on forested uplands on slopes that range to more than 30 percent. In some places, particularly in the steeper areas, chert fragments are scattered on the surface and throughout the profile.

A typical profile of Dubuque silt loam, deep, sloping, eroded, follows:

A_0 A thin layer of forest litter.

A_1 0 to 1 inch, gray (10YR 5/1)[6] silt loam; medium granular structure; contains a mass of roots; high in organic matter; pH 6.0.

A_2 1 to 10 inches, light brownish-gray (10YR 6/2) silt loam; granular in places; generally weak platy structure but breaks readily to small granules; peds in many places coated with light gray (10YR 7/2); numerous fibrous roots; many worm casts; pH 5.5.

B_1 10 to 14 inches, yellowish-brown (10YR 5/4) silt loam; moderate blocky structure; thin light-gray coating (10YR 7/2) on peds; a few roots; pH 6.0.

B_2 14 to 22 inches, yellowish-brown to dark yellowish-brown (10YR 5/6 to 4/4) light silty clay loam; strong blocky structure; a few roots; pH 5.5.

D_1 22 to 72 inches, dark reddish-brown (5YR 3/2), dusky-red (2.5YR 3/2), or brown (10YR 4/3) silty clay with some gray-coated peds; in many places contains many chert fragments and some grains of sand; very strong blocky structure; pH 7.0; bedrock of whitish hard dolomitic limestone.

The depth to the brown or reddish-brown clay ranges from 18 to 40 inches. In places where the depth of the silt is 30 inches or more, the material at depths between 30 and 40 inches is somewhat more friable and less well developed than in the typical profile. This indicates that a C horizon occurs within the silt, which is directly underlain by the red clay. The residual clay is browner than in the typical soil, in the areas where the limestone is free of chert.

Podzolization has been the dominant process in the formation of this soil. The loess that was the parent material probably was calcareous at the time it was deposited, but during the soil-developing process it has been leached free of carbonates. The variation in thickness of the red clay is probably related to the topography and to the erosion that occurred before the silt was deposited.

The differences among the Gray-Brown Podzolic soils in this county are chiefly related to differences in parent materials or topography. The soils of the Hixton and Norden series have developed from sandstone. The Hixton soils have developed from fine-grained sandstone that is nearly free of glauconite. The Norden soils have developed from fine-grained glauconitic sandstone. The Norden soils are more fertile and better developed than the Hixton soils and have a higher moisture-holding capacity.

The differences among the terrace soils, such as the Bertrand, Jackson, Meridian, Rockbridge, and Tell, are related to the thickness of the loessal parent material over the underlying sands or gravel. The Medary soil differs from the other terrace soils in having developed in silt that overlies lacustrine deposits on old lake terraces. These soils of the terraces all have well-developed Gray-Brown Podzolic characteristics and occur on more nearly level areas than the soils on the uplands.

The Chaseburg soils have weak profile development. They have formed in recent colluvial material that was washed from higher areas. They intergrade toward Alluvial soils.

Brunizems

The Brunizems, or Prairie soils, are normally formed in a temperate, moderately humid climate under a cover of tall grasses. In this county the bluestem grasses were dominant. The Brunizems typically have a very dark brown or grayish brown surface soil that grades to lighter colored parent material at depths of 2 to 5 feet.

In this county the soil series in this great soil group are:

Dakota.	Judson.
Gotham.	Sparta.

The Dakota soils are typical of the Brunizems in Richland County. They are noncalcareous. They have developed on sandy outwash plains and stream terraces. These soils occur mainly between the Sparta soils and the upland bluffs, in association with the Sparta soils. Except that they have a somewhat darker and finer textured surface soil and a moderately well developed B horizon, they are similar to the Sparta soils. Prairie grasses and scrub oak were the native vegetation.

A profile of Dakota fine sandy loam, observed in the SW corner of the NE¼ of section 35, Buena Vista Township, was taken as an example of the Brunizem soils in the county. This soil was in a cultivated field containing a good stand of corn.

Profile description:

A_p 0 to 8 inches, very dark gray (10YR 3/1) fine sandy loam; contains light-gray sand grains that give a salt-and-pepper effect; weak granular structure; contains numerous roots; pH 6.8.

A_3 8 to 14 inches, dark-gray (10YR 4/1) light fine sandy loam; weak granular structure; contains numerous roots; pH 5.8.

B_2 14 to 26 inches, dark grayish-brown (10YR 4/2) fine sandy loam; compact in place; weak blocky structure that shows only a small amount of development; contains several roots; pH 5.3.

B_3 26 to 32 inches, yellowish-brown (10YR 5/6) loamy fine sand; single grain; slightly compact in place; pH 5.5.

C 32 inches +, light yellowish-brown (10YR 6/4) loose fine sand; single grain; somewhat stratified; pH 6.0.

In the Dakota soils, the A horizon varies in texture and depth. The texture of the B horizon ranges from loamy fine sand to loam.

The Judson soils have formed from material washed from higher lying soils. They are young, weakly developed soils that intergrade toward the Alluvial soils.

Humic Gley soils

Humic Gley soils are poorly drained soils that have a thick surface horizon and a highly gleyed subsoil. They

[6] Symbols express Munsell color notations. Unless otherwise stated color is of moist soil.

have developed in slight depressions within the uplands or bottoms where water tends to pond and internal drainage is very poor. In Richland County only the Ettrick series is in this great soil group.

The Ettrick soils, represented in this county by Ettrick silt loam, have developed from silty materials that were deposited on high stream bottoms. They occur in association with Alluvial soils. These Humic Gleys are poorly drained and have a very dark surface soil and a mottled gray subsoil.

Profile in center of SW¼ of section 10, Bloom Township:

A_{11} 0 to 8 inches, black (7.5YR 2/0) silt loam; moderate granular structure; high content of organic matter; pH 7.0.
A_{12} 8 to 18 inches, very dark gray (7.5YR 3/0) heavy silt loam; contains several roots; in places is slightly mottled with yellowish brown; pH 7.0.
A_3 18 to 22 inches, very dark gray (7.5YR 3/0 to 4/0) silty clay loam; slightly mottled with yellowish brown; plastic when wet; pH 7.0.
B_{1g} 22 to 24 inches, gray (10YR 5/1) silt loam, mottled with gray (10YR 6/1) and yellowish brown (10YR 5/4); weak blocky structure; firm when moist and plastic when wet; pH 6.5.
G_1 24 to 35 inches, gray (10YR 5/1) massive silt loam to light silty clay loam; highly mottled with light yellowish brown (10YR 6/4) and brownish yellow (10YR 6/6); pH 6.5.
G_2 35 inches +, dark-gray (10YR 4/1) and yellowish-brown (10YR 5/4) massive silt loam that becomes stratified with depth; pH 7.0.

The surface layer varies slightly in color and in thickness. The subsoil varies in the degree of mottling.

Bog (Organic) soils

The Bog soils, represented in this county by Carlisle muck, are organic soils. They generally have a muck or peat surface soil underlain by peat. They are developing under swamp or marsh vegetation in a humid or subhumid climate. The soils have developed in depressions, in stream bottoms, and in a few places on seepage slopes. The soils have a high content of organic matter and are very wet. They consist chiefly of well decomposed to moderately well decomposed organic matter.

Alluvial soils

The Alluvial soils are developing from recently deposited alluvium on flood plains. They have little or no profile development and receive fresh deposits of sediment during each flood.

The following soil series are in this great soil group:

Arenzville.	Lawson.
Akan.	Orion.
Boaz.	

The Lawson soil is an example of an Alluvial soil in this county. It is a dark-colored, moderately well drained to well drained soil that occurs in the smaller stream valleys in the central and northern parts of the county. The soil is subject to overwash.

Profile in center of south section line, sec. 33, T. 10 N., R. 2 W.:

0 to 8 inches, very dark gray (10YR 3/1) silt loam; moderate granular structure; several roots and worm casts; pH 7.0.
8 to 16 inches, black (10YR 2/1) granular silt loam; somewhat more compact in place and breaks to larger granules than material in the above horizon; pH 7.0.
16 to 26 inches, very dark gray (10YR 3/1) silt loam that is high in organic matter; contains several roots; massive to irregular weak coarse blocky structure; slightly mottled in the lower part; pH 7.0.
26 to 38 inches, similar to horizon immediately above but has a slightly more grayish cast; pH 7.0.
38 inches +, very dark grayish-brown (10YR 3/2) silt loam, slightly mottled with yellowish-brown and black specks; contains several root channels; pH 7.0.

The surface soil varies from loam to silty clay loam. In places the reaction is slightly acid. Some areas have a thin covering of lighter colored, more recently deposited material, and in places the soil is slightly mottled at depths between 18 and 24 inches.

The Akan and Boaz soils have a medial B horizon and evidence of an A_2 horizon. They are therefore classified as intergrades towards the Low-Humic Gley great soil group.

Regosols

Regosols are an azonal group of soils consisting of deep, soft mineral deposits in which few or no clearly expressed soil characteristics have developed. Soils of this group are largely confined to recent sand dunes and to loess and glacial drift on steep slopes.

In this county the soil series in this great soil group are:

Boone.	Plainfield.

Profile observed in the central part of section 30, Buena Vista Township:

A 0 to 10 inches, dark grayish-brown to brown very friable loamy fine sand; weak fine granular structure; pH 6.0.
B 10 to 26 inches, dark yellowish-brown loose fine sand; single grain; color only, no textural or structural development of a B horizon; pH 5.5.
C 26 inches +, yellowish-brown, loose, stratified fine to medium sand many feet thick; pH 5.0.

Low-Humic Gley soils

Low-Humic Gley soils are imperfectly drained to poorly drained soils that have a thin surface horizon and a highly mottled subsoil. They have formed in slight depressions where water tends to pond and internal drainage is very poor. In Richland County there are no soils typical of this great soil group, but the Curran soils, which are Gray-Brown Podzolic soils, intergrade toward Low-Humic Gley soils. Akan and Boaz soils are members of the Alluvial great soil group, but they also intergrade towards Low-Humic Gley soils. All of these intergrades show some of the properties of the Low-Humic Gley soils.

Lithosols

Although no modal Lithosol profiles occur in the county, there are many small areas of soils within the miscellaneous land types mapped as Stony land that have characteristics typical of the Lithosol great soil group. The soils in these small areas grade toward the Gray-Brown Podzolic great soil group.

Miscellaneous land types

The miscellaneous land types are not classified by great soil groups. In Richland County these land types are:

Alluvial land, moderately well drained.	Riverwash.
Alluvial land, poorly drained.	Stony land, steep.
	Stony land, very steep.

Alluvial land, moderately well drained, is made up of many small areas of different alluvial soils. Alluvial land, poorly drained, although a miscellaneous land type, grades toward the Low-Humic Gley great soil group. Riverwash is made up of recently deposited sand and gravel.

Glossary

Acidity. The degree of acidity of the soil mass expressed in pH values or in words as follows:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6. 6–7. 3
		Mildly alkaline	7. 4–7. 8
Very strongly acid	4. 5–5. 0	Moderately alkaline	7. 9–8. 4
Strongly acid	5. 1–5. 5	Strongly alkaline	8. 5–9. 0
Medium acid	5. 6–6. 0	Very strongly alkaline	9.1 and higher.
Slightly acid	6. 1–6. 5		

Alluvium. Materials, as sand, silt, or clay, deposited on land by streams.

Clay. The small mineral soil grains less than 0.002 mm. (0.000079 in.) in diameter.

Colluvium. Deposits of rock fragments and soil materials accumulated at the bases of slopes through the combined influences of gravity and water.

Creep, soil. Movement of soil down slopes as the result of water action and gravity.

Depressions. Low-lying areas that have no surface outlets for the water that accumulates on them or that have only poor outlets.

Erosion. The wearing away or removal of soil material by water or wind.

Foot slopes. Mild slopes at the bases of steeper slopes.

Friable. Crushes easily under gentle to moderate pressure between thumb and forefinger, and coheres when pressed together.

Horizon, soil. A layer of soil approximately parallel to the soil surface and different in appearance and characteristics from the layers above and below it.

Lacustrine deposits. Materials laid down in lake waters.

Loess. Fine-textured, mainly silty materials transported by wind and deposited on land.

Mottling. The discoloration common in soils in which drainage is restricted. The mottles appear as spots or streaks and vary in number and size.

Outwash, glacial. The material swept out, sorted, and deposited beyond the glacial ice front by streams of melt water. In this county it consists of sediments, in many places sandy and gravelly, deposited in layers on terraces.

Parent material. The unconsolidated mass from which the soil profile has developed.

Percent slope. The slant or gradient of a slope stated in percent; for example, a slope of 10 percent is one that changes 10 feet in elevation for each 100 feet horizontal distance.

Permeability. The quality of a soil that enables it to transmit water or air.

Phase, soil. A subdivision of the soil type that differs from the type in such characteristics as relief, accelerated erosion, or stoniness.

Relief. The difference in elevation between the highest and lowest points in an area.

Renovation. Method of restoring pastures to higher productivity without causing excessive soil loss through erosion. The old sod is limed, and fertilizer is applied A seedbed is prepared by using a field cultivator or a disk to rip up the old sod; the area is then reseeded to a grass-legume mixture.

Sand. Small fragments of rocks or minerals that range in diameter from 0.05 mm. (0.002 in.) to 2.0 mm. (0.078 in.). The term sand is also applied to soils that contain 90 percent or more of sand.

Silt. Small mineral soil grains that range in size from 0.05 mm. (0.002 in.) to 0.002 mm. (0.000079 in.) in diameter.

Subsoil. Technically, the B horizon. Roughly, that part of the profile below plow depth.

Substratum. Material underlying the subsoil. It is below the zone of weathering.

Surface soil. The A horizon, or, commonly, the upper part of the profile that is stirred by plowing.

Topography. The lay of the land or the elevations or inequalities of the land surface as shown on a topographic map.

Type, soil. A subdivision of the soil series based upon the texture of the surface soil.

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Map symbol	Soil name	Topographic position	Depth to parent material or substratum	Internal drainage	Occurrence of high water table	Moisture-supplying capacity [1]	Erosion hazard	Special soil management problems [2]	Management group
			Inches						
Aa	Akan silt loam	High bottoms	18–36	Slow	Intermittent	High	Slight	Drainage; flood protection.	3D.
	Alluvial land:								
Ab	Moderately well drained	Flood plains	(3)	Medium	Intermittent	High	Slight	Drainage; flood protection.	3D.
Ac	Poorly drained	Flood plains	(3)	Very slow	Constant	High	Slight	Flood protection; drainage.	3F.
Ad	Arenzville silt loam	High bottoms	(3)	Medium	Occasional	High	Slight	Flood control	1A.
	Bertrand silt loam:								
Ba	Level to gently sloping	Terraces	42+	Medium	None	High	Slight	Fertility maintenance	1A.
Bb	Level to gently sloping, eroded.	Terraces	42+	Medium	None	High	Moderate	Fertility maintenance; erosion control.	2A.
Bc	Sloping, eroded	Terraces	42+	Medium	None	Moderate	Moderate	Fertility maintenance; erosion control.	3A.
Bd	Boaz silt loam	High bottoms	(3)	Slow	Occasional	High	Slight	Flood control; drainage	2D.
	Boone loamy fine sand:								
Be	Sloping, eroded	Valley slopes	12–28	Very rapid	None	Very low	High	Erosion control; fertility maintenance; droughtiness.	6B.
Bg	Steep, eroded	Valley slopes	(3)	Very rapid	None	Very low	High	Erosion control; droughtiness.	6B.
Bh	Steep, severely eroded	Valley slopes	8–24	Very rapid	None	Very low	High	Erosion control; droughtiness.	6B.
Ca	Carlisle muck	Depressions or seep slopes.	18–36+	Slow	Constant	Very high	Slight	Drainage; fertility maintenance.	3F.
	Chaseburg silt loam:								
Cd	Gently sloping	Colluvial slopes	24–30	Medium	None	High	Slight	Fertility maintenance	1A.
Ce	Sloping	Colluvial slopes	24–30	Medium	None	High	Moderate	Fertility maintenance; erosion control.	3A.
	Chaseburg fine sandy loam:								
Cb	Gently sloping	Colluvial slopes	22–28	Moderately rapid.	None	Moderate	Slight	Fertility maintenance	2A.
Cc	Sloping	Colluvial slopes	22–28	Moderately rapid.	None	Moderate	Moderate	Fertility maintenance; erosion control.	3B.
Cg	Curran silt loam	Terraces	42+	Slow	Intermittent	High	Slight	Drainage; fertility maintenance.	3E.
Db	Dakota loam	Terraces	26–38	Moderately rapid.	None	Moderate	Slight	Fertility maintenance; droughtiness.	2C.
Da	Dakota fine sandy loam	Terraces	26–38	Rapid	None	Moderately low.	Moderate	Fertility maintenance; erosion control; droughtiness.	3C.
	Downs silt loam:								
Dc	Gently sloping	Terraces	42+	Medium	None	High	Slight	Fertility maintenance; erosion control.	1B.
Dd	Gently sloping, eroded	Ridgetops	42+	Medium	None	High	Moderate	Fertility maintenance; erosion control.	2B.
De	Sloping, eroded	Ridgetops	42+	Medium	None	High	High	Erosion control; fertility maintenance.	3A.
Dg	Sloping, severely eroded	Terraces	42+	Medium	None	High	Moderate	Erosion control; fertility maintenance.	4B.

See footnotes at end of table.

SUPPLEMENT TO THE SOIL MAP: IMPORTANT CHARACTERISTICS OF THE SOILS OF RICHLAND COUNTY, WIS.—Con.

Map symbol	Soil name	Topographic position	Depth to parent material or substratum	Internal drainage	Occurrence of high water table	Moisture-supplying capacity [1]	Erosion hazard	Special soil management problems [2]	Management group
	Dubuque silt loam:		*Inches*						
Dn	Deep, gently sloping, eroded.	Ridgetops	18–42	Medium	None	High	Slight to moderate.	Fertility maintenance; erosion control.	2A.
Do	Deep, sloping, eroded	Ridgetops	18–42	Medium	None	High	Moderate	Erosion control; fertility maintenance.	3A.
Dp	Deep, steep, eroded	Ridgetops	18–40	Medium	None	High	High	Erosion control; fertility maintenance.	4A.
Dh	Gently sloping, eroded	Ridgetops	8–18	Moderately rapid.	None	Moderate	Slight to moderate.	Fertility maintenance; erosion control.	2A.
Dk	Sloping, eroded	Ridgetops	8–18	Moderately rapid.	None	Moderately low.	Moderate	Erosion control; fertility maintenance.	3A.
Dm	Steep, eroded	Ridgetops	8–18	Moderately rapid.	None	Low	High	Erosion control; fertility maintenance.	4A.
	Dubuque silty clay loam:								
Dr	Steep, severely eroded	Ridgetops	8–18	Moderately rapid.	None	Low	High	Erosion control	5A.
	Dubuque stony silt loam:								
Ds	Sloping, eroded	Ridgetops	6–18	Moderately rapid.	None	Moderately low.	Moderate	Erosion control; droughtiness.	5A.
Dt	Steep, eroded	Ridgetops	6–18	Moderately rapid.	None	Low	High	Erosion control; droughtiness.	6A.
Du	Very steep, eroded	Ridgetops	6–18	Moderately rapid.	None	Low	High	Erosion control; droughtiness.	6A.
Ea	Ettrick silt loam	High bottoms	[3]	Very slow	Intermittent	High	Slight	Drainage; fertility maintenance.	2D.
	Fayette silt loam, uplands:								
Fa	Gently sloping, eroded	Ridgetops	42+	Medium	None	High	Slight	Fertility maintenance; erosion control.	2A.
Fb	Sloping, eroded	Ridgetops	42+	Medium	None	High	Moderate	Erosion control; fertility maintenance.	3A.
Fc	Steep, eroded	Ridgetops	42+	Medium	None	High	High	Erosion control; fertility maintenance.	4A.
	Fayette silt loam, valleys:								
Fd	Sloping, eroded	Valley slopes	42+	Medium	None	High	Moderate	Erosion control; fertility maintenance.	3A.
Fe	Steep, eroded	Valley slopes	42+	Medium	None	High	High	Erosion control; fertility maintenance.	4A.
Ga	Gotham loamy fine sand	Low terraces	41+	Rapid	None	Moderately low.	Moderate	Erosion control; fertility maintenance; droughtiness.	4C.
	Hixton loam:								
Hd	Sloping, eroded	Valley slopes	24–30	Moderately rapid.	None	Moderate	Moderate	Erosion control; fertility maintenance.	3A.
He	Steep, eroded	Valley slopes	22–28	Moderately rapid.	None	Moderate	High	Erosion control; fertility maintenance.	4A.
	Hixton fine sandy loam:								
Ha	Sloping, eroded	Valley slopes	20–30	Moderately rapid.	None	Moderate	Moderate	Erosion control; fertility maintenance; droughtiness.	3B.
Hb	Steep, moderately eroded.	Valley slopes	18–26	Moderately rapid.	None	Moderate	High	Erosion control; fertility maintenance; droughtiness.	5B.
Hc	Very steep, eroded	Valley slopes	24+	Rapid	None	Moderate	High	Erosion control; droughtiness.	6A.
Ja	Jackson silt loam	Terraces	42+	Moderately slow.	Intermittent	High	Slight	Fertility maintenance	1A.

Jb	Judson silt loam: Gently sloping	Colluvial slopes	44+	Medium	None	High	Slight	Fertility maintenance; erosion control.	1B.
Jc	Sloping	Colluvial slopes	30+	Medium	None	High	Moderate	Erosion control; fertility maintenance.	2B.
La	Lawson silt loam	Bottom lands	42+	Medium	Occasional	High	Slight	Protection from floods	1B.
Ma	Medary silt loam	Terraces	30–42	Slow	None	High	Slight	Fertility maintenance; control of surface water.	3E.
Mb	Meridian fine sandy loam: Nearly level	Terraces	24–36	Moderately rapid.	None	Moderate	Slight	Fertility and organic matter maintenance; droughtiness.	3B.
Mc	Sloping, eroded	Terraces	22–32	Moderately rapid.	None	Moderate	Moderate	Fertility maintenance; erosion control; droughtiness.	4C.
Md	Steep, eroded	Terraces	20–28	Moderately rapid.	None	Moderately low.	High	Erosion control; droughtiness.	5B.
Nk	Norden silt loam: Sloping, eroded	Valley slopes	24–36	Medium	None	Moderate	Moderate	Fertility maintenance; erosion control.	3A.
Nm	Steep, eroded	Valley slopes	24–34	Medium	None	Moderate	High	Erosion control; fertility maintenance.	4A.
Nd	Norden loam: Sloping, eroded	Valley slopes	22–34	Medium	None	Moderate	Moderate	Fertility maintenance; erosion control.	3A.
Ne	Steep, eroded	Valley slopes	20–30	Moderately rapid.	None	Moderate	High	Erosion control; fertility maintenance.	4A.
Ng	Very steep, eroded	Valley slopes	(3)	Moderately rapid.	None	Moderately low.	High	Erosion control	6A.
Na	Norden fine sandy loam: Sloping, eroded	Valley slopes	22–34	Medium	None	Moderate	Moderate	Fertility maintenance; erosion control.	3B.
Nb	Steep, eroded	Valley slopes	22–32	Medium	None	Moderately low.	High	Erosion control; fertility maintenance; droughtiness.	5B.
Nc	Very steep, eroded	Valley slopes	20–30	Moderately rapid.	None	Low	High	Erosion control; droughtiness.	6A.
Oa	Orion silt loam	Bottom lands	18–36	Medium	Intermittent	High	Slight	Protection from floods	1A.
Pa	Plainfield loamy fine sand: Nearly level, eroded	Low terraces	18–24	Very rapid	None	Very low	High	Control of wind erosion; fertility maintenance; droughtiness.	4C.
Pb	Sloping, eroded	Low terraces	18–22	Very rapid	None	Very low	High	Control of wind erosion; fertility maintenance; droughtiness.	6B.
Pc	Steep, eroded	Low terraces	16–20	Very rapid	None	Very low	High	Control of wind erosion; droughtiness.	6B.
Ra	Riverwash	Stream bottoms	(3)	Very rapid	Intermittent	Very low	Slight	Control of streambank erosion; floods; droughtiness.	6B.
Rb	Rockbridge silt loam: Sloping, eroded	High terraces	24–36	Medium	None	High	Moderate	Erosion control; fertility maintenance.	3A.
Rc	Steep, eroded	High terraces	22–34	Medium	None	High	High	Erosion control; fertility maintenance.	4A.
Sc	Sparta loamy fine sand	Low terraces	20–30	Very rapid	None	Very low	High	Wind-erosion control; fertility maintenance; droughtiness.	4C.
Sa	Sparta fine sand, hummocky.	Low terraces	16–24	Very rapid	None	Very low	Very high	Wind-erosion control; fertility maintenance; droughtiness.	6B.
Sb	Eroded	Low terraces	10–24	Very rapid	None	Low	Very high	Wind-erosion control; droughtiness.	6B.

See footnotes at end of table.

SUPPLEMENT TO THE SOIL MAP: IMPORTANT CHARACTERISTICS OF THE SOILS OF RICHLAND COUNTY, WIS.—Con.

Map symbol	Soil name	Topographic position	Depth to parent material or substratum	Internal drainage	Occurrence of high water table	Moisture-supplying capacity [1]	Erosion hazard	Special soil management problems [2]	Management group
			Inches						
Sd	Stony land: Steep	Uplands	0–18	Rapid	None	Moderately low.	High		6A.
Se	Very steep	Uplands	0–18	Rapid	None	Moderately low.	High		6A.
Ta	Tell silt loam	Terraces	24–36	Medium	None	Moderate	Slight	Fertility and organic matter maintenance; droughtiness.	2A.

[1] Ability of a soil to hold enough available water to meet the normal requirements of the plants commonly grown.
[2] The most important management problem listed first.
[3] Variable.

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